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ARTICLE

Evaluating China's National Post-Disaster Plans: The 2008 Wenchuan Earthquake's Recovery and Reconstruction Planning

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Abstract The 2008 Wenchuan Earthquake caused tremendous casualties and property losses as well as a substantial need for rebuilding the affected localities in order to address housing and urban development issues for the future. China's central government applied a national planning approach in both the emergency response and the disaster recovery phases that aims at facilitating the flow of technological assistance and financial aid from the whole country to the earthquake-stricken areas. This study reviews disaster management practices in China with an interdisciplinary analysis to see how disaster planning and management can be fit into the top-down government administration system. The *Overall Plan for Post-Wenchuan Earthquake Recovery and Reconstruction* and the *City/Town System Plan for Post-Wenchuan Earthquake Recovery and Reconstruction*, two overarching plans initiated by the central government, are evaluated by reviewing the underlying facts, goals, and actions. The plans' merits are to be found in their incorporating hazard mitigation into disaster recovery plans and taking into account different strategies of relocation and reconstruction. The article also identifies the gap between making plans and meeting local needs, the insufficiency of public engagement in plan-making, and the negative planning impacts of competition for resources and funds. Suggestions for disaster planning and policy-making are provided with a focus on building a local disaster management system in China.

Keywords China, national post-disaster plans, recovery and reconstruction planning, Wenchuan Earthquake

1 Introduction

1.1 Recovery and Reconstruction Planning

Disaster planning has become increasingly crucial as an effective human intervention in achieving sustainable community development when confronted with natural disasters. It attracts numerous scientific studies from various disciplines, and contributes to "Sustainability Science" (Clark and Dickson 2003) by studying the dynamic coping mechanisms designed to manage human-environment systems for sustainability under uncertainty (Levin and Clark 2010). Recovery and reconstruction planning, an important component of disaster management systems, represents a comprehensive response and proactive adjustment in disaster recovery, which is part of the "Vulnerability Framework" proposed by Turner and his colleagues (2003).

Land-use planning (or urban and regional planning) has been widely utilized in disaster recovery practice to build resilience to natural disasters (Burby 1998). In risk management or emergency management, it is considered as one of the best practices of prevention and mitigation (Leonard and Howitt 2010; Lindell, Prater, and Perry 2006). Land-use planning has been readily adopted in post-disaster plans for community recovery and reconstruction. An analysis of how these plans are designed and how effective they are in disaster recovery processes is essential in understanding disaster planning decision-making and implementation.

Planning, as a direct and standardized response to natural disasters, in most cases is initiated and implemented as mandated, funded, and managed in a top-down fashion (Schafer et al. 2008). This occurs internationally in both centralized (for example, Japan and Taiwan) and decentralized (for example, U.S.A.) government systems, especially when dealing with disasters at a regional or national level (Amendola et al. 2008; Schafer et al. 2008; Wu and Lindell 2004). As the post-disaster risk communication is initiated by governments, diversified stakeholders become involved in the policy-making processes, which are prevalent in the disaster recovery practices of many countries. On the one hand, the top-down post-disaster planning and management mechanism is effective as a quick and systematic governmental intervention on the disaster-affected areas with financial aid, relief resources, policy rewards, and development priority setting. On the other hand, latent policy-making problems such as a lack of policy flexibility and specificity for localities are possibly affecting the implementation of the state-mandated policies and plans.

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1.2 Wenchuan Earthquake, China

In the past three years, China has unfortunately experienced a series of devastating natural disasters beginning with the Wenchuan Earthquake. Also known as the Sichuan Earthquake, it occurred on May 12, 2008 in Sichuan Province. The epicenter was 80 kilometers west-northwest of Chengdu, the capital of Sichuan, with a focal depth of 19 kilometers. The earthquake was felt as far away as Beijing (1500 kilometers away) and Shanghai (1700 kilometers away) and also in nearby countries. It was defined and reported as a national disaster by the State Council of China. Official figures (as of July 21, 2008) state that 69,227 people were confirmed dead, including 68,636 in Sichuan Province, and 374,176 were injured, with an additional 18,222 listed as missing. The earthquake left about 4.8 million people homeless (reportedly the number could be as high as 11 million). The affected areas used to have a population of 21.23 million, including a large portion of rural residents and ethnic minorities such as the Qiang Minority. The Wenchuan Earthquake was the deadliest to hit China since the 1976 Tangshan Earthquake, which caused 240,000 casualties. On November 6, 2008 the national government announced that it budgeted 1 trillion Yuan (about 146.5 billion U.S. dollars based on the November 2008 exchange rate) over the next three years to rebuild areas ravaged by the earthquake.

The 2008 Sichuan Earthquake caused tremendous casualties and property losses and resulted in massive efforts to plan for local reconstruction and urban-rural sustainable development. Due to the scarcity of available land, the physical and social vulnerability of the local communities, and the lack of a national disaster planning mechanism, urban and regional planning was pushed to the forefront of the emergency response and disaster recovery agenda. Two national recovery and reconstruction plans were followed by a wave of planning revisions and updates in the local regions and cities by professionals and experts throughout China.

1.3 Research Questions

This article examines the role urban planning played in the overall disaster recovery and reconstruction process and analyzes the plan-making of the two national recovery and reconstruction plans as well as the national planning system in response to a national disaster. The plan evaluation and disaster policy and management assessment aim to answer the following questions:

(1) Are these post-disaster recovery and reconstruction plans consistent with local demands?
(2) Are there any bottom-up feedbacks and public engagement in the plan-making process?
(3) Are these plans incorporated with a pre-event mitigation component?
(4) Can these plans potentially cause competition for resources and relief funds?
(5) Is there a local disaster management system institutionalized in China?

2 Method

This empirical study adopts a policy analysis research method based on case studies with an explanatory goal and a focus on contemporary events (Yin 2003). The pertinent data are gathered from previous literature, government historical data, archival data, Internet resources, and plan texts and maps from urban planning consultants.

The study reviews disaster management practices in China by incorporating an interdisciplinary analysis of urban planning, hazard and disaster studies, and public administration. It analyzes disaster planning and management in the context of the current government administration system.

Two national-level plans that were drawn up after the Wenchuan Earthquake were selected for plan quality analysis and policy analysis. One is the *Overall Plan for Post-Wenchuan Earthquake Recovery and Reconstruction* (Planning Group of Post-Wenchuan Earthquake Recovery and Reconstruction 2008), and the other is the *City/Town System Plan for Post-Wenchuan Earthquake Recovery and Reconstruction* (China Academy of Urban Planning and Design 2008). The plan content evaluation is conducted with two basic methods. One is oriented, from the perspective of the disaster recovery studies, towards recovery phase delineation; and the other follows the plan quality evaluation school in the discipline of urban planning by examining the plans' factual basis, goals, and actions (including policies, tools, and strategies). The analyses are expected to show both merits and lessons from the plan-making processes through an evaluation of the effectiveness and feasibility of the plans. All the findings support the need for a more comprehensive national disaster planning system for future disaster planning and management in China.

3 China's Disaster Management System

Britton (2006, 347) argued that the notion of a "national system" for disaster management "calls for specific actions at a central government level." While there are significant differences between the political systems of China and others in the world, the central government in China, just like other national governments, "[does] not automatically recognize disaster management as a core function" (Britton 2006, 349). As a geographically large and disaster-prone country, China presents a diversity of economic development levels and a complexity of social, economic, cultural, ecological, and environmental issues. There is an urgent need for a national disaster management system to direct the administrative authorities having to deal with disasters/emergencies in provincial, prefectural, and municipal governments. In the highly hierarchical administrative system of China, the single

political party has great influence over the whole system. In the planning domain, plans initiated by local governments must be approved by upper-level governments. The vertical circulation of communication between governments at various levels on the one hand ensures an integrative output and strong incentive for plan implementation at the local level, but on the other hand increases the transaction costs of policy-making and potential fallacies in implementation. Before reviewing the national recovery and reconstruction planning practices after the Wenchuan Earthquake, it is important to understand the national disaster management framework in China in general, which can be summarized into four key components.

First, a production safety monitoring system, whose capacity has improved steadily from the establishment of the People's Republic of China in 1949, is the origin and foundation for an all-hazard management system. Since the liberation from the former semifeudal and semicolonial administration, the new China has experienced a gigantic social revolution. Based on the existing industrial system, production safety issues have been the priority in emergency management, which was a void in government management field at that time and recognized by the Chinese government recently.

Second, a post-disaster aid and relief system is highly reliant on the central government and requires a substantive government investment. Within a centralized system of administration, governments, especially the central government, take on the responsibilities of disaster recovery in terms of economic regeneration and settlement reconstruction. Before 1978, the year when the Reform and Open-up Policy was launched, China had an administrative system in which the central government controlled most aspects of provincial and local governments through strict and rigid mandates. Big disasters, exemplified by the 1976 Tangshan Earthquake, were directly aided by national budget and relief funds. Although the socialist market economy has become the main feature of China today, post-disaster aid and relief remain the tasks of the central government, a paradigm from the previous planned economy. However, the good news is that more Chinese and international NGOs and local governments have started to participate in disaster recovery in many ways, such as in public education, training, scientific research, donation, and international technical support.

Third, the emergency management system that was formally founded in 2005 requires a large amount of capacity building efforts. Nominally, the National Committee for Disaster Reduction is housed in the Ministry of Civil Affairs, but its functions only cover policy research, disaster monitoring, and coordination by a small number of employees. In the United States, although the Federal Emergency Management Agency (FEMA) has become the leader of the national hazard mitigation and disaster recovery system, it remains a nascent agency under the Department of Homeland Security and is still in need of capacity building and role definition. Similarly, the National Committee for Disaster Reduction in China is still a newer governmental authority and has not established regional branches. In addition, emergency management authorities at the local level are mainly set up in departments such as Public Safety, Housing and Urban-Rural Construction, and National Land Resources and Management. Thus, an effective national emergency system is far from fully developed and institutionalized.

Finally, a disaster insurance system is still at a trial stage. Globally, the use of disaster insurance is very complicated in different nations and the success in practice is also very mixed. For example, in the United States disaster insurance for individuals has already become an indispensable instrument to protect property owners against financial losses after natural disasters (Mileti 1999, 166). But in many hazard-prone developing countries disaster insurance is still a new field to be explored. In China, disaster victims can receive compensation from life insurance and property insurance companies, but only a few disaster insurance plans have been designed by the insurance and reinsurance industry in China. Some business insurance companies have started to promote a 10 percent additional earthquake insurance attachment to existing packages, but very few insured purchase these since it is not mandatory.

4 Post-Wenchuan Earthquake National Plans Evaluation

China is in a transitional period in which a vibrant socialist market economy is taking the place of the previous planned economy. However, in most administrative practices, the features of a planned national system remain very clear. This is especially true for the disaster recovery and reconstruction efforts after the Wenchuan Earthquake. As a quick emergency response, the State Council organized a national planning system for the recovery process (Figure 1). Due to the severe damage to most quake zones in the earthquake as well as the enormous demand of housing recovery, the plan system focused on city/town reconstruction and was led by urban and regional planning authorities from the central and provincial governments to local governments. From the national planning system, one can reflect on the reform of the national disaster management system and thus improve the current system from the plan-making and plan implementation perspectives.

In Figure 1, plans 2 to 4 in the middle box (the "9+1 Plans" box) were led by the Ministry of Construction of China, whose major responsibilities are in housing and construction. In this study, we will analyze the *City/Town System Plan* and the overarching plan, the *Overall Plan of Recovery and Reconstruction*. As a whole, the "9+1 Plans" serve as the core of the structure that connects the 3 assessment reports and the 8 policy studies.

According to the widely accepted classification of measures for mitigating natural hazards including seismic hazards that generally divides them into structural and non-structural

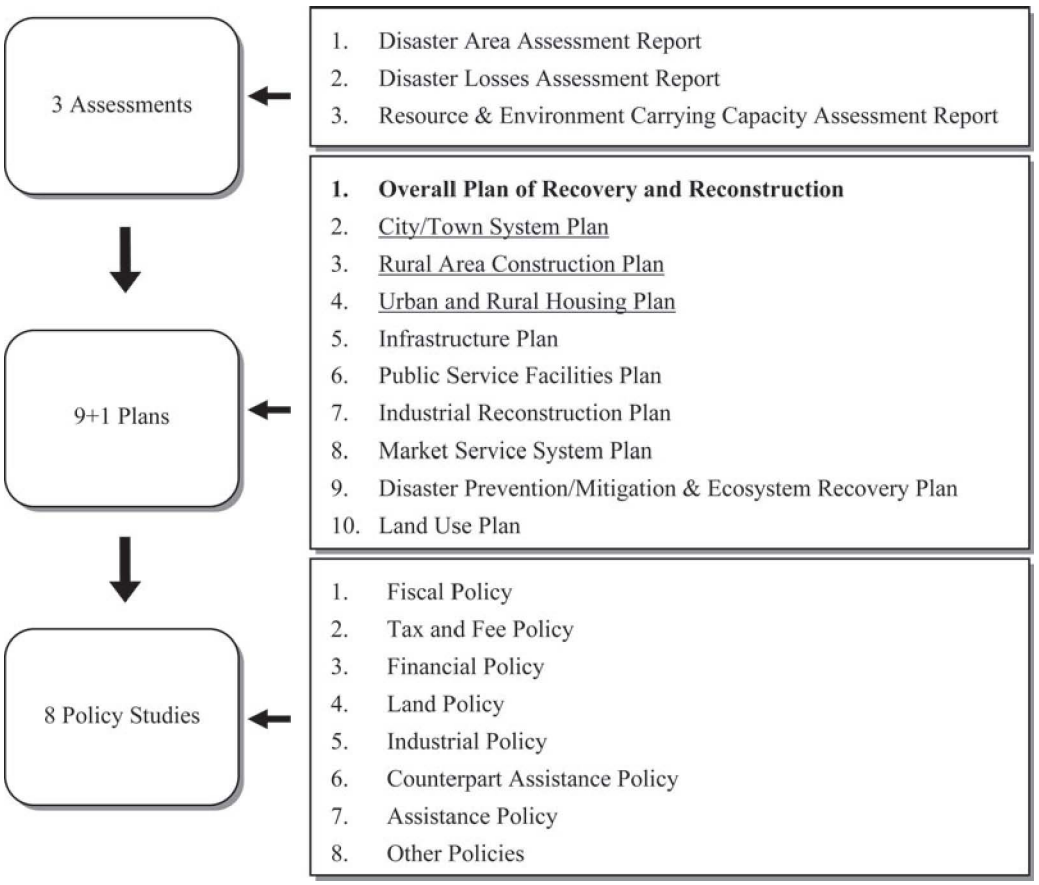

Figure 1. The overall recovery and reconstruction planning system
Source: Planning Group of Post-Wenchuan Earthquake Recovery and Reconstruction 2008.

mitigations (Godschalk et al. 1999, 5), the post-Wenchuan national plans adopted a comprehensive approach with a non-structural emphasis on land-use planning adjustments in heavily damaged regions. The three major policy instruments of sanctions, incentives, and risk communication (Lindell and Perry 2004; Lindell, Prater, and Perry 2006) in the national plans can be seen as strong regulatory mandates complemented by a few fiscal and financial incentives.

4.1 The Overall Plan of Recovery and Reconstruction

4.1.1 Planning Area

The Wenchuan Earthquake struck over 417 counties (or city districts) in 10 provinces (or autonomous regions, provincial-level municipalities), covering a total area of 500,000 km^2 in western China. Faced with the huge geographical scope of the disaster areas, the overall plan focuses on the heavily damaged areas (Figure 2). This includes 51 counties with a total area of 132,596 km^2. Altogether 14,565 administrative villages in 1,271 townships (within the counties) are under consideration, of which the total population by the end of 2007 was 21.23 million. The whole planning area is classified into two levels: (1) severely affected areas (pink) including 10 counties in Sichuan Province (Wenchuan, Beichuan, Mianzhu, Shifang, Qingchuan, Mao, An, Dujiangyan, Pingwu, and Pengzhou); and (2) affected areas (yellow) including 41 counties in total, 29 in Sichuan Province, 8 in Gansu Province, and 4 in Shaanxi Province (Planning Group of Post-Wenchuan Earthquake Recovery and Reconstruction 2008).

4.1.2 Plan Content Evaluation

Quarantelli (1999, 2) proposed that recovery often implies "attempting to [bring] and/or bringing the post disaster situation to some level of acceptability. This may or may not be the same as the pre-impact level." This definition includes a variety of issues pertaining to recovery: physical recovery, economic recovery, and social/psychological recovery (Figure 3). The post-earthquake plan (Table 1), as a recovery plan on a regional level, comprehensively reflects the three interconnected recovery processes.

Alternative options are recommended for housing reconstruction and city/town relocation. The plan pays close attention to temporary housing and permanent housing both in urban and in rural areas, since the plan was approved by the State Council and began to be implemented in September

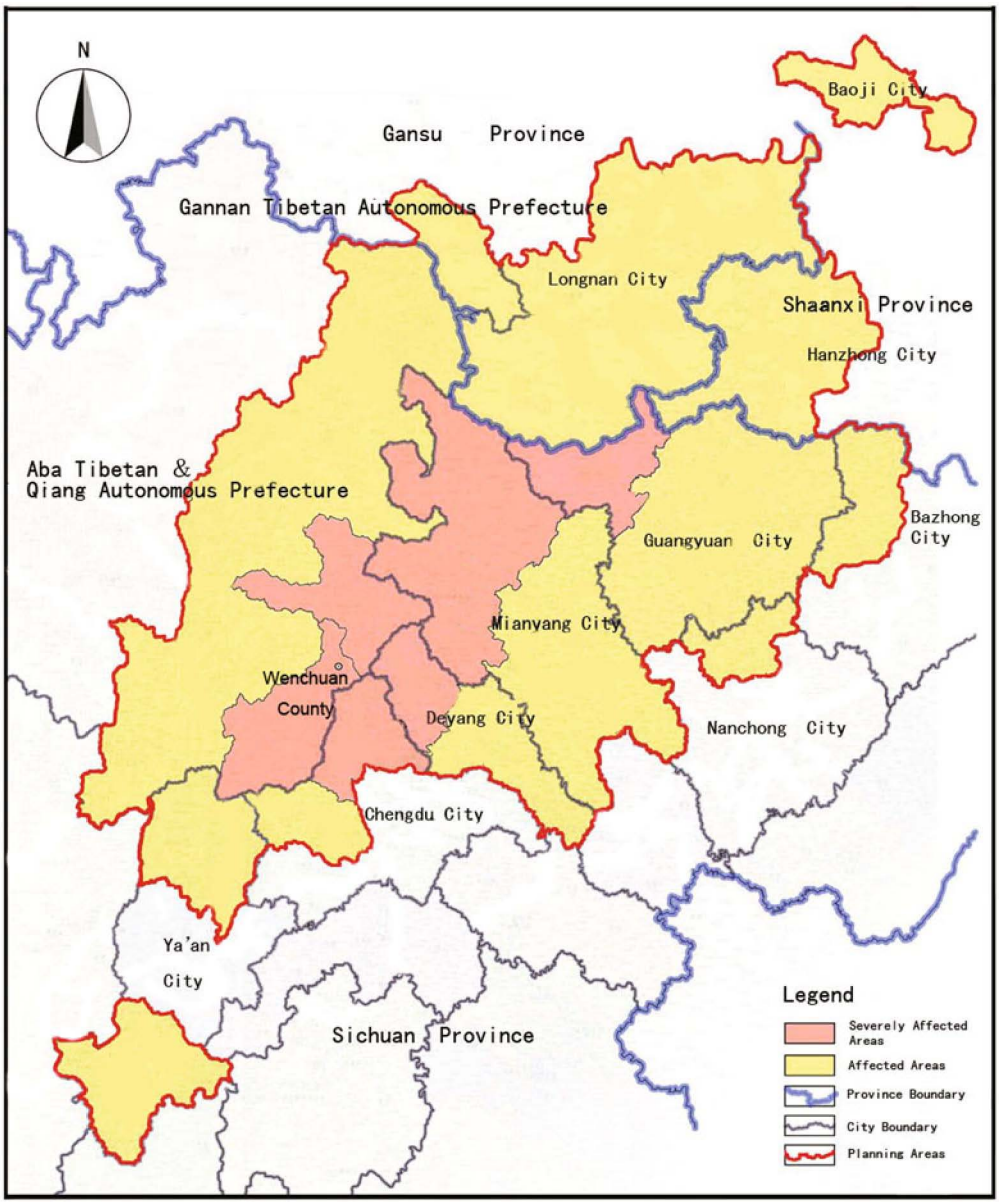

Figure 2. Planning area of the Overall Plan of Recovery and Reconstruction
Source: Planning Group of Post-Wenchuan Earthquake Recovery and Reconstruction 2008.

2008, four months after the formidable earthquake. Associated infrastructure (Chapter VIII) and public services recovery (Chapter VII) are explicitly addressed as well to back up the housing reconstruction.

In addition to household recovery, the plan intervenes by applying ways to recover businesses and proposes feasible projects and industries with comparative advantages (tourism and cultural industry) for the disaster-stricken areas. In Chapter XIII, various policies and economic incentives are presented to assist in plan implementation. Economic incentives are comprised of fiscal policy, tax and fee policy, financial policy, counterpart assistance policy, and other assistance policies. Among them, counterpart assistance acts as a very unique program that bridges cities in the coastal areas and cities/towns in the affected areas. One-on-one assistance embodies a planned economy from before 1978 and reduces the huge financial burden on the central government in terms of recovery relief.

From the social and psychological recovery perspectives, the plan focuses on humane care and national spirit in Chapter XII. Cultural representation of ethnic minorities, especially for the Qiang Minority, is given specific consideration by repairing and restoring vernacular buildings, rescuing and protecting intangible cultural heritage, and building earthquake memorials. Through phased in community reorganization and community regeneration shown in Figure 3,

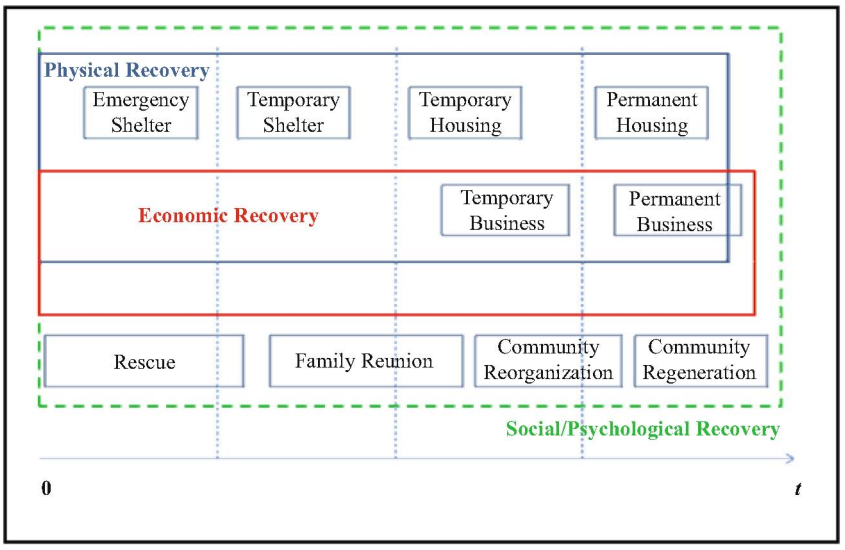

Figure 3. Processes of disaster recovery

Table 1. Contents of the Overall Plan of Recovery and Reconstruction

Chapter I Basis for Reconstruction
- §1 An Overview of the Disaster Areas
- §2 Disaster Losses
- §3 Challenges
- §4 Favorable Conditions

Chapter II General Requirements
- §1 Guidelines
- §2 Basic Principles
- §3 Reconstruction Objectives

Chapter III Spatial Distribution
- §1 Division of Reconstruction Areas
- §2 Urban and Rural Distribution
- §3 Industrial Distribution
- §4 Population Resettlement
- §5 Land-Use Arrangements

Chapter IV Urban and Rural Housing
- §1 Rural Housing
- §2 Urban Housing

Chapter V Urban Construction
- §1 Municipal Public Utility Facilities
- §2 Famous Cities, Towns and Villages of Cultural and Historical Interests

Chapter VI Rural Construction
- §1 Agricultural Production
- §2 Agricultural Service System
- §3 Infrastructure in Rural Areas

Chapter VII Public Services
- §1 Education and Scientific Research
- §2 Health and Medical Care
- §3 Culture and Sports
- §4 Cultural and Natural Heritages
- §5 Employment and Social Security
- §6 Social Management

Chapter VIII Infrastructure
- §1 Traffic
- §2 Communications
- §3 Energy
- §4 Water Conservancy

Chapter IX Industrial Reconstruction
- §1. Industry
- §2. Tourism
- §3. Commerce and Trade
- §4. Finance
- §5. Cultural Industry

Chapter X Disaster Prevention and Mitigation
- §1. Disaster Prevention and Control
- §2. Disaster Mitigation and Relief

Chapter XI Eco-Environment
- §1. Ecological Recovery
- §2. Environmental Improvement
- §3. Land Consolidation and Reclamation

Chapter XII Spiritual Homeland
- §1. Humane Care
- §2. National Spirit

Chapter XIII Policies and Measures
- §1. Fiscal Policy
- §2. Tax and Fee Policy
- §3. Financial Policy
- §4. Land Policy
- §5. Industrial Policy
- §6. Counterpart Assistance Policy
- §7. Assistance Policy
- §8. Other Policies

Chapter XIV Reconstruction Funds
- §1. Fund Demands and Financing
- §2. Financing Innovations
- §3. Funds Allocation

Chapter XV Planning Implementation
- §1. Organization and Leadership
- §2. Planning and Management
- §3. Categorized Implementation
- §4. Material Support
- §5. Supervision and Inspection

Source: Planning Group of Post-Wenchuan Earthquake Recovery and Reconstruction 2008.

Wenchuan Earthquake affected areas plan to strengthen community attachment and amplify the cultural uniqueness to help local residents with psychological rehabilitation.

Evaluation criteria of plan quality (Brody 2003; Kaiser, Godschalk, and Chapin 1995; Tang et al. 2008) are to be utilized to assess the strengths and weaknesses of the overall plan. First, the plan systematically introduces the demographic and socioeconomic background and provides a disaster impact assessment in terms of both casualty and property losses. Second, overarching objectives have been set out in Chapter II in light of economic goals, environmental goals, and public welfare goals. The problems are reflected in the lack of stakeholder identification, clear timelines, and measurable indicators for assessing the effectiveness and efficiency of plan implementation. This can be attributed to the fact that it is the general or basic plan in the overall post-Wenchuan recovery and reconstruction planning system and it requires a series of consecutive detailed plans to lay out specific objectives in the recovery. Third, the policy and implementation chapters (XIII – XV) are the most impressive sections of the plan covering issues in the "9+1 Plans" framework by providing both mandatory regulations and voluntary incentives. Last, while short in length, policy-makers have started to integrate disaster mitigation and monitoring into the plan by applying pre-impact tools and strategies in a recovery plan.

Finally, the plan can be viewed as a quick response and recovery plan to the national disaster, but emergency preparedness should be added to address issues before disasters have happened. Another recommendation is for future analyses of sociocultural vulnerability to complement the "3 Assessment Reports" from a social behavioral perspective.

4.2 The City/Town System Plan

The City/Town System Plan is a very unique regulatory plan inheriting from the planned economy model. From a regional perspective, the plan addresses the spatial distribution and temporal ordering of reconstruction for cities/towns in the planning area and guides the plan-making of urban master plans for enclosed cities/towns (Table 2).

Table 2. Contents of the City/Town System Plan

1	General Principles
2	Goals and Objectives
3	Spatial Arrangement of Cities/Towns
4	Housing
5	Public Service Facilities
6	Inter-City Infrastructure
7	Infrastructure in Cities
8	Historic and Cultural Cities/Villages Conservation
9	National/State Parks
10	Geological Hazard Prevention and All-Hazard Mitigation System
11	Budget Plan of Investment
12	Plan Implementation

Source: China Academy of Urban Planning and Design 2008.

The initial task for this systematic plan is to identify the variations of urban development directions among the planned cities/towns in terms of physical redistribution and economic regeneration. The plan benefits from the scientific evidence and assessment from the "3 Assessment Reports" (see Figure 1) in the overall recovery and reconstruction planning system, especially the overall suitability assessment for the living environment (see Figure 4) and proposes an important development priority ranking of cities/towns (Figure 5). The economic development network in a regional system and the cross-jurisdiction land-use structure predict the future pattern of the city/town system in the earthquake area and coordinate the local development from a central government's initiative. The plan term covers three years, from 2008–2010. As an action plan, professional planning standards of housing, land use, employment, and infrastructure have been flexibly adopted for different cities/towns. The city/town system plan clarifies development priorities and spatial relationships for cities/towns in the recovery and reconstruction system.

As a follow-up plan to the *Overall Plan of Recovery and Reconstruction*, the *City/Town System Plan* shares the solid factual basis analysis in the earthquake-affected areas, stipulates in more detail the objectives set in the *Overall Plan*, and proposes a series of strategies for diversified relocation and reconstruction.

5 Results and Discussions

5.1 Consistent with Local Demands?

The two national plans on post-disaster recovery and reconstruction were officially initiated by the central government and created a situation in which government officials from various levels of government and technical experts from places other than the localities became the main force dealing with the recovery plan-making. The common practice is that they stay at the disaster areas for a brief period of time, usually less than a month, draft plans with technical documents and plots for construction, report them to the local governments, and leave with the possibility of returning for several governmental evaluation meetings to revise the plans. Although they worked at the earthquake sites under extremely tough working conditions and dangerous trembles for a couple of weeks, due to the unfamiliarity with the local situation and the emergent needs of publishing the plan to direct recovery, inevitably there are concerns about the consistency of the technical plans with the real needs of the local residents. To what degree these plans can be implemented effectively in a locale is to be examined through the plan monitoring processes.

5.2 Any Bottom-up Feedbacks and Public Engagement?

Wu and Lindell (2004, 63) noted that during the disaster recovery process, "immense confusion and conflict" will take

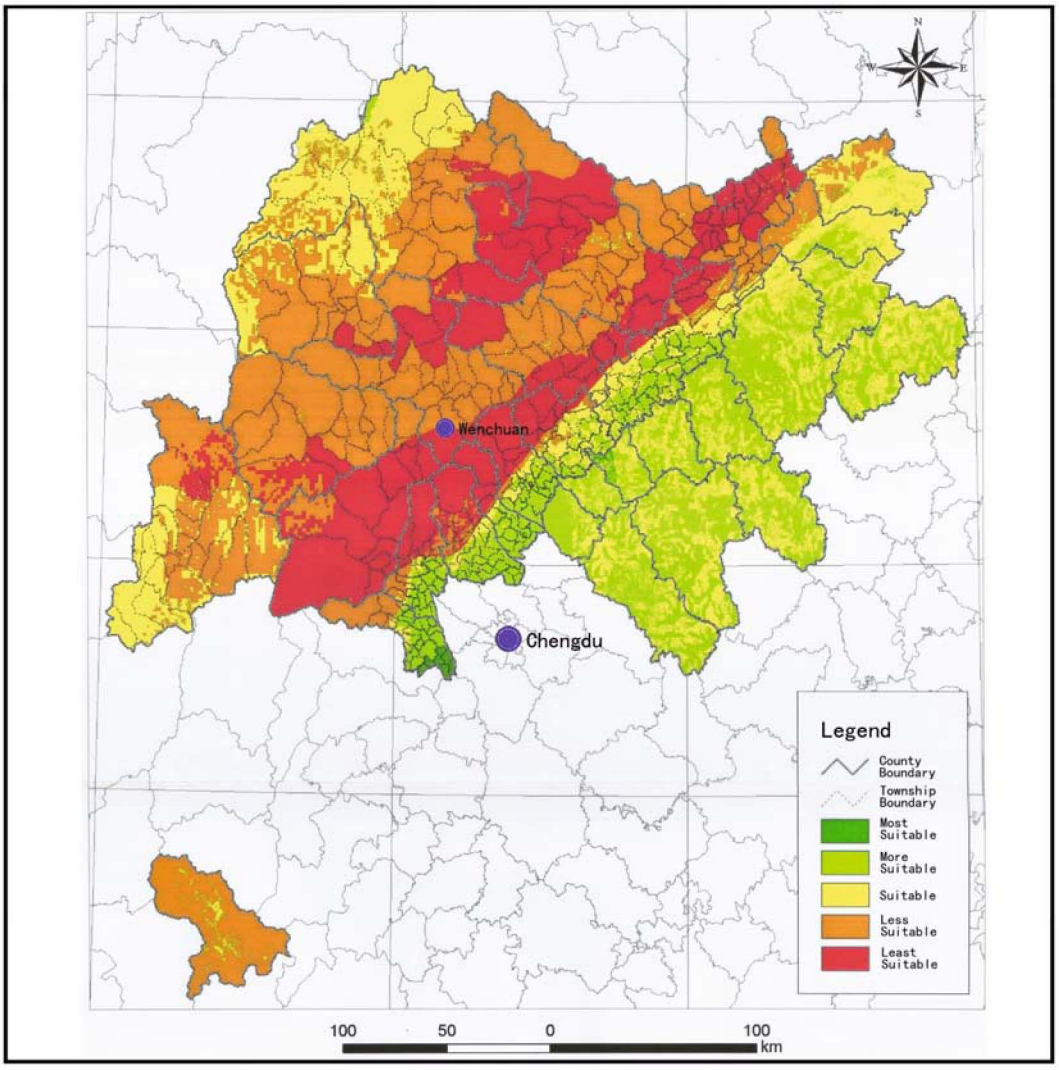

Figure 4. Suitability analysis of the living environment
Source: China Academy of Urban Planning and Design 2008.

place between different stakeholders and local governments concerning many aspects of recovery and reconstruction. Public engagement of NGOs, local communities, and businesses should be a critical component in post-disaster plan-making and updates. Because of the highly administrative functions of the reconstruction plans, they could not explicitly address grassroots' voices due to the limited time in plan-making as well as risk communication barriers in the hierarchical institutional architecture. For instance, the strong place attachment of the local victims cannot be sufficiently addressed in recovery and reconstruction plans at the household level. The worries and anxieties over future livelihoods among the victims to be displaced as decided by some plans may be extremely overwhelming. China has a long way to go in sociopolitical reform to be able to deal with not only emergency management but also the administrative system as a whole to be able to take into account household-level demands in making public policies.

5.3 Post-Disaster Reconstruction or Pre-Event Mitigation?

The two plans analyzed here as well as other planning conducted for Wenchuan Earthquake recovery and reconstruction were primarily post-disaster plans for reconstructing the local communities in seismically secure places and restoring the overall society to the previous state. But the national plan-making approaches also shed light on natural hazard mitigation through land-use planning, which is pre-event and proactive. All plans are based on scientific investigations on both local physical conditions and intended local communities' demands. The comprehensive goal of building a resilient society with the combination of local reconstruction and intraprovincial migration exhibits the humanitarian intention for the disaster victims in terms of respecting whether or not they are willing to relocate, maintaining cultural and religious traditions, recovering local businesses, initiating national

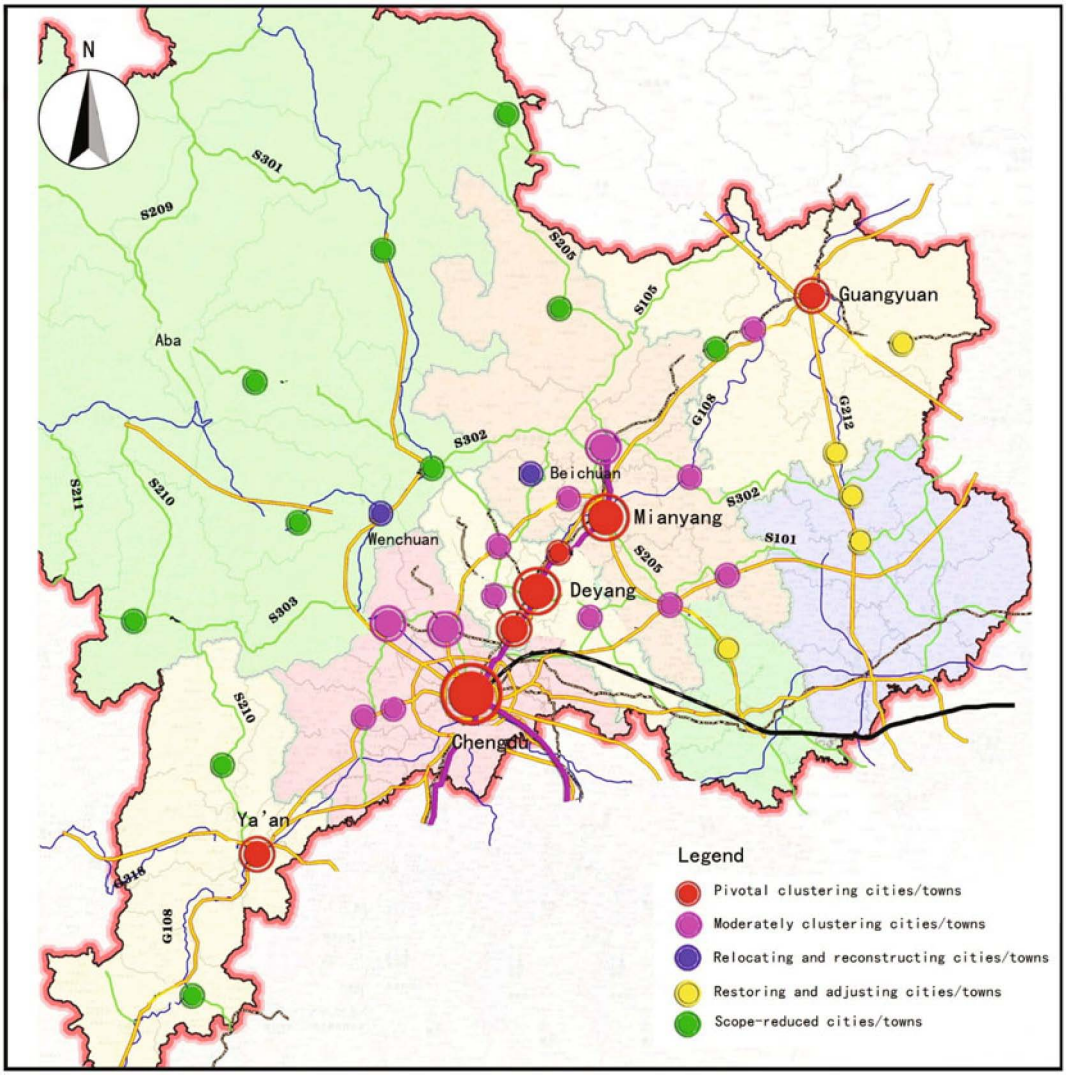

Figure 5. Plan of city/town ranking in severely damaged areas
Source: China Academy of Urban Planning and Design 2008.

and regional assistance systems, and aiming at regional development.

5.4 Competing for Resources and Funds?

With an urgent and huge demand of financial support to rebuild the communities, local governments and communities compete for the limited resources including funds and technical personnel, and also development priority rankings of city/town systems. Some negative impacts can be expected from several regional plans differentiating and defining not only the trend of urban development in the next few years but also the prospective visions in the long run that have been affected by local interests. Furthermore, cities/towns within the planning area will benefit from the aid and relief system from the central government much more than some remote places, such as villages in Gansu and Shaanxi provinces that are not included in the planning area. In a large-scale disaster recovery process, to consider every disaster-stricken area and evaluate each one objectively and transparently is a task not only for scientists and technicians but, more significantly, for policy-makers to help achieve a goal of social equality and design a better mechanism for disaster relief.

5.5 Local Disaster Management System?

Finally, the heavy dependency on urban and regional planning professionals and departments cannot substitute for forming a solid local disaster management system. Both the academics and professionals in disaster management are surprisingly few in number and also insufficient in proficiency of skills and scope of research. The Wenchuan Earthquake and other national disasters in the past stimulate the development of a comprehensive disaster management system in China in two ways. On the one hand, an administrative framework of disaster management ought to be at the top

of the agenda of both the national and local governments in order to institutionalize an individual disaster management system into the existing multiagency government fabric. On the other hand, in addition to the physical recovery and reconstruction, the long-term socioeconomic recovery and psychological recovery processes are equally important, which requires a multi- and interdisciplinary research architecture to ascertain that the recovery plans and policies are more scientific and effective.

6 Policy Recommendations

6.1 Post-Disaster Migration

In the next three to eight years, because of the massive relocation and reconstruction in earthquake areas and the relief demand for socioeconomic recovery, China's central government will bear an enormous burden in post-disaster investment and financial aid to both communities and individuals. Lacking a sound disaster insurance system in China, the financial aid will last for a much longer period. Since most of the earthquake-stricken jurisdictions are economically underdeveloped and have limited highways linked to big cities, the reconstruction of the affected cities, towns, and villages calls for considerable financial support. Meanwhile, the residents of some severely damaged jurisdictions will have to rely on physical migration to the neighboring jurisdictions, which also causes a series of social issues in addition to the financial burden. Thus, the recovery and reconstruction plans follow a principle of local reconstruction as the first choice to attenuate the potential problems induced by emigration from intensively damaged jurisdictions.

Chen and Luo (2010) investigated 1243 households in the severely affected areas to explore their willingness of rebuilding. They found that a couple of factors were statistically significant in affecting households' decisions on relocating to new places versus rebuilding locally. Being in the severely affected area, being rural, high educational attainment, and high adaptation ability to a new environment are positively related to higher willingness to relocate to new places. However, property losses other than houses, place attachment to local communities, and pessimism about the household economy in the future are negatively associated with relocation decisions. These findings effectively support the plans' general principle of encouraging the internal displaced persons (IDPs) to migrate within Sichuan Province.

The *UN Guiding Principles on Internal Displacement* (UN-OCHA 1998) and the *Guiding Principles on Internal Displacement: Annotations* (Kälin 2008) provide a normative framework for countries to deal with internal displacement issues that the post-disaster recovery and reconstruction plans can refer to. Migration after the Wenchuan Earthquake is a disaster-oriented environmental migration, which involves 15 million earthquake victims relocating to new towns and cities within Sichuan Province and Chongqing Municipality. In response to the tremendous and urgent need of emergency housing, most victims were resettled in towns and cities adjacent to their own jurisdictions. Later on, regional migrations are to move to the Sichuan Basin region where there are fewer seismic hazards and major cities are located. The forced internal displacement after natural disasters initiates a number of national taskforces and interprovincial assistance in disaster-affected areas.

6.2 Public Education, Training, Drills

Because there are still no preparedness plans or related components in the current recovery and reconstruction planning system, public education, training, and drills will not be well incorporated into the disaster management of local communities. This will delay psychological recovery and mean a loss of opportunity for enhancing the disaster-response capacity of households and businesses. Disaster emergency response involves not only actions from related governments and NGOs but also self-rescue and mutual assistance among victims. Although the military promptly reacted to the devastating earthquake, it is also crucial for the victims themselves to create an order and find a means for an immediate rescue. Effective self-reaction to disasters needs to be embedded in local communities through long-time education, training, and drills. Addressing these important issues is an urgent call to urban planners and emergency managers in the recovery planning process.

7 Conclusion

The recovery and reconstruction planning approach in the wake of the Wenchuan/Sichuan Earthquake is effective in terms of immediate emergency response, technical support, and relief assistance, but short-term recovery plans lack consistency with local demands and are insufficient in addressing the long-term sustainable development issues in the post-disaster urbanization process. The evaluation of the plan contents and the assessment of the planning system in the disaster recovery practice are of great assistance to policy-makers in the disaster-stricken areas to find sustainable solutions in building disaster-resistant and disaster-resilient communities. It will have significantly broader impacts on raising policy-makers' awareness about the need of a sustainable institutional reform to construct a national disaster management system embedded in the centralized administrative architecture.

Further studies need to review the tools and strategies in those plans in order to evaluate the policy implementation practice in the local areas and solve the development problems emerging from the implementation stage. Coordination between different levels of governments can be another evaluation criterion to study when reviewing the post-disaster plans since it largely affects the efficiency and effectiveness

of plan implementation in the recovery and reconstruction processes. There is also a need for future research to assess the cognitive processes of planners in plan decision-making as well as the public engagement potential under the current top-down sociopolitical system.

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