



Empowerment and Capacity Building

Recovery Lessons from an Earthquake in China

*Alice Chang, Regan Potangaroa, Suzanne Wilkinson, Erica Seville, Kelvin Zuo
from the Resilient Organisations Research Team*

On 12 May 2008 an earthquake measuring 8.0 on the Richter scale struck Western China's province of Sichuan and its neighbours, killing 69,266 people, injuring 374,643 people and leaving 17,923 people missing (as of noon, 11 September 2008).

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The town of Beichuan in December 2008, six months after the earthquake in Sichuan province

The earthquake caused widespread destruction to buildings and infrastructure. Approximately 34,125 kilometres of highways, 1,263 reservoirs, 7,444 schools, 11,028 medical institutions and numerous urban structures, rural residences and factories were devastated by the earthquake with direct economic losses reaching RMB\$843.77 billion (State Planning Group of Post-Wenchuan Earthquake Restoration and Reconstruction, 2008). The subsequent persistent heavy rains and numerous aftershocks further compounded the situation, leading to a large number of secondary hazards such as landslides, landslips, mud-rock flows and “quake lakes”.

According to the China Earthquake Administration (2008), the earthquake originated on the Longmenshan fault. The energy source of the Wenchuan earthquake and Longmenshan’s southeast push came from the crush of the Indian Plate onto the Eurasian Plate and its northward push. The inter-plate relative motion caused large-scale structural deformation inside the Asian continent, resulting in a thinning crust of the Qinghai-Tibet Plateau, the uplift of its landscape and an eastward extrude. Near the Sichuan Basin, Qinghai-Tibet Plateau’s east-northward movement met with strong resistance from the South China Block, causing a high degree of stress accumulation in the Longmenshan thrust formation, which finally caused a sudden dislocation in the Yingxiu-Beichuan fracture, leading to the violent earthquake of M8.0.

In the days following the disaster, many domestic and international reconnaissance teams of engineers made detailed preliminary surveys and assessment of damaged buildings. The findings showed a variety of reasons for the failure of structures to withstand the earthquake. Besides the distinctive mountainous topology and seismicity, another major issue attributable to construction failure was the construction method used in the damaged region. Due to local custom, brick masonry was the predominant type of construction in Sichuan Province, particularly used for housing in rural and mountainous terrain areas. Construction defects including poor-quality cement and bricks, an improper concrete-making operation, insufficient drawings, scant attention to building codes, and lack of seismic-resistant structures and qualified skilled construction staff were primarily responsible for structural collapses and damage during the earthquake.

RECOVERY

After the earthquake, the emergency response was impressively rapid and decisive with enormous effort focused on rescue and resettlement. The People’s Liberation Army (PLA) played a significant role in searching, rescuing, repairing access and maintaining order. The State Council quickly established an Earthquake Rescue and Relief Headquarters providing the fundamental principles and priorities for resuming the livelihoods and physical environment of 51 counties in the 132,596 km² affected region and its 20 million residents (US Earthquake Engineering Research Institute, 2008). The General Coordinating Office for Earthquake Relief in each affected municipal area was established to organise and coordinate relief work of the army, police, medical staff, non-governmental agencies and other social assistant individuals or groups.

The State Council took swift legislative action to establish a multi-governmental management framework for the recovery endeavour. The *Regulations on Post-Wenchuan Earthquake Restoration and Reconstruction*¹ sets guidelines for the reconstruction and provides an important legal ground for various departments and government agencies, both inside and outside the quake-hit region, to assist with recovery and reconstruction.

As a supplementary policy to aid the full implementation of the regulations, *One-on-One Assistance Program for Wenchuan Post-earthquake Restoration and Reconstruction* became a key constituent of China’s post-disaster management framework. The earthquake-stricken areas of Sichuan, Gansu and Shaan-xi provinces were divided into 24 districts and twinned with 24 relatively developed localities across China. For instance, the historical tourist city Dujiangyan is sponsored by Shanghai municipality and the well-known industrial city Mianzhu is assisted by Jiangsu province in China’s developed east coast. Sister localities have been tasked over the next three years with funding 1% of their GDP, provision of human resources and temporary housing units, and in-kind support from planning institutions and other departments in association with disaster reconstruction.

Many recovery programmes at local level aimed specifically at livelihood issues have been effective in addressing employment needs and community capacity with a view to restoring the normal living conditions of the stricken community in a short time (Photo 1).

1 Came into effect on 4 June 2008.



Photo 1: With livelihood and public facilities returning to normal, post-earthquake, children play in Beichuan 'Hope Primary School' established by the Chinese Academy of Sciences.

RECONSTRUCTION

The guarantee of people's well-being was deemed the fundamental issue in post-Wenchuan earthquake restoration and reconstruction. The top priority was, therefore, given to repairing and rebuilding urban and rural residential houses and restoring public facilities and infrastructures, to ensure the resettlement, stability and reassurance of the affected population (Photo 2).

Three months after the earthquake a comprehensive reconstruction plan, *The State Overall Planning for Post-Wenchuan Earthquake Restoration and Reconstruction*, was developed in partnership with all parties involved and was released for public review. As the recovery steps entered into an overall rebuilding stage, the role and responsibilities of the Chinese Government have shifted to technical support and supervision of reconstruction implementation with less administrative intervention.

One of the most pressing challenges is to ensure higher seismic standards and construction quality in rebuilding in order to minimise vulnerabilities of buildings to future disasters. In rural areas, a capacity building programme combined with a targeted monetary incentive campaign was initiated locally to integrate disaster risk reduction into the reconstruction process. The local government organised experienced engineers and technicians to advise and provide training on safe rebuilding. Picture books, simplified construction guidelines, checklists, and

on-site demonstrations and inspections were provided to house-owners to convey the knowledge of disaster risk mitigation and to change the prevailing construction practices. RMB\$16,000 subsidies were only granted to rural households on the premise of better understanding and compliance with construction standards. Likewise, in urban areas, a 'filing system' was launched by local government. Only when drawings and schemes for rebuilding or retrofit were provided, were subsidies varying from RMB\$1,000 to RMB\$8,000 given to the household in need.

The 'One-on-One Assistance Program' featured prominently in the reconstruction, through assistance with rebuilding infrastructure such as roads, water and sewage, electricity, and broadcasting, as well as public buildings such as schools, hospitals, clinics, and key sectors of the economy, such as tourism and production facilities. Sponsor localities and their local reconstruction counterparts have been communicating and cooperating. As winter drew near, reconstruction works were accelerated in some quake-hit areas where local officials had promised that no people in the quake-hit area would live in the makeshift tents during the wintertime. The time pressure had been best met before Chinese traditional New Year through partnerships between government institutions and communities.

At the early stage of reconstruction, most material production institutions were still in a paralysed state, which created a disproportionate imbalance between construction material demand and supply, resulting in soaring price escalations. The most needed resources were bricks, cement and aggregate with 127%, 30%, and 125% rate increases respectively thus far.² Precipitous wage increases of local labourers also served to undermine the sustainability of the reconstruction trade market. A consortium of government interventions and price limitation policies including setting maximum rates, profit control for material retailers, designating production supply, and assigning inspectors to monitor selling prices, have, to some extent, helped the reconstruction effort.

LESSONS FOR NEW ZEALAND

It is widely acknowledged that China coped with this large-scale natural disaster well and effectively, and efficiently dealt with relief and recovery in the aftermath of the Wenchuan Earthquake. Nevertheless, many of the challenges that faced the Chinese Government and reconstruction practitioners

² Price contrast between in pre-earthquake April 2008 and in post-earthquake February 2009.

are still visible. The coordination problems among different players and imbalance between Government's macro-control and market self-regulation remain a serious concern.

There are lessons to be drawn from the disaster for both China and international society. There is a need for speed and efficiency in relief work, a need to build a strong organisational structure to deal with reconstruction, and a need to keep social communities fully involved in planning and implementing reconstruction throughout all post-disaster stages.

Central policy planning with a decentralised mechanism to ensure decision making and involvement of all players and implementation of the recovery plan made recovery relatively smooth. The special powers from all parts of government, across different sectors, at national, provincial and county levels were consistent. Statutory procedures were circumvented using a 'Green Lane' open routine.

The *Regulations on Post-Wenchuan Earthquake Restoration and Reconstruction* set the legal requirements for reconstruction. The appropriate legal system in line with a series of policy changes for recovery made effective coordination and delivery of reconstruction works possible.

The sustainable reconstruction process was well planned and implemented with a wide variety of community participatory approaches that incorporated hazard mitigation and risk reduction measures into a holistic reconstruction framework.

The Wenchuan Earthquake recovery and reconstruction serves as an example of success in what was a disastrous and complex environment. Further study of this recovery and reconstruction should be capitalised upon by New Zealand in order that the potential for improving our own recovery, reconstruction and community resilience can be realised if New Zealand faces a similar disaster.

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Photo 2: Traditional cultural features were integrated into the reconstruction design and building.

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