



OBSERVATIONS AND SUGGESTIONS

Asian Development Bank

Resident Mission in the PRC

INTERNATIONAL EXPERIENCES AND SUGGESTIONS ON POST-DISASTER REHABILITATION AND RECONSTRUCTION

A. Purpose of the note

1. The Government of the People's Republic of China (PRC), through its National Development and Reform Commission (NDRC), has requested further ADB assistance to summarize international experiences and good practice in situations similar to that which PRC is currently experiencing as a result of a great earthquake¹ that struck Sichuan Province on 12th May 2008. This note examines recent large-scale disasters in India, Indonesia, Japan, Turkey, and the United States (see appendix 1 for disaster sketches) and focuses on generic issues pertaining to urban development, rural and urban housing construction, infrastructure construction, livelihood rehabilitation, spatial planning (land use), and disaster prevention.

B. Comparative analysis of the earthquake and its relative significance

2. It is appropriate to place the Sichuan earthquake into perspective, both within PRC and in a global context. In a typical year, up to 200 million people are affected by natural disasters in PRC, and 40 million hectares of crops are damaged. The average annual economic impact from disasters is about 100 billion Yuan (\$14.5 billion). While PRC has experienced at least 3,200 destructive earthquakes since BC1931, many of which have resulted in substantial death and destruction, it is typhoons with their heavy rain, strong winds, storm surges and concomitant flooding that cause more casualties and property loss overall than any other kind of natural hazard in PRC,² even though earthquakes have accounted for 54% of natural disaster deaths since 1949. Table 1 provides a comparative analysis using the number of people affected in recent natural disasters in PRC.

¹ Earthquakes are often classified into different groups based on their size (refer footnote 4). An earthquake is designated 'great' if it has a magnitude of 8 or more. On average, the global occurrence of a great earthquake is one a year.

² On an average, the South China Sea and Taiwan Strait are hit by severe storms up to 160 days a year.

3. The Sichuan earthquake has been described by PRC Government officials as the most destructive and widespread earthquake and has posed the most difficulty since the PRC was founded in 1949.³ The event was an M8 earthquake (with an intensity⁴ of 11 at the epicenter) in Sichuan Province. This earthquake resulted in 69,146 known deaths, an additional 17,516 persons still missing, and 374,131 injured.⁵ The earthquake caused an estimated direct economic loss of 400-500 billion Yuan (\$58-73 billion)⁶, affected an area of 100,000 square kilometers, displaced up to 15 million people, affected 46 million people overall, severely damaged or collapsed approximately 20 million buildings, damaged over 47,000 kilometers of highway and other critical infrastructure including 69 dams that are in danger of collapse; and created major secondary impacts including the creation of large and unstable 'quake lakes'⁷ and possible hazardous materials leakage.

Table: Recent natural disasters in People's Republic of China

Year	Hazard event	Impact
1991	Typhoon/Flood	210 million people affected
1994	Severe weather/Flood	78 million people affected
1994	Drought	80 million people affected
1998	Typhoon/Flood	200 million people affected
2002	Drought	60 million people affected
2002	Typhoon/Flood	200 million people affected
2002	Typhoon/Flood	60 million people affected
2003	Typhoon/Flood	150 million people affected
2004	Typhoon/Flood	33 million people affected
2006	Typhoon/Flood	29 million people affected
2006	Drought	18 million people affected
2008	Snowstorm	'tens of millions'
2008	Earthquake	46 million people affected

Source: Estimates compiled from various sources

4. Each disaster is different and impact lessons can not be automatically transferable. This is particularly the case when transmission is from one cultural and/or economic setting to another. Hence it is difficult to draw universal lessons on recovery following large-scale disasters: the significance of this point must not be underestimated. There are, however, some conclusions that seem to apply in various cases. Before identifying these, it is important to recognize that the Sichuan earthquake has distinctive characteristics that might make

³ People's Daily online, 14th June, 2008.

⁴ Earthquake magnitude (M) is a quantitative measure of the wave amplitude an earthquake generates, and hence is a measure of its size. An increase in M by 1.0 implies 10 times higher waveform amplitude and about 31 times higher energy released. Earthquake intensity is a qualitative measure of the actual shaking at a location during an earthquake, and are typically based on three features: (i) perception by people and animals; (ii) performance of buildings; and (iii) changes to natural surroundings.

⁵ Figures cited in *Updates about May 12th Earthquake and Suggestions for Cooperation*. NDRC fax addressed to ADB PRC Resident Mission. 1 June 2008.

⁶ Figures reported in the *Financial Times*, 18th June 2008. Despite the high figure, the overall negative impact on the Chinese economy is expected to be minimal. About 1% of PRC's population live in the affected area, which accounts for 4% of the national GDP, with industrial output accounting for 2.5% of the national total. More likely, expected reconstruction projects will provide a significant economic boost that could spread beyond the damaged region, and could even include an upgrade of infrastructure across PRC's economy. See also footnote 13.

⁷ A lake formed when an earthquake causes landslides that block a river and forms a temporary unstable dam, and which can create flash floods if they collapse, often from aftershocks (over 11,000 aftershocks have been recorded to date). Thirty-five quake lakes have formed following the earthquake. Historically, quake lakes have been a major cause of death in PRC: over the last century 5,500 people have been killed following quake lake bursts, and in 1786 a landslide dam formed by a large earthquake in Sichuan collapsed 10 days later killing 100,000 people.

comparative analysis problematic, and which could make the application of lessons from other disasters difficult. Some of the unique attributes are:

- *Scale of the task:* Compared to disasters elsewhere, the size of the event in terms of area affected (about the size of South Korea), number of victims requiring resettlement (more than the population of Spain) and the overall number of people affected (more than the population of Canada), may place this event as amongst the largest disaster impacts in human history. The significance of this is that the scale of the reconstruction tasks is unprecedented, which could render some contrasts pointless. In essence, the Sichuan earthquake has created a new order of magnitude of disaster recovery.
- *Inland, mountainous location:* Heavily populated areas impacted by severe disasters have not typically been inland or in mountainous terrain (most densely populated areas are on or near coasts). The location of this earthquake may create new logistical and recovery issues that have not hitherto been dealt with or thought through.
- *Rapidity of decision-making:* The PRC Government swiftly decided upon several courses of action that has shaped both response and recovery: in fact, when compared to the comparator disaster events, key decisions have not only been prompt but also, at least to date, are rapidly being carried out⁸. For example, within 10 days of impact, the PRC Government had instructed all central government departments to cut FY2008 expenditure by 5% to help finance reconstruction efforts⁹. The disaster literature indicates that capacity of policy makers to react quickly is important, as speed of response is a key for restoring market confidence and contributing to a feeling that pressures faced may be temporary.
- *Pace of reconstruction:* The intention of the PRC Government is to restore all basic living and production conditions, including the relocation and construction of a new city,¹⁰ reconstruction of over 47,000km of highways, national and rural roads, over 5,500 bridges and 110 tunnels,¹¹ within 3 years (by 2010), and rebuilding of the medical system by the end of December 2008;¹² and with overall coordinated sustainable redevelopment by 2015; that is, within 8 years.¹³ If these targets are achieved it will, once again, be unprecedented especially given the scale of activities¹⁴.
- *Decision to relocate entire communities:* The county seat of Beichuan was 70% destroyed by the earthquake. A similar situation confronted the city of Darwin (Australia) following its almost complete destruction after tropical cyclone Tracy's landfall on Christmas Day, 1976. The Government of Australia decided against relocation, but instead temporarily removed all survivors to cities throughout the country in what was Australia's largest single internal migration until the city was rebuilt. Beichuan, on the other hand, has been rendered unsalvageable in the eyes of the PRC authorities and will be rebuilt 35 kilometers away. History is filled with examples of major urban earthquakes, but a repeated observation is

⁸ Nonetheless, preparedness and response measures require major overhaul since many aspects were found wanting. The rapid response may in part be central government's acknowledgement of the overall poor state of disaster planning, coupled with recognition of the credibility crises that USA and Myanmar central administrations (following hurricane Katrina and typhoon Nargis, respectively) found themselves in: in both cases all levels of government failed and no responsible decision-maker escaped severe condemnation.

⁹ This can be contrasted with the USA where it took a year for the Bush Administration to approve a \$10 billion grant to assist flooded-out homeowners following hurricane Katrina. *The Economist*, 25th August, 2007.

¹⁰ People's Daily. *Experts choose site for quake-leveld county*. 11th June, 2008.

¹¹ Xinhua News Agency. *China to rebuild main roads in quake zone within 3 years*. 13th June, 2008.

¹² Xinhua News Agency. *China aims to rebuild medical system in quake zone by year-end*. 17th June 2008.

¹³ Cited in *Updates about May 12th Earthquake and Suggestions for Cooperation*. NDRC fax addressed to ADB PRC Resident Mission. 1 June 2008.

¹⁴ Following the earthquake in 1995, Kobe (Japan) took nearly a decade to economically recover and 11 years for the population to recover to pre-earthquake levels.

that damaged cities are almost always rebuilt on the same site rather than relocated to safer territory. The relocation of a city after an earthquake is not a simple concept.

5. Against this background, the Sichuan earthquake also shows evidence of similarities with other large-scale disaster impacts. The parallels include the following:

- *Minimal long-term economic effect.* As a rule, large-scale disasters have limited effects at the aggregate level. While disasters destroy physical capital and reduce the national stock of wealth, this impact is normally small on a national scale. And while disasters reduce the number of jobs and lower economic activity in the short-term as a reflection of damages to local businesses, loss of lives and out-migration, the resultant reconstruction, resettlement and recovery activities can actually boost activity and increase GDP growth. In PRC, spending in the earthquake-hit areas may dwarf the economic cost of the disaster¹⁵, and the impact of the earthquake on the full-year economic and industrial production could be very limited. This is partly because the disaster area is not a PRC economic powerhouse.
- *Disasters fast-track current social and economic trends:* Disasters do not create new social or economic dimensions, but they do accentuate existing patterns. For example, if the impacted community is exhibiting an overall economic downturn and out-migration, or if a specific industry sector is in decline; or conversely if a community is undergoing economic expansion and in-migration, disaster impact is likely to propel the trends. The same effect has been observed in disaster victims: individuals and families tend to re-commit themselves if they were previously upbeat about their locale, or alternatively disaster will reinforce feelings of ambivalence and reinforce decisions to move. Assuming economic trend analyses and census figures have been kept, some predictions could be made for Sichuan. At the national level, the earthquake will intensify PRC's current huge demand for raw materials such as cement, steel and petroleum, and raise the prospect of more upward pressure on global commodity prices.
- *Compensation issues are critical for social rehabilitation:* Disasters produce both winners and losers, but who wins and who loses is a result of public policy decisions. While all disaster victims are losers as a result of being injured, or lost jobs, family members, homes, or a sense of purpose, some may also be *comparative losers* because decisions about who should receive assistance, and for what, may go against them. Those who are favored by these decisions are winners. These decisions are often random or decided inappropriately, and typically exacerbate social rehabilitation problems. In Sichuan, this situation has manifested itself in parents of school-aged children killed in what appears to be an extraordinarily high number of school building collapses and who feel they are not being given fair treatment by authorities.
- *Wait for a disaster and then act:* The disaster literature abounds with examples of decision- and policy-makers at all levels of government failing to implement essential public safety measures, and then avoiding accountability when failure inevitably occurs. The PRC appears to be no different: as recently as August 2006, in a keynote speech to mayors at a China Mayors' Association forum on urban development, Vice-Premier Zeng Peiyan warned that many municipal governments are weak in urban management and disaster prevention, and exhorted mayors to

¹⁵ The *Financial Times* (18th June 2008) cites a State Information Center report indicating reconstruction would add 0.3% to PRC's growth rate; direct losses would slow growth by 0.1% but investments resulting from the earthquake will add 0.4%.

abandon “blind expansion of cities” and to focus on increasing disaster preparedness and prevention.¹⁶ The apparent failure to adhere to building codes for public buildings such as schools supports the Vice-Premier’s statement. A related issue is that while many urban structures are modern and presumably built to a relatively high standard¹⁷, building management has lagged behind in terms of standard operating procedures for emergencies. At the national level, the National Plan for Comprehensive Disaster Reduction¹⁸ identifies inadequate comprehensive legislation as one of several major weaknesses. As in other nations, this recent disaster has identified past failures to act on known facts, readily available information, and existing hazard mitigation directives.

C. International experiences

6. Of all the phases of disaster management, recovery is the least researched and the most ill-defined in terms of policies, authorities, processes and plans. Disaster management in general has evolved largely in response to disastrous events, but the recovery phase, in particular, has largely developed on an ad-hoc basis, as decisions are made and solutions developed to deal with unique situations in the aftermath of impact. Most countries have had very little experience with major disasters and ‘hands-on’ experience is based on smaller, less complex impacts: however, policy measures for a small-scale disaster may be inappropriate or even counter-productive when losses are significant, and when strategic questions are raised about what should be rebuilt and where. In the compilation that follows, insights are gleaned from individual disasters, wherein the letters in brackets [] indicate the specific disaster: [A] = Aceh, Indonesia [G] = Gujarat, India [K] = Kobe, Japan, [M] = Marmara, Turkey [N] = New Orleans, USA (refer appendix 1). In addition, specific lessons from the 2004 Indian Ocean Tsunami that affected several Asian nations and ADB’s own reflections supporting the reconstruction effort in Aceh can be found in appendix 2.

Recovery in general

- As rebuilding activities proceed, inter-governmental issues become more evident: state and local governments need federal assistance, but the multiple layers of bureaucracies cause delays and added complications through factors such as inexperienced and overworked staff, the necessity for fraud prevent measures, and the characteristics peculiar to the workings of each governmental structure [A, G, I, N].
- If no consideration for mass re-development has taken place prior to impact, post-disaster planning can be a protracted activity. In New Orleans, recovery planning culminated 17 months after impact when a plan was finally adopted. In Kobe it took 6 months (the recovery plan was adapted from the city’s 1995-2005 General Plan, formally approved 4 days prior to impact; however there was no clear policy guidance to accomplish them and many economic recovery programs were ill-timed and ill-matched to the needs of businesses trying to recovery amidst a prolonged slump in the Japanese economy) [K].
- Given its experience of construction following disasters and war, it is almost second nature for Japanese authorities to come up with urban planning projects when disaster strikes. It is, however, doubtful whether it was wise to lay out a plan without

¹⁶ China Daily. *Experts urge urban emergency spending*. 23rd August 2006.

¹⁷ It must be noted that with regard to natural hazards such as earthquakes, building codes in the PRC (as in other countries such as the USA) dictate *minimum levels of safety* for constructed buildings.

¹⁸ *National Plan for Comprehensive Disaster Reduction During the “Eleventh Five-Year Plan” Period of the People’s Republic of China*. China National Committee on Disaster Reduction. 2007.

- informing the impacted population and to forcibly decide on it, neglecting claims or opinions from those people [K].
- Citizen participation is indispensable for successful recovery, and local leadership is essential [A, K], but getting buy-in to proposed recovery options is difficult when the population is dispersed after impact, hence comprehensive communications programs are critical for building public support [N].
 - Short-term economic recovery is driven largely by recovery of the predominant industries prior to impact [K, N].
 - Recovery investments can be hampered, or even undermined, by two key risks: uncertainty in the population return, and the need for enhanced disaster risk protection systems [N].
 - Local government authorities made it clear that they did not recognize compensation for individuals and did not make any demands to the national government for that. Instead they prioritized infrastructure reconstruction: as a result, while the port was rebuilt quickly, shipping volumes and the facilities are still below full capacity [K].
 - The number of bankruptcies in 1995 and 1996 was lower than in any ordinary year because of the recovery of loans supported by the government. Nevertheless, the number of bankruptcies increased rapidly in 1997. Also, the economic situation was so severe that the growth rate became negative two years after the disaster [K].
 - Delayed aid, in turn, delays recovery. The level of finger-pointing from one layer of government to another that began with the failures of the immediate disaster response has continued and increased throughout the recovery phase [N].
 - Recovery has stalled and hampered developers seeking to renovate and rebuild affordable housing, leading to an estimated doubling of the city's homeless population and making it difficult for business owners to hire an adequate number of employees [N].
 - Too much funds and too many implementers can cause major problems and waste. The unprecedented impact of the tsunami resulted in a "second tsunami" of aid. Its chaotic delivery resulted in waste, overlap, and even dysfunctional programs/efforts. No-one expected such an outpouring of goodwill, thus the major players that moved in quickly had stand-alone projects with no provision for collaborative work [A].
 - The discrepancy between pledged and actual funds can be significant; and problems can arise if recovery programs are based on the former. It appears that the 3-year budget was a grossly overstated "pledged budget" that far exceeded actual disbursements as donor fatigue set in and many programs turned out to be unsustainable and wasteful [A].
 - Lack of local capacity can be a limiting factor that has to be dealt with first and foremost – Aceh had special problems even before the tsunami. The 25-year conflict resulted in: (i) serious risk aversion among banks and other potential financial institutions (e.g., cooperatives); and (ii) lack of product knowledge and skills to deal with the microfinance market, which is now found to be a viable and lucrative market elsewhere. Capacity-building is a necessary initial step prior to the provision of financial assistance [A].
 - Place emphasis on "developmental" rather than "emergency" response irrespective of the size of disaster being dealt with. ADB's Indian Ocean tsunami assistance was properly designed to emphasize recovery and developmental rather than the emergency mode because it anticipated that government and international assistance would provide the emergency response [A].

Urban development

- The recovery plan fails to address the critical issue of what to do about rebuilding in the high at-risk areas of the city, thereby leaving residents without crucial information they need to make a decision about how to rebuild or even whether to return. As a result, pockets of rebuilding are springing up in a scattered fashion, further straining limited city services [N].
- Local governments requested financial assistance from central government to assist demolition of damaged structures, fearing that disposal would not proceed smoothly. The Self Defense Force cooperated with municipalities in debris handling [K].
- Ownership status of the land and housing units must be clear, and complete with legal documentation to avoid any dispute and complications in the future. Land rights must be restored even prior to housing construction to remove the threat of occupation by others during displacement of the affected population [A].
- The private sector has a fundamental role to play in recovery. Reconstruction authorities at all levels should engage private sector assistance and expertise to promote both growth and equity. Immediate attention needs to be focused on rebuilding critical facilities that can restore local livelihoods [A].
- Many donors and NGOs focused on the provision of housing and not the associated infrastructure. This is in part understandable, given that villagers have indicated their primary need is housing. However, much housing construction proceeded without the provision of basic services (water supply, drainage, sanitation, power and lighting, roads, and solid waste disposal). The community-based approach to housing development does not lend itself easily to the provision of a coordinated network of primary and secondary services managed by local government and utilities. Authorities and donors need to ensure that a systematic and coordinated plan, linking settlements with infrastructure networks including water and sanitation, drainage, and roads is developed and retrofitted for housing or settlements already constructed [A].

Rural and urban housing construction

- Without sufficient housing, workers and their families can't return. Without workers businesses cannot reopen in any great number. Without businesses and their employees, communities will continue to struggle financially and remain dependent on state and federal government handouts [N]. By contrast, in Kobe ten years of public housing supply was completed in less than three years, which led to a significant local economic slump [K].
- Rebuilt housing should be sited where it is needed, not just where space is available [A, K]. Temporary housing was built in remote areas, taking several hours to get there; and communities were fragmented because relocated people were dispersed. Had there been assistance for temporary repairs and the construction of private temporary housing on private lots, residents would not have had to leave their original town and the local communities would not have been fragmented. Support centers and community associations (which require funding support) played an important role in countering these effects [K].
- Since the period during which people could receive aid was limited to one year, people were driven into demolition; in the process a lot of repairable houses were scrapped in the rush to receive aid [K].
- The large number of housing units spread out over an extensive geographic area and requiring either relocation or in-situ rehabilitation, contributed to implementation

- problems. Differences in how severely villages were affected also contributed to the development of different options for rebuilding [G].
- In villages that suffered over 70% of building collapse or severe damage, the entire village was moved to a nearby location and rebuilt entirely. Fifty-two villages were relocated. The government managed the rebuilding and construction. For the 80% of villages requiring reconstruction, repair or strengthening, beneficiaries chose whether to rebuild or strengthen an existing structure. Beneficiaries also decided construction techniques and materials and managed the construction process. Junior engineers assigned to work with beneficiaries at the village level, supervised design and construction, thereby establishing a comprehensive means of imparting seismic design concepts to owners, artisans and engineers [G].
 - Housing reconstruction programs revolve around many issues, one of which is the appropriate identification of the victims. Four groups of housing victims were identified: (i) households that completely lost their houses and their land; (ii) houses that were non-repairable and needed to be rebuilt; (iii) tenants who lost the accommodation they were renting; and (iv) squatters who lost their temporary shelters. To accommodate the different beneficiary groups, authorities issued four guidelines as part of the Housing Settlement framework between March and May 2006 to provide a uniform mechanism for all actors involved [A].
 - Price hikes of over 200% for building materials and the lack of quality supplies added a further burden, and in most cases reduced target achievement by up to 50%. Serious efforts have been also made to ensure all timber used is procured from legal and sustainable sources. Many houses have already shown signs of severe degradation due to untreated and weak quality timber used [A].
 - The overall challenge still remains that of building houses with high quality and anti-seismic standards¹⁹. This has been lacking in several projects for both community and contractor based construction. Several actors have failed to maintain high monitoring and evaluation standards which has resulted in weak and non-durable houses. Some recent houses have become uninhabitable prior to the beneficiary occupying the premises. The ability to build a quality settlement is the primary goal in the coming months and years [A].

Infrastructure construction

- Recovery can be hampered by limited federal and state funding for public infrastructure and facility repairs, and lack of flexibility in applying available funds to match local needs [N].
- Infrastructure was restored in two years, which at the time, was astonishingly fast, but at the expense of economic and social recovery, which is still underway after 13 years [K]. 92% of the \$80 billion provided by the national government went into infrastructure and public facility repair and only 8% into support for people's well-being. In hindsight, this investment ratio not only almost crushed the local economy but failed to recognize the support needed for rebuilding the social component [K].
- Lifeline networks (such as gas, water, electricity) are constructed hierarchically, with higher-order facilities relatively earthquake-resistant, but it is difficult to do the same with most lower-order facilities. Destruction of facilities in lower layers, such as pipes, may paralyze the entire system. When implementing preventive measures it is important to undertake it for the entire system [K].

¹⁹ For the Indonesia context houses should be built to withstand at least M7.0 events as determined by ADB housing experts.

- Reliability has been improved by measures such as adding redundancy to the system (loop system), constructing backup systems, and dividing lower networks into blocks to disconnect damaged networks from the entire system [K].
- Since different lifelines are buried under the same roads and understanding of damage and recovery operations tend to be complex, road managers play a great role in coordination. Roles expected of coordinators include centralized information sharing with residents, common use of resources including personnel from different organizations, and the hosting of comprehensive disaster prevention exercises with individual organizations [K].
- The socialization of the benefits of access to adequate water supply and access to sanitation facilities is an ongoing priority as major reconstruction projects include them but communities tend to disregard them. In some cases, facilities have been built without the required connections which render the service unusable such as in the case of communal washing facilities without any water supply [A].

Public facilities

- The incorporation of both passive and active security features in school building design, including assessing and retrofitting existing structures, is an important consideration for education ministries, school architects, and students and teachers using school buildings.
- Post-disaster education funding tends to focus on rebuilding schools but neglects the quality of education delivered. While infrastructure needs certainly should not be ignored, it does little good to create a new platform for learning without good quality. Appendix 3 provides an example of a comprehensive education rehabilitation program.

Livelihood rehabilitation

- Livelihood programs are a priority. Programs should be geared towards not just restoration of damaged facilities and the construction of new processing plants but most importantly with access to capital as well as equipment and training on skills such as carpentry, sewing, and starting a small enterprise [A].
- Access to capital for people to start small and medium businesses is necessary as most of the population survives on extremely limited cash flow. The injection of capital into local communities will revive village level activities and develop locally based institutions at community level [A].
- The benefits of financial services needs to be communicated to the communities by the banks and other institutions to stimulate small businesses as most people are unwilling to borrow because the terms and conditions are seldom understood [A, G].
- In the absence of a systematic base to support primary producers, livelihood programs need to focus on the creation of producer groups [A], G.
- Risks to livelihoods must be minimized such that people can afford to invest in income generating activities. Savings and loan facilities and microfinance programs which are owned and managed directly by the local communities tend to be extremely effective for positive economic and social development [A].
- Traditional farming and production methods need to be updated with simple, reliable, and affordable new technology to improve the output and efficiency of the livelihood program and keep pace with other areas at both provincial and national levels [A, G].

Spatial planning

- Almost two years after the tsunami, a proper spatial plan is still being prepared with the aim of re-establishing basic infrastructure services and support to the communities and stimulating sustainable livelihood programs. Nevertheless, authorities recognized that strategic spatial planning at local administrative levels would be the most efficient way of identifying needs and project requirements, as well as the means to underpin reconstruction and rehabilitation in the preliminary stages of the planning process [A].
- Land availability and tenure after disaster is at the heart of economic and social revival and the key to people's livelihood. Response to land issues was a challenge to the government during the conflict years and was further complicated after the disaster. While some damaged land has been rehabilitated in the last two years, the majority will never be productive again. This will require communities to relocate and restart their lives [A].

Disaster prevention

- Disaster preparedness has remained a priority, and particularly to give people a sense of security and to enable them to become more self-reliant. The rebuilt city is organized into districts or neighborhoods able to provide decentralized disaster relief. Thus rebuilding combined economic objectives for a more competitive city with issues related to ageing, social housing, land-use, and risk reduction. At the same time, disaster-resistant cities are difficult to build in Japan because of institutional obstacles to reconstruction, urban planning and public awareness. Because of the prevalent belief that financial assistance should be provided to restore original conditions, few incentives exist to implement improvements to prevent future disasters. Urban planning demonstrates a notable absence of serious debate on building safe cities [K].
- It is important for residents to know the circumstances of their area – where fire hydrants and water-use facilities are, whether disaster-resistant facilities and equipment are usable on a daily basis, and so on. It is ideal to actually go on a tour to check dangerous places and the facilities with a map in hand. Prevention measures should be established defining what can be done by residents and what should be done by administrative bodies [K].
- An important dimension of the rehabilitation and recovery efforts is the Marmara Earthquake Emergency Reconstruction (MEER) project. In addition to rehabilitating housing, infrastructure and businesses, the project is directed to creating emergency management offices at national and municipal levels; creating a disaster insurance scheme; modifying disaster laws; strengthening municipal capabilities for disaster-resistant development; developing risk-based municipal plans; and establishing a land-use information system [M].

D. Suggestions

7. Six main observations can be gleaned from the issues identified in recovery operations from the five major disasters discussed above. They may assist the PRC Government as it develops its overall reconstruction and rehabilitation program:

- (i) *Inter-governmental coordination is vital:* Each level of government has specific responsibilities in every aspect of disaster management (hazard mitigation, disaster preparedness, disaster response, disaster recovery). The effectiveness

of a nation's disaster management system, however, can be measured by the degree to which these various components are integrated: without coordination there is no effective system. Nowhere is this more obvious than in post-disaster recovery, which relies on bringing together an enormous range of issues with an equally large number of public and private players – governments responsibility is to ensure this complex array is managed in terms of efficiency and effectiveness.

- (ii) *Timing is important.* Recovery actions initiated too early or too late can have significant downstream implications. Hasty decisions that have not been carefully researched, sufficiently consulted on, or appropriate alternatives not investigated can jeopardize good intentions. Decisions on what and where to relocate typically fall in this category. Similarly, some decisions that are delayed or not enunciated in a timely manner, such as victim compensation measures or new building codes may interfere with smooth recovery procedures.
- (iii) *Recovery implies physical, economic and social integration:* Quality and adequate infrastructure availability is a nonnegotiable prerequisite for any form of economic development, and is more so for disaster-impacted communities. However, the desire for rapid physical structural results must be balanced against the need for equitable and sustainable long-term economic and social solutions. Aspects such as livelihood assistance and social integration programs need to be dealt with concurrent with the reconstruction of damaged structures.
- (iv) *Process and participation is as important as the physical:* Disaster recovery is all about re-building *communities*: communities are not just bricks and mortar; they are first and foremost about people and their relationships. Hence, who decides and how decisions are arrived at with respect to physical recovery is of utmost importance.
- (v) *Focus on content as well as construction:* Too often the onus is placed on the rapid physical reconstruction of structures, such as school, hospitals and critical service infrastructure, without decisions being made to re-visit content, such whether the school curriculum or teacher training was adequate to meet the wider needs of society, or if underground cabling is better for 'all-hazards' risk reduction than overhead wiring (for example in seismic areas also prone to high wind/severe storms).
- (vi) *Incorporate disaster risk reduction components:* Disasters do strike twice! Locations that have had disasters in the past will have disasters in the future – the difference is how much damage disruption will there be. Rebuilding follow disaster is an opportunity to get things right the second time around and to "build back better!" Every effort should be made to ensure that the lessons the world has learnt about how to reduce risk from natural hazards are incorporated into all recovery activities.

Appendix 1: Sketches of relevant recent disasters

Disaster 1: Kobe, Japan [K]

Initiating event: earthquake M7.2

Date: 17th January 1995

Fatalities: 6,425

Impact on housing: 250,000 dwellings completely or partially destroyed (burnt-out homes = 6,148); 300,000 homeless

Economic damage: \$130 billion

Insured loss: \$3.3 billion

Fiscal impact: \$100 billion (1.9% of GDP) – includes government programs for infrastructure replacement; grants, low-cost loans and tax relief to victims;

Disaster 2: Earthquake – Marmara, Turkey [M]

Initiating event: earthquakes (M7.6, M7.2)

Date: 17th August, 12 November 1999

Fatalities: 18,000+

Impact on housing: 360,000 dwellings/businesses completely or partially destroyed; 600,000 homeless

Economic damage: \$9-13 billion

Insured loss: \$1-2 billion

Fiscal impact: \$4.2 billion (1.9% of national GDP) – includes extra consumption and transfer spending for relief and additional social security spending linked to death and disability benefits; credit subsidies and tax deferrals/losses; infrastructure replacement (Note: a large part of the fiscal cost was met with official foreign financing managed through the World Bank-financed project implementation unit).

Disaster 3: - Gujarat, India [G]

Initiating event: earthquake M7.7

Date: 26th January 2001

Fatalities: 30,000

Impact on housing: 1.1 million homes damaged or destroyed

Economic damage: \$3.4 billion

Insured loss: N/A –mostly uninsured residential property loss

Fiscal impact: income loss equivalent to 2-3% of gross state domestic product

Disaster 4: Aceh/Nias, Indonesia [A]

Initiating event: earthquakes M9.0, M8.7

Date: 26 December 2004, 28th March 2005

Fatalities: 170, 000, 38,000 missing

Impact on housing: 215,000 dwellings completely or partially destroyed, 500,000 homeless

Economic damage: \$4.9 billion

Insured loss: less than \$1 billion

Fiscal impact: 20% decline of Nias GDP, 5% decline of Aceh regional GDP. (Note: a large part of the fiscal cost was met by aid grants from ADB, the Multi-Donor Fund, and substantial contributions from non-governmental, philanthropic and individual donations).

Disaster 5: New Orleans/Gulf Coast, USA [N]

Initiating event: hurricane

Date: 29th August, 2005

Fatalities: 1,500

Impact on housing: 160,000 houses requiring demolition, 1 million people displaced (up to 300,000 likely to be permanently displaced)

Economic damage: \$125 billion. Significant environmental damage (including damage to 5 Superfund sites)

Insured loss: \$70 billion

Fiscal impact: 50% reduction in sales and property tax receipts, 50% city administration budget shortfall (city staff reduced by 3,000)

Appendix 2: General Lessons from Tsunami Recovery Program and ADB's Earthquake and Tsunami Emergency Support Project (ETESP)

8. This note summarizes some key lessons based on (i) the assessment made by the Special Envoy for Tsunami Recovery, Mr. Bill Clinton on the overall tsunami reconstruction program in Asia; and (ii) ADB's own experience in implementing the ETESP, which started in June 2005 and is expected to be completed in December 2008.²⁰

Overall Lessons from the Tsunami Recovery²¹

9. In December 2006, the United Nations Special Envoy for Tsunami Recovery, former United States President Bill Clinton, released his assessment of the recovery process and offered 10 key propositions to help enhance the quality of ongoing responses in the affected regions. The propositions were as follows:

- (i) Governments, donors, and aid agencies must recognize that families and communities drive their own recovery.
- (ii) Recovery must promote fairness and equity.
- (iii) Governments must enhance preparedness for future disasters.
- (iv) Local governments must be empowered to manage recovery efforts, and donors must devote greater resources to strengthening government recovery institutions, especially at the local level.
- (v) Good recovery planning and effective coordination depend on good information.
- (vi) Multilateral agencies must clarify their roles and relationships, especially in addressing the early stage of the recovery process.
- (vii) The expanding role of non-governmental organizations (NGO) and the International Red Cross and Red Crescent Movement carries greater responsibilities for quality in recovery efforts.
- (viii) From the start of recovery operations, governments and aid agencies must create the conditions for entrepreneurs to flourish.
- (ix) Beneficiaries deserve the kind of agency partnerships that move beyond rivalry and unhealthy competition.
- (x) Good recovery must leave communities safer by reducing risks and building resilience.

ADB's Experience in ETESP Implementation

10. While the advice of the Office of the Special Envoy guided the implementation of the ETESP, ADB also benefited from community consultations, particularly for livelihood and community infrastructure subprojects. It should be emphasized that extensive consultations with local government agencies and other stakeholders helped ensure the formulation of sustainable

²⁰ The ETESP covers the reconstruction and recovery program of Aceh and North Sumatra (including Nias) since the tsunami of December 2004 and the earthquake of March 2005 which hit the island of Nias.

²¹ See Progress Report on Indonesia: Aceh-Nias Rehabilitation and Reconstruction, March 2007 (Paras. 13-14, pages 4-5).

subprojects. Coordination with development partners and other stakeholders has been strengthened. Furthermore, NGOs have been involved in the delivery of ETESP support. Capacity building of local government agencies and communities has been built into the design of several subprojects.

11. Experience in implementing the ETESP has yielded the following insights and lessons for planning and managing post-disaster reconstruction program:

- (i) While assessing the size and scope of emergency assistance, (a) the implementation capabilities should be assessed realistically to avoid a mismatch between expectations and realities on the ground, and (b) the sectoral focus should be properly assessed and balanced to avoid spreading out too thinly over too many sectors.
- (ii) Considerable time and efforts are necessary in preparing projects for implementation and ensuring that social and environmental issues are addressed properly. Local communities should be aware of the role and importance of social and environmental safeguards at the start.
- (iii) Funds should not be allocated/locked in upfront to sectors and programs; flexibility in programming /reallocating external support during implementation is essential. A sector approach has the advantage of being flexible.
- (iv) Reconstruction activities should be planned and implemented based on an integrated approach. A more integrated approach among sectors may have been more cost effective and resulted in sustainable systems being developed.
- (v) Local governments and communities should be involved from the beginning instead of involving them after programs have commenced. Lack of partnership between relevant central Government agencies and other donors with local go led to a dualism in planning and implementation.
- (vi) The database should provide necessary implementation information to facilitate synergies and avoid overlap. Regular media briefings on implementation progress should be held in order for communities to be informed.
- (vii) One-off “give-away” programs are not sustainable.
- (viii) Government should recognize the need to ensure sound fiduciary governance in the utilization of public funds and donor support for reconstruction. In the case of ETESP, ADB supported fiduciary oversight arrangements, including the establishment of internal control and audit systems in the executing agency and capacity building for the Supreme Audit Institution.

Appendix 3: Example of a comprehensive education rehabilitation program

Issues	Recommended Strategy
Re-establishment of local education system ²²	<ul style="list-style-type: none"> ○ Coordination, support and supervision to be provided to school managers, teachers and education personnel on regular basis. ○ Baseline data and M&E data from Education and Management Information System (EMIS) and other available information sources, to be systematically and regularly collected, and analyzed for continuous identification of educational needs, capacities resources and gaps. ○ Rehabilitation Plan to be updated regularly and transferred/changed to government plan.
Re-building schools	<ul style="list-style-type: none"> ○ All reconstruction include time-bound quality interventions, (e.g. rapid teacher training, re-establishment of school management committees, distribution of textbook, school feeding program etc) in along with the rehabilitation plan. ○ Transition of children from temporary schools to permanent schools to be arranged smoothly.
Filling teacher gaps	<ul style="list-style-type: none"> ○ Arrangement of rapid teacher training in areas such as psychosocial support, active learning and use of local materials to be made. ○ Use of local resources such as university graduates and community members as teacher assistants and recreation leaders in extra-curricular activities, to be encouraged. ○ Longer-term training efforts to be led by teachers colleges, universities and distance education
Curricula	<ul style="list-style-type: none"> ○ Smooth transition to a new curriculum to be conducted.²³ ○ Continuity of children's learning and academic plan to be ensured. ○ Psychosocial and cognitive needs to be strengthened.
Need for records and certification	<ul style="list-style-type: none"> ○ Recognized academic certificates in the rehabilitation process for students to be ensured. ○ All teacher training to be recorded and certificates awarded. ○ Attendance records to be developed and monitored.
Donor Coordination	<ul style="list-style-type: none"> ○ Information exchange to be continued at the rehabilitation stage²⁴
Community Involvement	<ul style="list-style-type: none"> ○ Active involvement of community members in assessing, design, plan implementation and evaluation to be ensured.

²² At the rehabilitation stage, authority for education matter is handed over from the security oriented authority to local education authority. Education authority's initial involvement is critical in order to avoid smooth transition from the stages of emergency to rehabilitation.

²³ In emergency situation, a double shift (a half-day school) is often introduced, and taught at tents.

²⁴ Systematic sharing of knowledge among all those involve in school operation is fundamental to achieving both a common understanding of challenges and effective coordination among stakeholders.