

# EAP DRM KnowledgeNotes

## Disaster Risk Management in East Asia and the Pacific

### PLANNING FOR URBAN AND TOWNSHIP SETTLEMENTS AFTER THE EARTHQUAKE

By Edward Leman

#### INTRODUCTION

This note builds on the proactive measures taken by the Government of China as announced in: (i) the *Decree of the State Council of the People's Republic of China, No. 526 (Decree)* issued on 9 June 2008, providing regulations on post-Wenchuan Earthquake reconstruction; (ii) the *Directive on Counterpart Assistance (Directive)* of 11 June 2008; and, (iii) the *Land Policies to Support the Reconstruction of Wenchuan (Land Policies)* of 11 June 2008 by the Ministry of Land and Natural Resources. This note cites selected international experience in reconstruction from recent earthquakes in Kobe, Japan; Gujarat, India; Bam, Iran; and Marmara, Turkey.

The Wenchuan Earthquake affected a wide spectrum of rural and urban settlements in varying geographic contexts across a large area. The government quickly devised four categories of damage for the provinces of Gansu, Shaanxi, and Sichuan: (i) extremely affected, (ii) heavily affected, (iii) moderately affected, and (iv) affected areas. Analysis of the then-interim information on affected towns, townships, counties, and cities suggested that settlement planning efforts would need to respond to very different contexts.

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In extremely affected areas (EAAs), reconstruction should address:

- Small towns and villages in isolated mountainous valleys (e.g., counties of Wenchuan and Beichuan): These would require village-based planning approaches, including consolidation and construction of new villages in a few areas.
- Medium-sized towns in isolated mountainous valleys (e.g., towns of Nanba in Pingwu County, Qiaozhuang in Qingchuan County, Qushan in Beichuan County): These would require structured planning.
- Suburban villages and small towns near small- and medium-sized cities (e.g., the cluster of extremely affected

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towns and townships around Dujiangyan): Planning could improve integration of these villages and towns with the cities, and some infrastructure services could be extended.

- Large- and medium-sized towns adjacent to county-level cities at the edge of the Sichuan Plain (e.g., the towns of Hangwang and Zundao near Mianzhu in Deyang).
- Suburban and urban areas of these county-level cities may require major adjustments or expansion of city master plans: The scale and scope of reconstruction efforts are likely to be very broad.

In heavily affected areas (HAAs), although the severity of damage was more limited, the number of settlements is greater and includes:

- Suburban villages and small towns (e.g., around Chongzhou and Deyang).
- Villages and towns adjacent to medium- and large-sized cities (e.g., Mianyang and the northern districts of Chengdu): These cities may require adjustments to city and district master plans to better integrate these areas into urban regions.
- Outer areas and pockets of inner-urban areas of these cities, possibly requiring the planning of large-scale redevelopment of more formalized precincts and communities.

The type of development planning needed in isolated areas would be quite different from those required in suburban or inner urban areas of large cities. There would not be a “one size fits all” approach to the process and content of urban planning for reconstruction. It is recommended that the government accelerate the damage and loss assessment to help determine the scale and extent of planning required. It would also guide the differentiation of approaches to post-disaster urban planning efforts.

### HOW URBAN DEVELOPMENT PLANNING CAN SUPPORT RECONSTRUCTION

Although approaches may differ, they all should address the basic objectives of effective urban planning: (i) defining the types, locations, quantities, and intensities of land uses; (ii) ensuring the availability of land (land supply); (iii) ensuring the serviceability of land for allocated uses (i.e., provision of infrastructure services); and, (iv) facilitating the connectivity between land uses (i.e., transport networks and services).

Urban planning is critical in effective reconstruction planning. It sets the framework within which affected populations can permanently reestablish their livelihoods. It also allows enterprises to securely resume or start new operations.

Successful international experience shows that effective post-disaster urban planning can:

- Provide a powerful instrument for incorporating disaster risk management into redevelopment efforts.
- Provide a framework for coordinated, integrative efforts toward sustainable reconstruction by defining the framework within which infrastructure, transport, environmental management, and development occur.
- Provide a framework for setting and adhering to reconstruction priorities.
- Facilitate monitoring of performance and progress.
- Provide a disciplined framework for reconstruction financing (capital investment budgeting, changes to fiscal revenue assignments, and fiscal transfers).
- Provide stakeholders with a common basis for responding to unforeseen needs and new constraints as the city, town, or village evolves through reconstruction.

### URBANIZATION AND RECONSTRUCTION POLICY: REDUCING RECONSTRUCTION PRESSURES

A prerequisite to post-disaster urban planning is ensuring that planning is directed to areas that need it the

most. The government could consider several policy options to better-focus planning efforts.

#### **Facilitate voluntary resettlement to unaffected areas:**

Reconstruction pressures could be reduced by giving residents of affected areas the choice of moving permanently to unaffected towns and cities, especially if a sponsoring family member had already migrated and become successfully established prior to the earthquake. Compensation to affected family members could take the form of resettlement assistance instead of the housing grants offered by the government for the rebuilding of homes.

Some national government assistance to local governments in receiving areas could be given to offset the costs of additional education and social service obligations. This policy could be structured to continue the intent of the *Directive on Counterpart Assistance*. For households who do not have migrant members in unaffected areas, the government could consider a similar model but limited to resettlement in towns and cities within the original or adjacent prefecture-level city. This approach is consistent with the long-standing government policy promoting rural-urban migration to towns and small cities.<sup>1</sup>

#### **Abandonment of unsustainable settlements at high risk:**

The *Decree* clearly recognizes that the Wenchuan Earthquake caused almost total devastation in some villages and towns. Unsustainable settlements at high risk may need to be abandoned. This is a very difficult policy decision, and one that should be considered with care. Experience shows that new settlements can lead to social problems and lack of accessibility to employment and means of livelihood. However, in some cases relocation may need to be considered to ensure the safety of remaining residents in dangerous zones. While the *Decree* states that these settlements will need to be reconstructed in other locations, the government could consider a strategy of consolidating villages and towns.

#### **Rationalization and consolidation of strategic towns**

**and cities:** Some of the affected villages and towns were in regions that have been lagging economically for decades. The rationalization and consolidation of strategic towns would need to be coordinated with the resettlement of inhabitants from dangerous areas, and could focus on towns and cities that clearly have: (i) the capacity to generate additional employment and nonwage economic opportunities for resettled households; and (ii) the fiscal and institutional capacities to expand current levels of health, education, and social services. Selecting these towns and cities presents challenges and requires accurate and current information to assess their absorption capacities within the context of regional economic development.

### **PROCESS GUIDELINES FOR URBAN PLANNING AND IMPLEMENTATION**

Given the urgency of reconstruction, there is not enough time or resources to follow the current hierarchy of statutory urban plans in China. The major exceptions to current policy on land management, announced by the Ministry of Lands and Natural Resources (MLNR) on 11 June 2008, are a precedent for the kinds of exceptions to statutory urban planning practice that the Ministry of Housing and Urban and Rural Development (MHURD) should formulate.

International experience indicates that what is needed in earthquake-affected areas is not new master plans and urban designs but rather iterative urban development strategies. These should be supported by economic and social development policies and priority action programs in key sectors. The government should consider a more adaptable approach to urban planning during reconstruction comprised of:

- Rapid declaration of a strategic vision for affected settlements.
- Preparation of structure plans that establish planning intentions, but without the degree of detail inherent in current master plans.

- Preparation of concept plans for affected precincts and communities.

### Strategic Vision

In Kobe, the government announced its strategic vision for the city three months after the earthquake, providing residents with a focus on the future and demonstrating its readiness and resolve to rebuild a better city. This strategic vision guided all subsequent planning and reconstruction efforts over a ten-year period. Given that the State Council has articulated its overall vision for Wenchuan Earthquake reconstruction, local governments in affected areas should articulate visions for their communities at the earliest possible time.

### Structure Plan

A structure plan sets out broad principles and policies for the development of a town or city.<sup>2</sup> It is typically at the city or district level and is a flexible outline of the planning intent for the area. The plan should include information on: (i) hazard areas and mitigation policies; (ii) environmental and heritage attributes; (iii) roads and public transport; and, (iv) broad land-use zoning and maximum densities.

A structure plan needs to be flexible. As reconstruction progresses, it needs to be regularly updated to reflect unforeseen outcomes of migration and economic trends, and changing fiscal capacities of local governments. The structure plan should form the basis for all infrastructure and transport planning and investment. The plan should designate the priority areas for redevelopment.

An important first step in planning for Wenchuan Earthquake reconstruction is to define the scope of detail appropriate to structure plans for the different types of affected cities and towns. Structure plans need to be given the same statutory effect as current master plans. Structure plans should be prepared and adopted within a maximum period of three to six months.

### Concept Plan

A concept plan applies the principles and policies of the structure plan to define the specific planning requirements to the detailed planning and development of priority areas.<sup>3</sup> For Wenchuan Earthquake reconstruction, the concept plan would become a broader, more strategic (but still statutory) replacement of the current detailed plan for a control mechanism. The concept plan needs to incorporate the geological risk assessment required by MLNR in its land policies of 11 June 2008.

Of critical importance in the preparation of both structure and concept plans is the definition of measurable indicators and benchmarks. The indicators should be developed in close consultation with affected communities. The purpose is to allow monitoring and evaluation to be carried out, help residents understand the progress achieved, and elucidate the paths to success for the government. Indicators should be as specific as possible: for instance, the extent of new residential areas developed with sufficient municipal infrastructure, and accessibility improvements from road construction measured in travel times to city or town centers.

The planning process should also allow for:

**Relaxing of planning standards based on local conditions:** As with land policies of the MLNR, the government could consider suspending some or all of the national planning standards for Wenchuan Earthquake reconstruction, as long as all safety and security performance standards are met and certified by a competent provincial or national authority.

**Ensuring land supply:** The post-Wenchuan Earthquake land policies set out by the MLNR proactively address a critical requirement for reconstruction planning that is, ensuring that sufficient land is made available in locations where and when it is most needed. International experience underscores the importance of having up-to-date information on all types of affected properties.

Current, accurate, and codified cadastral information is required for land parcels to quickly and securely enter the reconstruction land market and be redeveloped.<sup>4</sup> It is recommended that the government quickly assess the status of available land and as part of reconstruction, initiate a program to update, regularize, store, and distribute cadastral information in a secure digital format.

**Explicitly incorporating disaster risk management into urban and rural planning:** The *Decree* effectively outlines requirements for incorporating hazard assessments into reconstruction planning. Structured technical assistance and rapid training may be needed, including by professionals from other countries who have incorporated risk management into reconstruction planning of their earthquake-stricken towns and cities.<sup>5</sup>

**Active community engagement:** International experience shows that effective outcomes of post-disaster urban planning depend almost as much on the planning process as on the content of the final plan. Its realization depends on the participation and commitment of all key stakeholders.<sup>6</sup> The participatory preparation of a post-disaster urban development plan can act as a very strong unifying force in affected communities. Consistent with the *Decree*, local governments will need to carefully balance the need for speed and completeness with the very real and significant social benefits of active community engagement.

**Ensuring adequate implementation capacities:** Urban plans will not be implemented without sufficient institutional and fiscal capacities at the local government and community levels. While the State Council's counterpart assistance program is a very significant effort, its time frame is currently three years. As part of reconstruction, the government could consider structuring a comprehensive, long-term program to strengthen local planning, monitoring and evaluation, and reconstruction management capacities at the district, town, and village levels in affected areas.

## PLANNING GUIDELINES

This section outlines planning guidelines that could be considered in Wenchuan Earthquake reconstruction, based on the World Bank's experience in reconstruction and urban/regional development.

**Maximize connectivity at the regional scale:** The restoration of social and market supply linkages between affected settlements is key to the reestablishment of livelihoods and enterprises. In the case of areas affected by the Wenchuan Earthquake, experience suggests that a strategy of connecting towns and villages to nearby cities, and villages to nearby towns should guide priorities in the reconstruction and expansion of road networks. However, roads alone are not enough: attention also needs to be given to facilitating the reestablishment of public bus and truck transport services as soon as possible. These linkages will also serve to support more efficient logistics required to move materials and labor needed in reconstruction.

**Site selection for new settlements:** The generally recommended practice for the siting of new settlements is that they be located as close as possible to the original (now devastated) village, town, or city. This facilitates access to rural landholdings, maintains market supply linkages, and retains cultural ties to the original locale. However, in the case of the Wenchuan Earthquake, many of the settlements that will need to be replaced are likely in isolated mountainous areas, or along narrow river valleys that are subject to continuing risk from landslides, mudflows, and floods. Agricultural landholdings may have been destroyed or severely damaged. In these cases, moving to another valley or mountain could be as socially and economically disruptive to households as moving to an entirely different but safer area, including to larger towns and cities. Given that virtually all collectively owned land is already contracted out, residents of communities where agricultural land has been destroyed are likely to have little choice but to move to

towns and cities. Aside from the geotechnical and engineering issues raised in the *Decree*, the reconstruction of devastated settlements without a viable agricultural land base needs to be considered in light of the prospects for sustaining livelihoods. While a new village or town site might meet engineering criteria, if livelihoods cannot be reestablished and sustained, the viability of new settlements is difficult to achieve.

**Maximize accessibility:** The structure of labor and supply markets in affected areas will likely change as a result of the earthquake, in some cases quite considerably. In suburban villages and towns, nonfarm workers will need to quickly reestablish employment or nonwage activities (perhaps with different enterprises). Supply chains are also likely to change. A critical role of urban/town planning is to maximize physical accessibility of workers to and between enterprises.

**Emergency preparedness:** An additional important consideration is planning for the mitigation of future disasters by ensuring emergency accessibility for rescue personnel and for rapid evacuation of affected areas, as in Kobe<sup>7</sup> and Gujarat.

**Consolidate unused land:** Considerable tracts of land, especially in the suburban areas of towns and cities, are largely unused. Some of that land is likely to be applied to temporary shelters. For reconstruction planning, unused and temporarily used sites need to be quickly identified and property rights consolidated to facilitate their entry into the stock of land available for new development.

**New uses for lagging industrial precincts and obsolete infrastructure:** The earthquake has reportedly damaged some areas in which old industrial and infrastructure facilities had persisted, despite restructuring efforts by the government. With proper site remediation, the redevelopment of what are likely comparatively large tracts of land could have significant impact on the urban structure of towns and cities. The government should insti-

tute policies that provide for the rapid demolition and remediation of affected industrial sites to integrate these strategic land parcels into reconstruction planning.

**Resist enclave development:** The preceding guideline does not necessarily mean that communities should be completely relocated without consideration of the wider social networks in receiving locations. Experience shows that building enclaves for newcomers usually leads to social exclusion, weak integration of migrants into town and city life, and a wide range of social problems. Planners need to carefully locate and integrate relocation areas into the existing fabric of receiving towns and cities, and ensure their accessibility to places of employment and settlement wide social and cultural facilities.

## RECOMMENDATIONS

Prepare and announce an urbanization (or rural–urban migration) policy for Wenchuan Earthquake reconstruction. The policy should at least define:

- Circumstances under which permanent urban *hukou*, or the transfer of urban *hukou* to other municipalities, will need to be considered for affected households (e.g., dispersed households prior to the earthquake in which one or two main income earners were migrant workers outside of the affected areas, and rural households in which landholdings were either destroyed or at an unacceptable level of continued risk).
- Receiving locations for which urban *hukou* will be granted (e.g., coastal cities where migrants were working; counterpart assistance jurisdictions; and towns/county-level cities or urban area of prefecture-level cities where the household originated).
- Rights associated with the new urban *hukou* and rights to collectively owned land that residents would permanently exchange.
- Compensation to households who choose to migrate.
- Compensation (if any) to receiving municipalities to partially offset increased social, education, and health

care service costs. The government could consider making this policy time-bound.

Prepare and announce a Wenchuan Earthquake urban and rural planning policy. Similar to the intent of ML-NR's Wenchuan land policies, the policy should define:

- Exceptions to the statutory master, secondary, and detailed plans for control mechanisms for Wenchuan reconstruction.
- Key parameters, information, and level of detail that the structure and concept plans (or similar) will be required to contain.
- Minimum levels of community participation and consultation in plan preparation.
- Streamlined approvals process for structure and concept plans (or similar), including retroactive approvals.
- Maximum time period allowed for the preparation of these plans.
- Statutory status of these plans.
- Statutory relationship of these plans to sectoral infrastructure and transport plans and public investment programs.
- Processes through which structure plans are to be prepared that cross municipal jurisdictions (e.g., district and adjoining county-level city, and town and adjoining county-level city).
- Clearly stipulate which national planning standards are suspended or relaxed for Wenchuan Earthquake reconstruction and for what period of time.

### **Design and implement a local capacity-building program on disaster-related urban and rural planning:**

Incorporating disaster risk avoidance, mitigation, and response measures into reconstruction planning is critical. These measures are not generally well known to professional planners in areas that have not experienced disasters similar to the Wenchuan Earthquake. Professional planners, engineers, transport planners, and local authorities working on urban and rural planning in affected areas could benefit from rapid training on how to incorporate

disaster risk management into development plans. Ongoing training to build local capacities in this field should continue. The most effective instructors or mentors in these measures are likely to be planners who have already gone through similar reconstruction planning processes in response to earthquakes and similar disasters in their own cities, including from outside of China. ■

### **End Notes**

<sup>1</sup> Experience in other countries indicates that, if given the option, many households will want to migrate out of affected areas. For example, in Marmara (Turkey), 18 percent of households in affected areas declared their intention to move to other towns and cities.

<sup>2</sup> Structure plans were prepared and adopted within four months in Bam (Iran) and seven months in Kobe (Japan) after their respective earthquakes.

<sup>3</sup> Concept plans also have become effective instruments for explicitly addressing the protection and restoration of cultural heritage sites. In Bam, at the request of the Government of Iran, UNESCO quickly and simultaneously included the “city of Bam and its cultural landscape” on its World Heritage List and on the World Heritage in Danger List; this provided impetus to a comprehensive reconstruction project, supported by UNESCO, for the 2,500 year old Citadel and numerous other damaged heritage sites.

<sup>4</sup> In Marmara (Turkey) a major program to update and upgrade cadastral information in affected areas was conducted with World Bank assistance.

<sup>5</sup> Also in Marmara, a targeted national training program was delivered to local decision makers on the urban development process and risk management through urban planning and building regulation; training addressed the needs of practicing land use and integrating urban development planners, with special emphasis on the creation of hazard maps and their incorporation into special project zone plan documents.

<sup>6</sup> In Kobe (Japan), the government actively engaged affected communities and stakeholders by forming community development councils (*Machizukuri*) that had significant influence on outputs and outcomes of the urban and community planning process throughout the 10 years of reconstruction. Similarly high levels of community engagement were also successfully structured in the affected towns and cities of Gujarat (India).

<sup>7</sup> Kobe incorporated into its urban structure plan an emergency transportation network providing access and egress for rescue vehicles and evacuation of affected residents. It also incorporated an open space network and green buffers as mitigation measures in the new urban structure plan.

## ANNEX 1: Summary Descriptions of International Major Earthquake Disasters

GREAT HANSHIN-AWAJI EARTHQUAKE, KOBE, JAPAN			
<b>Characteristics</b>			
<b>Date:</b> 1995 (17 Jan.)	<b>Country:</b> Japan	<b>Location:</b> Hyogo Prefecture	<b>Magnitude:</b> 7.3
<b>Context</b>			
<b>Geographic:</b> Coastal, along northwest and north shores of Osaka Bay; urban area surrounded by low coastal mountains to west, north, and east.		<b>Settlement:</b> Predominantly metropolitan region (3.8 million residents in 1995).	
<b>Effects</b>			
<b>Deaths:</b> 6,433	<b>Missing:</b> 3		<b>Homeless:</b> 316,678 (at peak)
<b>Buildings Destroyed:</b> 249,180 homes totally or partially destroyed.	<b>Buildings Seriously Damaged:</b> Earthquake was followed by extensive fires.	<b>Transportation:</b> Collapse and major damage to elevated expressways and bridges; extensive damage to port facilities, railways, subways, and <i>Shinkansen</i> (bullet train) line.	<b>Infrastructure:</b> Electricity cut to 2.6 million homes; gas service lost to 845,000 homes; water supply cut to 1.27 million homes.
<b>Key Lessons for Wenchuan (Urban Planning)</b>			
<ol style="list-style-type: none"> <li>1. Rapid and coordinated sequencing of principles, vision, and plans: Governor of Hyogo Prefecture publicly announced the basic principles for the reconstruction three days after earthquake; public articulation of strategic vision three months after; issue of the city reconstruction plan for priority emergency areas three months after; issue of the reconstruction master plan seven months after; issue of the city reconstruction master plan eight months after; issue of Hyogo Prefecture Housing Reconstruction Plan (three year plan period) eight months after; and Hyogo Prefecture Infrastructure Reconstruction Plan (three year plan period) 11 months after the earthquake.</li> <li>2. Establishment of a coordination committee among affected cities and towns (five months after the earthquake).</li> <li>3. Extensive public consultation and participation in redevelopment planning (<i>Machizukuri</i>, or community development councils).</li> <li>4. Extensive replanning of affected areas: Development projects decided after two months, during which reconstruction was frozen by government; 124.6 hectares in land readjustment projects; 25.9 hectares in urban development projects (most of which had already been proposed before the earthquake); and new district plans (five sites) covering 70.6 hectares.</li> <li>5. Incorporation into urban structure plan of emergency transportation network providing access and egress for rescue vehicles and evacuation.</li> <li>6. Incorporation of open space network and green buffers as mitigation measures in new urban plan.</li> </ol>			
<b>World Bank Support:</b>	<b>Project Name:</b> n/a	<b>Loan/Credit No.:</b> n/a	<b>IDA/IBRD:</b> n/a

BAM EARTHQUAKE, IRAN			
<b>Characteristics</b>			
<b>Date:</b> 2003 (26 Dec.)	<b>Country:</b> Iran	<b>Location:</b> Bam District	<b>Magnitude:</b> 6.5
<b>Context</b>			
<b>Geographic:</b> Generally flat highland in the Jaz-Murian Basin between Zagros and East Iran Mountains Ranges; highly active seismic area.		<b>Settlement:</b> Mixed urban/rural, with comparatively large anchor city: Bam District comprises Bam City (92,000 residents in 2003), two nearby towns, and 900 surrounding villages; total population of 200,000; numerous and widespread date orchards scattered within the city of Bam itself providing key local livelihoods.	
<b>Effects</b>			
<b>Deaths:</b> 26,000		<b>Injured:</b> 30,000	<b>Homeless:</b> 75,600
<b>Buildings Destroyed:</b> More than 85 percent of city (largely mud and dried-brick construction) destroyed, including much of Bam's 2,500 year old fortress ( <i>Arg-e Bam</i> Citadel), a major religious and national heritage site, and among the largest earthen structures in the world.	<b>Buildings Seriously Damaged:</b> 24,598 urban housing units severely damaged; 24,715 rural housing units severely damaged within 16 km radius of Bam; 3,346 commercial units in the city (shops and workshops) severely damaged; in addition to <i>Arg-e Bam</i> Citadel, 26 other cultural heritage sites experienced significant damage.	<b>Transportation:</b> Major damage to local airport, 190 km of highways, 20 km of city, town, and village roads.	<b>Infrastructure:</b> Extensive damage to water supply and drainage systems; severe damage to telecommunications lines (> 380 km), switching centers, and microwave station; <i>Qanats</i> , the traditional underground irrigation systems, sustained severe damage, threatening sustainability of the date industry.
<b>Key Lessons for Wenchuan (Urban Planning)</b>			
<ol style="list-style-type: none"> <li>1. Explicit strategy for community consultation articulated very soon after the earthquake; design to explicitly include implementation agencies, community leaders, NGOs, women, youth and children; very high level of community participation in rebuilding of housing and local infrastructure.</li> <li>2. Structure Plan (2015) for the city of Bam approved by High Council of Urban Planning and Architecture at Central Ministry of Housing and Urban Development (MHUD) four months after the earthquake.</li> <li>3. Structure Plan specifically addressed need to respect the traditional architecture and urban design of the city and villages, to protect buffer zones, minimize resettlement, and minimize expropriation through reuse of land; structure plan formed basis for subsequent more detailed planning of priority reconstruction areas.</li> <li>4. Housing reconstruction predominantly on existing sites (80 percent of urban housing was privately owned) to higher seismic standards using nontraditional technology.</li> <li>5. Pursuant to the structure plan, reconstruction plans were prepared for 11 areas in the city of Bam: Each area had a <u>different</u> planner (reducing chances of scaleless uniformity); similarly, two commercial areas had different planning teams; all plans were reviewed by National Engineering Association of Iran and a newly established Architectural Committee at the national level reporting to MHUD.</li> <li>6. In 2004 at the request of Government of Iran, Bam and its cultural landscape were included by UNESCO on its World Heritage List and on the World Heritage in Danger List; this provided impetus for a comprehensive reconstruction project, supported by UNESCO, for the Citadel and numerous other damaged heritage sites.</li> </ol>			
<b>World Bank Support:</b>	<b>Project Name:</b> Bam Earthquake Emergency Reconstruction Project (2004)	<b>Project ID:</b> P088060	<b>IBRD:</b> USD 220 m

MARMARA EARTHQUAKE, TURKEY			
<b>Characteristics</b>			
<b>Date:</b> 1999 (17 Aug.)	<b>Country:</b> Turkey	<b>Location:</b> 7 provinces in region	<b>Magnitude:</b> 7.4
<b>Context</b>			
<b>Geographic:</b> Coastal, valley, and highland areas over a wide area between Istanbul and Ankara east of the Sea of Marmara.		<b>Settlement:</b> Mix of urban and rural settlements with concentration in medium-sized cities; areas of peak damage included cities (provinces): Izmit, Iznik (Nicea), Gebze, Sakarya (Adapazari), Duzce.	
<b>Effects</b>			
<b>Deaths:</b> 17,000			<b>Homeless:</b> Between 400,000-600,000
<b>Buildings Destroyed:</b> 113,000, many built illegally in areas not zoned for residential development.	<b>Buildings Seriously Damaged:</b> 213,843.	<b>Transportation:</b> Overpass on the motorway between Izmit and Ankara collapsed; extensive damage to city and village roads, and to connecting roads.	<b>Infrastructure:</b> Extensive damage to municipal water supply, drainage, sewers, local electric networks; main fiber optic cable was cut (backbone of the telephone into the region); national electric power grid damaged causing a widespread power blackout.
<b>Key Lessons for Wenchuan (Urban Planning)</b>			
<ol style="list-style-type: none"> <li>1. Pilot projects implemented in six selected municipalities to assist local building and planning departments in preparing and implementing risk-based municipal urban development plans, incorporating approaches to disaster prevention, minimization, mitigation, and recovery.</li> <li>2. Standardization of detailed municipal hazard and vulnerability assessments.</li> <li>3. Targeted, national training program for local decision makers on the urban development process and risk management through urban planning and building regulation; training addressed the needs of practicing land-use and urban development planners with special emphasis on the creation of hazard maps and their incorporation into master plan special project zone plan documents; training also addressed methods of public information and public participation in planning as means to support public safety interest in limiting illegal land use.</li> <li>4. Comprehensive cadastral renovation and land management program designed and implemented to: (i) supply current and reliable land information to cope with the post-earthquake situation, and update and improve obsolete registers and maps; and, (ii) facilitate land supply operations, with emphasis on housing schemes and the overall improvement of the land market.</li> <li>5. Establishment and codification in laws and regulations of a hierarchy and standardization of national, regional, and municipal plan documents.</li> <li>6. Establishment of clear criteria for site selection for new development areas: (i) proximity to existing infrastructure, social facilities, transportation, and employment opportunities; (ii) appropriateness of proposed housing standard: type of housing to be built is appropriate for lower middle-class families; future value limited by typology and, therefore, located where potential urbanized land values match economic potential in order to avoid future real estate market distortions; (iii) consideration of existing nearby housing capacity, existing and planned increases in the housing supply such as cooperatives that are planned or under construction; and, (iv) consideration of existing structural and land-use plans: Selection will address the context of preexisting land use and environmental planning.</li> </ol>			
<b>World Bank Support:</b>	<b>Project Name:</b> Marmara Earthquake Emergency Reconstruction Project (approved 1999; closed 2006)	<b>Project ID:</b> P068368	<b>IBRD:</b> USD 505 m

GUJARAT EARTHQUAKE, INDIA			
<b>Characteristics</b>			
<b>Date:</b> 2001 (26 Jan.)	<b>Country:</b> India	<b>Location:</b> Gujarat State (12 of 22 districts); Kutch district particularly hard hit (70 percent of buildings destroyed)	<b>Magnitude:</b> 6.9; hundreds of aftershocks of 3.0 and above.
<b>Context</b>			
<b>Geographic:</b> Coastal (including salt flats, estuaries, intertidal zones, and alluvial deposits – all subject to intense liquefaction during earthquakes) and inland area; generally rolling topography (no mountains); 250 km from Ahmedabad.		<b>Settlement:</b> Urban/rural mix; 7,633 villages and towns; small cities; Ahmedabad also affected.	
<b>Effects</b>			
<b>Deaths:</b> 13,805		<b>Injured:</b> 167,000	<b>Homeless:</b>
<b>Buildings Destroyed:</b> 234,000 homes destroyed; thousands of shops and workshops destroyed or severely damaged.	<b>Buildings Seriously Damaged:</b> 970,000 homes seriously damaged; 2,000 health care facilities; 12,000 schools; numerous civil administration buildings; extensive damage to cultural heritage (especially in Kachchh and Rajkot Districts).	<b>Transportation:</b> Extensive damage to urban and village roads, and connecting roads; damage to ports facilities and railroads.	<b>Infrastructure:</b> Extensive damage to municipal infrastructure: water and drainage, power, telecommunications, earthen dams providing drinking water and irrigation.
<b>Key Lessons for Wenchuan (Urban Planning)</b>			
<ol style="list-style-type: none"> <li>1. Very large program designed and implemented on disaster management with focus on hazard mitigation and risk transfer, especially: (i) digital hazard maps for earthquake, flood, drought, and cyclone; (ii) inventories of hazardous buildings in major urban areas and strategies for retrofitting privately owned buildings (with special emphasis on multistory apartment blocks, business establishments, and industrial plants) and publicly owned lifelines (e.g., power stations and water reservoirs); (iii) regulatory studies on strengthening building codes and institutionalizing their improved enforcement; and (iv) procedures for community-based disaster management planning (i.e., process and plans) for the <i>taluka</i> (subdistrict), district, and state government levels; and, (v) risk transfer and insurance.</li> <li>2. Immediate formation of Gujarat State Disaster Management Authority to implement reconstruction and rehabilitation program.</li> <li>3. Regulatory reforms to building codes and land-use planning and development control laws and regulations, formulation of a statewide Disaster Management Act.</li> <li>4. Relocation of entire villages that sustained more than 70 percent building damage to new locations.</li> <li>5. Major, structured program of community engagement in both cities and towns, throughout the reconstruction program (Communication and Transparency Strategy).</li> </ol>			
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