LAND MANAGEMENT

By Mir Altaf

INTRODUCTION
The Wenchuan Earthquake affected 20 cities, 158 counties, and 3,655 towns and villages. Geographic and demographic conditions varied significantly from small, rural villages to county-level cities, as did the magnitude of the physical damages. The reconstruction strategy and plan, inclusive of land management, depended on the conditions specific to each locale, from in situ reconstruction for the cities and towns with limited damage in relatively safe locations to the possibility of physical relocation from high- to low-risk locations that is, total reconstruction.

Given this swath of differences, any one reconstruction blueprint would have been inadequate. Therefore, readers are referred to the Urban Development note for the wide range of issues to be considered in urban planning in the process of reconstruction. This Land Management note focuses in particular on how to efficiently provide land to the Wenchuan Earthquake-affected population and more generally on land management issues. It is based on two World Bank works: (i) a study entitled, “The Spatial Organization of Cities: Deliberate Outcome or Unforeseen Consequence?”¹ and (ii) the ongoing Sichuan Urban Development Project, where new urban land in peri-urban areas is being developed through rational spatial development planning.² To the extent possible, the Annex provides relevant experiences from other countries.

LAND PROVISION FOR THE AFFECTED POPULATION
China is experiencing an unprecedented scale of urbanization driven by rapid rural–urban migration, with income disparities being a powerful factor. By 2010, the province of Sichuan is projected to have an urbanization rate of 40 percent and a population growth rate of 8–10 percent. To prepare for this rapid urbanization, an emphasis has been

¹ The Spatial Organization of Cities: Deliberate Outcome or Unforeseen Consequence?
² Sichuan Urban Development Project
Having lost their homes and places of work, urban areas offered two tangible opportunities to the thousands of displaced persons: (i) greater opportunities to find work and (ii) temporary housing provided by the government.

This accelerated pattern of migration will place strong pressure on an already very limited supply of urban land for residences, public places, and economic activities. Because little space is available in the central business districts (CBD), most of the migrants will settle in peri-urban areas. The key question becomes how to make provisions for the affected population with the limited urban land.

In the cited study, it was found that urban land use is not fully efficient in Chinese cities, while the population density is much higher than that of cities in now-developed countries. Land-use policy can have a significant impact on the urban spatial form and should therefore be used to promote land-use efficiency. The study identifies a number of regulations, policies, and management practices with unintended negative impacts on land-use efficiency. Four factors contribute to dispersed spatial patterns and inefficient land use: (i) the national regulations to limit land consumption by protecting farmland have the unintended consequence of fragmenting the urban periphery; (ii) the national policy to promote city-centered economic growth creates strong incentives for municipal authorities to convert agricultural land for nonagricultural uses in excess of need; (iii) the municipal practice of limiting building intensity within the city lowers land-use efficiency and extends spatial spread; and, (iv) the lack of coordination between land use and infrastructure development increases travel times and costs. These factors jointly contribute to the consumption of more land than is necessary and at lower efficiency than possible.

Farmland protection: The fast growth of second- and third-tier Chinese cities led to a policy of quotas to protect basic farmland. Proximity to the city determined land use: agricultural land within or close to city boundaries was protected from outright development; remote villages were considered nonagricultural and authorized for development. Although well-intended, the policy produced agricultural enclaves within thriving metropolises. Utility networks and transport lines were required to bypass large pockets of empty land that were losing productivity for lack of access to irrigation. Although the premise of the basic agricultural protection law is valid, its inflexible implementation lowered both agricultural and urban productivity.

Incentives to convert agricultural land: Land is being over allocated for industrial and other uses in the
suburbs adding to spatial expansion. Industries that were located in central urban areas during the period of the planned economy are being relocated to new industrial estates in peri-urban areas where municipal authorities have incentives to over-release land below market value as a source of revenue. In Chinese cities, land allocated for industrial use is two to three times that in comparable cities with well-functioning land markets. Although reforms are underway to correct the allocation and pricing of industrial land, it will take time to redress the problem as most relocation of industry occurred fairly recent. In addition, anticipation of restrictions and price corrections has caused land banking by cities and developers in the form of unused industrial estates.

**Limits to building intensity:** The spatial expansion of cities can be reduced by using the existing land more intensively. The intensity of land use depends on the rate at which urban land is transformed into floor space. This intensity has increased in Chinese cities over time as measured by the gross floor area ratio (FAR). However, there is considerable room to increase the intensity because the gross FAR in major Chinese cities is lower than in urban centers like Manhattan, Seoul, and Tokyo. Overly strict limits on FAR values in central urban areas force cities to accommodate the demand for space by spatial expansion, increasing both land consumption and average commuting times.

**Lack of coordination of land use with infrastructure:** Urban land use is not characterized by the strategic location of high-density nodes connected by rapid public transit. Although densities are high in Chinese cities, they do not vary sufficiently due to uniformly regulated FAR values that suppress location premiums from being reflected in the price of land. This leads to a dearth of strategically located high-density nodes. FAR values are not publicly available on citywide maps as guides to developers but are the subject of detailed planning at the block level. This approach fails to signal the value of land based on location and leads to its suboptimal use.

**Higher intensities of land use, as measured by FAR values, can cause traffic congestion unless the strategically located high-density nodes are linked by an appropriate rapid transit infrastructure. This aspect has not received adequate attention in China where land use and access policies are not sufficiently coordinated. It is a critical policy area because China is in the early stages of motorization when the worst excesses are potentially avoidable. Chinese cities have limited mass rail transit networks at present, and the huge investment needed to increase coverage and make it sustainable necessitates a concern with ridership, which depends on the densities of residence and employment nodes and their alignment with mass transit routes. As cities in China continue to grow, suburban housing that is uncoordinated with...
transport infrastructure will increase automobile use, energy consumption, and travel time.

While the fundamental resolution of these policy, regulatory, and practice constraints may be protracted, the government could consider removing the first (farmland protection) and third (limits to building intensity) constraints on an exceptional basis for the earthquake-affected areas as well as for the urban areas that will host thousands of displaced persons.

**SICHUAN URBAN DEVELOPMENT PROJECT: MIANYANG AS BEST PRACTICE OF LAND DEVELOPMENT IN CHINA**

The Government of Sichuan Province and the World Bank have been implementing the Sichuan Urban Development Project (SUPD) since 2006. It aims to promote rational spatial development and efficient land use by overcoming existing constraints and includes land development in the peri-urban areas of the second-tier cities Suining and Mianyang. In terms of providing land for the earthquake-affected population, the policies and practices of the Sichuan Urban Development Project are fungible at both the national and provincial government levels.

The Sichuan policy of placing emphasis on the growth of second- and third-tier (medium- and small-sized) cities is exemplified by Mianyang. Typical of medium-sized cities, its benign environment and good city management has attracted high-tech industries and driven rapid development. Its geographic make up has created two distinct socioeconomic groups, with different legal rights, different relationships to the land, and different population densities.

The limits between formal urban and designated farming areas in Mianyang, like most Chinese cities, while clear-cut, follow idiosyncratic contours with enclaves of agricultural areas surrounded by fully developed urban areas. While the urban population typically has access to all city services, the agricultural community must rely on villages and rural collectives for the provision of education and health care services, generally of lower-quality.

In a medium-sized Chinese city, the population density of a farming area is typically 10–40 people per hectare as compared to 120–250 people per hectare in the urban areas. Urban households are able to buy housing from large, well-capitalized, formal developers who themselves purchase land-use rights from the municipal governments (which have a monopoly on both the development of land and the transfer of land-use rights). Urban dwellers can rent or buy a shop or workshop in a formal urban development with full infrastructure services, although at prices that are at least double those in the farming areas. The farming areas, on the other hand, have dual-use designations: agricultural and nonagricultural. As indicated above, the policy of agricultural quotas was implemented to protect farmland; however, nonagricultural uses are legally permitted too. The farming areas have been developed at higher densities than rural areas but lower densities than urban areas; and, their provision of affordable workshop space to small entrepreneurs and less costly housing to new residents have become indispensible to the development of Chinese cities.

As Figure 1 indicates, proximity to the CBD not only determines the density of a farming area (the closer, the denser) but also their income level (the closer, the larger part derived from urban activities).

Chinese cities do not usually expand in the most economical manner from a spatial point of view, not because they want to spare semi-developed farming areas but
because the lack of construction finance pushes formal development in a linear direction along already-existing trunk infrastructure. The pattern of formal urban development in Mianyang is typical of this less than optimal approach (see Figure 1).

The development follows the main intercity roads, leaving large enclaves of undeveloped land very close to the city center. To the extent that topography permits, developing land in a compact manner around the CBD is the most economical model, with a circle centered on the CBD being the most compact form. This compact form generates shorter trips, significantly saves on energy, and decreases the capital costs of utility networks. Of course, topography often prevents cities from reaching their most efficient shape.

In Mianyang, even with very wide rivers and hills constraining the spatial development, Pioneer Park and the Southern Economic Development Zone (the two SUPD sites) will, as the population increases, significantly improve overall efficiency by decreasing the average distance to the city center. These two SUDP sites represent a consolidation infill strategy and rest 2.5–7 kilometers and 3–9 kilometers from the city center, as compared to the far expanse of the built-up area at 14 kilometers. The current spatial policy implicit in the master plan of Mianyang could be summarized as follows: (i) redevelopment of older areas and (ii) consolidation of underused areas and agricultural enclaves within the existing urbanized radius.

Because Mianyang and Suining represent a consolidated infill strategy, they inherently offer flexibility to the ur-

**Figure 1: Map of formal urban areas and farmers area in Mianyang**

![Map of formal urban areas and farmers area in Mianyang](image)
Though not a part of the original master plan, but in response to the Wenchuan Earthquake, both cities have established thousands of temporary housing sites with the provision of infrastructure services and access to urban workplaces.

Recommendations
The following measures are meant to best address the land management issues in both the earthquake-affected provinces and in the urban areas hosting the earthquake-affected population. Again, the strategy and plan were designed to suit both the provincial and national levels of government, with application of one-time exceptions should current regulations, or their revision, inhibit timely action. The measures were drawn from the comprehensive list of recommendations in the World Bank study, “The Spatial Growth of Cities,” and were based on two criteria: (i) a large impact and (ii) relatively low costs of implementation.

The application of land conversion quotas could be made more flexible by allowing prioritized conversion within urban growth boundaries and growth corridors. The fragmentation of the urban fringe leaves patches of farmland served by expensive infrastructure networks while development leapfrogs beyond the built-up edge. This pattern is caused in part by the land protection system that does not differentiate between agricultural parcels located close to the city center and those located further away. This could be prevented by enabling infilling of agricultural enclaves, in particular those located within ring roads and along designated corridors. It is suggested that a modification of the application of current quotas on conversion of agricultural land within urban growth boundaries and in designated growth corridors. Priority for conversion through transfers should be accorded within growth boundaries and in strategic corridors to allow contiguous development. Growth boundaries should be aimed at steering development away from both highly fertile and ecologically fragile areas, and along growth corridors. Outside the boundaries and corridors, the protective basic agricultural law would be strictly enforced. The policy could be reviewed at regular intervals.

Floor area ratio regulations could be used by municipalities to channel growth to desired locations and enable the emergence of high-density nodes. By using FAR regulations to discriminate between land with dif-
ferent location premiums, municipalities would be able to create the variations in the value of land that would encourage efficient use. Thus locations in the proximity of mass transit stations could be allocated higher FAR values to encourage densification. This could then lead to the coordination of land-use and public transit investments.

It is suggested that citywide zoning maps show the allowed FAR variations by zone to provide accurate valuation guides to developers. In cities with functioning land markets, FAR values are closely linked to local demand for floor space, being higher where demand is higher. In turn, these manifest themselves in higher land prices, which act as the signals that drive efficient land use. In China, urban master plans need to show FAR values, which at present are only specified at the individual block level rather than as part of the publicly available master plan documentation. This would enable developers to compare the value of different locations. There seems to be no explicit spatial strategy to guide the FAR values used in the detailed plans.

End Notes


3 After the Kobe Earthquake, it took five years to completely remove the temporary housing. Kobe is a large, commercial, and industrial city with a population of 1.5 million. Given that the earthquake-affected areas of China are underdeveloped economically, the duration of temporary housing is likely to be even longer.

4 Bertaud, The Spatial Organization of Cities.

5 The floor area ratio (FAR) is the ratio (or the limit imposed on such a ratio) of the total floor area of buildings on a certain location to the size of the land of that location. A limit on the FAR of 2.0 would mean that the total floor area constructed is not allowed to exceed two times the gross area of the plot. A FAR of 2.0 could be achieved in different ways: by constructing two floors on the entire plot; four floors on half the plot; or eight floors on a quarter of the plot.

Great Fire of London, 1666
The Great Fire of London in 1666 is estimated to have destroyed the homes of 70,000 of the city’s 80,000 residents. Although many radical schemes to rebuild the city were proposed, in the end the original street plan was recreated for the simple reason that city authorities could not ascertain the exact ownership of properties and, thus, could not acquire the land for reconstruction. Improvements consisted of wider streets, better hygiene and fire safety infrastructure, a sewage-drainage system, and brick and stone instead of wood housing. Thatched roofs were forbidden.

An important policy decision was to encourage the homeless to move away from London and settle elsewhere immediately. A proclamation was issued that “all cities and towns whatsoever shall without any contradiction receive the said distressed persons and permit them the free exercise of their manual trades.”

Lisbon Earthquake, 1755
The Lisbon Earthquake in 1755 was one of the most destructive earthquakes in history at the time with a death toll estimated between 60,000 and 100,000. The city underwent a radical rebuilding with big squares, large and rectilinear avenues, and widened streets. Not only were these features adopted as “mottos” by the city, but the new buildings were also among the first seismically protected buildings in the world.

Paris Cholera Epidemic, 1832
The Paris Cholera Epidemic in 1832 provided the impetus to launch the long-debated reconstruction of the city. From 1852 to 1870, under Baron Haussmann, the old Paris of dense and irregular medieval alleyways was replaced by a rational city with wide avenues and open spaces. Haussmann’s projects were decided and managed by the state, carried out by private entrepreneurs, and financed with loans backed by the state.

As a first step, the state expropriated those owners whose land stood in the way of the renovations. The main judicial tool was expropriation “for purposes of public interest” under which the city could acquire buildings placed along the avenues to be constructed, whereas earlier it could only acquire the buildings placed directly on the future construction site. It then demolished the buildings and built new avenues fully equipped with water, natural gas, and sewers. The state reimbursed the reconstruction loans by dividing the land into plots and selling the plots to developers who were required to build according to a set of precise rules. This system allowed the city to devote each year a budget to the renovations twice that of the municipal budget.

An innovative legal tool, the Servitude d’alignement, was also brought into use in Paris during its reconstruction. This prevented real estate owners from renovating or rebuilding beyond a certain line drawn by the administration. In this sense, it could be considered a predecessor of the urban growth boundaries that are employed for the same purpose in a number of modern cities—Portland, Oregon (United States) is among the better-known examples.

One of the most important innovations of the French case was the adoption of an overall objective to guide the reconstruction. This was to “let air and men circulate” based on the then-popular miasma theory of disease that associated epidemics with the circulation of foul air and odors. Even though the theory was incorrect, it enabled diverse agencies to coordinate their efforts with a single, clear objective in mind.

San Francisco Earthquake, 1906
The San Francisco Earthquake in 1906 resulted in a relatively low loss of life (approximately 3,000 people) but the resultant fire destroyed about 500 city blocks of the downtown core. The Army built 5,610 wooden

ANNEX: Experiences of other countries
relief houses to accommodate 20,000 displaced persons. The houses were grouped in eleven camps, packed close to each other and rented to people for USD 2 per month until rebuilding was completed. This gave more time for the reconstruction. The cottages cost on average USD 100–740 to put up. The USD 2 monthly rent went toward the full purchase price of USD 50.

The proposals for reconstruction included Paris-style avenues, boulevards, and arterial thoroughfares that radiated across the city, a massive civic center complex with classical structures, and what would have been the largest urban park in the world. But this plan was dismissed at the time as impractical and unrealistic. Real estate investors and other land owners were against the idea due to the large amount of land the city would have to appropriate to realize such proposals. In the end, the original street grid was restored but with many improvements like wider streets, arterial thoroughfares, and modern buildings.

The most negative aspect of the reconstruction of San Francisco was the decision to rebuild quickly. In this rush, building standards were in fact lowered rather than strengthened. It is estimated that building standards did not reach 1906 standards till about 1950, and the older buildings pose a hazard even today.

Kobe Earthquake, 1995

For the reconstruction of urban areas destroyed by Kobe Earthquake in 1995, the city of Kobe chose the land readjustment scheme. When large city areas have been destroyed, the scheme allows the city to accelerate the implementation of a preprogrammed land adjustment plan. The mechanisms of land readjustment are explained in Figure 2.

South Asia Earthquake, 2005

The 2005 South Asia Earthquake is the most similar to the Wenchuan Earthquake. The magnitude and death toll were very similar as was the mountainous rural terrain with only a few secondary cities affected. Yet, in many ways, the context was very different. In Azad Jammu—Kashmir and North West Frontier Provinces, the Pakistani effort was led largely by domestic and international NGOs and international relief agencies coordinated by the United Nations. Nevertheless, some policy lessons are relevant. These were learned the hard way as the initial choices were not the best in most cases.

The first lesson was that the rural and urban contexts were entirely different and needed to be addressed accordingly. In small, self-contained villages, the revival of the village economy was more important than household-based relief measures. In the absence of the former, households remained dependent on relief and also suffered from emotional trauma from continued loss of livelihoods. Thus, it was found that the replacement of draft animals and seed stocks was the most critical intervention in rural areas in the reconstruction phase.

In the urban context, the decision on the choice of incremental versus radical renewal needed to be made very quickly in order to prepare the residents to cooperate with future plans. Ambivalence in this regard was the cause of much discontent.

KEY LESSONS

Based on these case studies a number of key lessons can be identified and options listed for consideration. The first step is the obvious one of determining the seismic suitability of the affected land for reconstruction and the minimum building standards needed for each type of land category. In rural areas, a village-by-village determination should be made if a specific village economy can be revived as a whole. If not, arrangements should be made for the relocation of the affected village population. In urban areas, a rapid assessment of the extent of property damage is needed to decide whether buildings are going to be repaired or demolished. If the number of repairable buildings in a given area is be-
A predetermined threshold (say 30 percent of total buildings), it may be better to acquire them for demolition so that an improved city could be constructed. Rural and urban areas, thus, have different criteria for this first step.

An early decision on the mechanism for compensation is important for the nature of reconstruction. Property-by-property compensation mechanisms, while more fair in one way, slow down the acquisition of land for reconstruction. A quick decision, one way or the other, is required to design the appropriate reconstruction strategy.

The nature of the temporary housing for the displaced population is an important policy decision that determines the time available for reconstruction. One of the important lessons from the case studies is not to make very fast reconstruction a measure of ultimate success.

The policy to allow displaced families (both rural and urban) to resettle in neighboring locations with permission to work is another important policy decision that allows more time for planned reconstruction.

A peculiarity in China is the existence of designated agricultural areas within urban jurisdictions. These pres-
ently serve the purpose of providing affordable rental housing for migrants and a source of income for farmers whose land has lost productivity. The reconstruction would provide an opportunity to rationalize the status of such villages. If it is determined that the seismic protection of new housing would make it unaffordable to migrants, it might be better to compensate the farmers, incorporate the land into the urban jurisdiction, and locate the housing elsewhere.

The mechanism adopted to finance the reconstruction would have a bearing on the speed of reconstruction and the nature of the built form. This is a policy decision that should not be made independently of the rest of the reconstruction plan.

One of the most important lessons from the case studies is the adoption of an overriding objective for the reconstruction. This is critical because many different agencies are involved in land management and reconstruction. Without a common objective, they are likely to maximize their own limited objectives, which would lead to a suboptimal global solution.

The choice of a global objective is up to the policy makers. In the context of very high energy prices, it seems reasonable to focus the urban efforts on the construction of ecologically efficient cities. This would require consideration of urban growth boundaries and integrated land management to optimize the location of housing and employment and the type of transport links between them.
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