Huang, Y. N. & Wong, H. (2017). Disaster recovery and sustainable community development. In C. N. Madu & C. H. Kuei (Eds.), *Handbook of disaster risk reduction & management* (pp. 787-804). London: World Scientific Publishing Company. doi: 10.1142/9789813207950_0033

# Chapter 33

## Disaster recovery and sustainable community development

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This chapter addresses disaster recovery. The theories related to disaster recovery including systems, vulnerability, socio-political ecology, feminist, and emergent norm theories and the models of disaster recovery including four-stage, top-down, holistic, community-based, and sustainable community development models are presented, with the focus on sustainable community development. The case of the recovery of the 5.12 Wenchuan earthquake is examined by adopting the six principles of sustainable community development. It is shown that overall the principles were not well implemented in this earthquake recovery. It is argued that China's political system, unjust social policy, rapid recovery process, lack of recovery expertise, and the environmental characteristics of the earthquake-affected areas might result in the poor implementation of sustainable community development principles in the recovery.

**Keywords**: disaster recovery, sustainable community development, the Wenchuan earthquake, China

## 1. Introduction

Disasters can be defined as natural events, social disruptions, and political phenomena that affect individuals, families, and communities physically, psychologically, and spiritually (Mirzamani and Mohammadi, 2007; Quarantelli, 1998; Rosenfeld *et al*., 2010). Although disasters may trigger severe, lasting, and pervasive psychological, social and other problems (Erikson, 1976; Freedy *et al*., 1993; Green, 1995; Logue *et al*., 1981; Norris *et al*., 2002a; Norris *et al*., 2002b; Winkworth, 2007), they may provide an opportunity for new voices to be heard in society and become a force for change and building a more resilient and sustainable community (Berke *et al*., 1993; Phillips, 2009). This chapter describes and discusses disaster recovery and sustainable community development and their relations. The first section comprises the introduction. The second section briefly describes concepts and theories on disaster recovery. The third section introduces the post-disaster sustainable community development. The fourth section applies the principles of sustainable community development to examine the case of the recovery of the Wenchuan earthquake, which happened on May 12, 2008 in Sichuan China. The fifth section presents the discussion and the conclusion.

## 2. Disaster recovery

Disaster management has four phases, namely, mitigation, preparedness, response, and recovery (National Governors' Association, 1978). Although the definition of recovery remains a subject of debate, recovery involves short- and long-term efforts to rebuild disaster-affected communities, which commences after the immediate threat lessens and the survivors' basic needs are met (Berke *et al*., 1993; Gardoni and Murphy, 2008). This phase includes reconstructing and restoring the disaster-stricken area, dealing with community disruption, meeting the survivors' needs, and mitigating future hazards (Tierney, 1993; Winkworth, 2007). There are different theories related to disaster recovery and distinct models of disaster recovery.

### 2.1. *Theories related to disaster recovery*

Few theories have been developed specifically for disaster recovery. However, theories in other fields, such as systems, vulnerability, socio-political ecology, feminism, and emergent norms, can shed light on disaster recovery scenarios (Phillips, 2009). Systems theory suggests the misfit of physical, build, and human systems that results in disasters and, accordingly, the need for disaster recovery development (Meleti, 1999). Physical systems are dimensions arising naturally from the environment that includes the atmosphere, geography, land, and so on. Built systems comprise roads, bridges, houses, ports, and other utilities. Human systems refer to people. According to systems theory, disaster recovery needs the rectification of the misfit of these three systems, and the achievement of a higher level of fit or safety among systems.

Vulnerability theory indicates the different susceptibility of individuals, families, groups, communities, and countries to losses from disasters (Blaikie *et al*., 2004). This theory specifies that some individuals, families, groups, communities, and countries are at higher risk than others during disasters, and argues that disaster recovery is a political and cultural process. According to vulnerability theory, unlike approaches should be used in disaster recovery given the different vulnerabilities within the population.

Socio-political ecology theory concerns about the interaction within a social system comprising a human community or an ecological network of actors, such as organizations and large groups. This theory focuses on heterogeneity and social inequality in disaster impact and outcomes (Peacock and Ragsdale, 1997). It regards disasters as events that disrupt the social system interaction and argues that competition occurs after disasters due to inequalities within the social system. Furthermore, it suggests that competition may conflict with the social system. Based on this theory, disaster recovery should pay special attention to the promotion of coordination within the network and the mitigation of destructive competition among systems during and after disasters.

Feminist theory is connected to disaster practice through examining the influence of gender on disaster experiences and includes a variety of perspectives, i.e., liberal feminism, multiracial feminism, and feminist

political ecology (Enarson and Phillips, 2008; Phillips, 2009). This theory points out that women and children are more likely to be severely affected by disasters and there are barriers for women to participate in decision making related to disaster policies and programs. Feminist theory recommends highlighting women's issues and empowering women's voices and participation in disaster recovery decision making and implementation.

Emergent norm theory studies dynamic characteristics of human behavior and organizational structures during disasters, particularly in the spontaneous aspects. This theory indicates that relatively spontaneous actions and organizations emerge during disasters to respond to newly emerging needs (Dynes and Quarantelli, 1968). It argues that disaster recovery should face and handle uncertainty given the new behavioral and organizational structures.

### 2.2. *Models of disaster recovery*

There are different models of disaster recovery according to distinct focuses. For example, based on the process of recovery, Kates and Pijawka (1997) presented a four-stage model of disaster recovery consisting of emergency, restoration, replacement reconstruction, and commemorative, better, and developmental reconstruction periods. Emergency period may last days, a few weeks, or longer periods depending on the nature of disasters and coping capacities of the community. This period mainly focuses on the search and rescue of survivors, emergency mass feeding, housing, and removal of debris from principal pathways. The restoration period will then last for some months to beyond a year. Main activities include patching up the utility, commercial, and industrial structures, and returning to the normal social and economic activities. The time duration for the third and fourth periods is difficult to define and to estimate. Replacement reconstruction period rebuilds the capital stock to pre-disaster levels and returns social and economic activities to pre-disaster levels or even improves the situation. The functions of commemorative, better, and developmental reconstruction periods are to remember the disaster, to mark the post-disaster betterment or improvement, and to serve future growth or

development. Research also indicated that the four stages are not necessarily sequential, and may occur either simultaneously or in a different sequence (Rubin *et al*., 1985; Sutphen, 1983).

Based on the roles or status of government and non-governmental agencies in recovery, Huang *et al*. (2001) indicated a top-down model of disaster recovery in which the central government in China took a leading and dominant role, followed by the local government, while the participation of non-governmental organizations was weak. Such a model might overlook disaster survivors' needs and interests. Other researchers (e.g., Berke *et al*., 1993; Kapucu, 2006) also contended that the effective disaster recovery model involves trust and collaboration between government agencies and public and non-profit sector agencies and the participation of citizen and organizations.

According to the objects of recovery, Norman (2006) described a holistic recovery program adopted by the government of New Zealand. The model integrated all social, built, economic, and natural environments during the recovery. The social environment included psychosocial issues, cultural considerations, social networks like schools and churches, and social constructs, such as volunteer agencies. The built environment included buildings, roads, and bridges. The economic environment comprised tangible factors, like business and jobs, and intangible factors, like relationships and goodwill. The natural environment pertains to dimensions arising naturally from the environment.

The Australian government's disaster recovery specifically emphasizes the participation of the community and may be regarded as community-based recovery. It is stated that "[r]ecovery is the coordinated process of supporting communities affected by disasters or emergencies, including terrorist incidents in the reconstruction of the physical infrastructure and the restoration of their emotional, social, economic and physical wellbeing" (Commonwealth of Australia, 2006: 55). The Australian Government further proposed that recovery should involve consequence management and long-term community rebuilding. Such a model is consistent with studies revealing the importance of a community's social capital, social network, and social support for the

recovery of disaster survivors (e.g., Huang and Wong, 2013; Shaw and Nakagawa, 2004; Tse *et al*., 2013).

In recent years, literature in disaster recovery has increasingly emphasized sustainable development (Becker *et al*., 2011; Mileti, 1999; Monday, 2002; National Hazards Center, 2005; Phillips, 2009). Smith and Wenger (2007) argued that sustainable development provides a useful framework to synthesize disaster recovery research perspectives, to develop a new theory of recovery, and to outline a future research agenda. The next section addresses the concept of sustainable community development and briefly reviews the literature on post-disaster sustainable community development.

## 3. Post-disaster sustainable community development

Sustainable development has been used diversely by different disciplines (Elliott, 2012; Hopwood *et al*., 2005; McEntire *et al*., 2002). The World Commission on Environment and Development (1987) defined sustainable development as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (p.43). Dale and Newman (2008) regarded sustainable development as a process of reconciliation with ecological, social, and economical imperatives in a community and the people's equal access to these resources. Barbier (1987) implied that sustainable development is "indistinguishable from the total development of society" (p. 103). Despite sustainable development being widely defined, common principles are emphasized, such as the commitment to equity and fairness, the precautionary principle, and the interconnection among the environment, economy, and society (Drexhage & Murphy, 2010; Hopwood et al., 2005).

In disaster recovery, sustainable development has been embraced by the majority of researchers. It implies that the recovered community has the capacity to maintain itself over time in all environmental, social, and economical spheres (National Hazards Center, 2005). The following six principles are critical in sustainable community development: 1) maintaining or enhancing the residents' quality of life; 2) enhancing local

economic vitality; 3) ensuring social and intergenerational equality; 4) maintaining or enhancing environmental quality; 5) incorporating disaster resilience and mitigation; and 6) using a consensus-building participatory process when making decisions (Mileti, 1999, as cited in National Hazards Center, 2005). Based on these six principles, sustainable disaster recovery or post-disaster sustainable community development can actually be regarded as a model that combines the community-based model, adopted by the Australian government, with the holistic model, adopted by the New Zealand government.

A review of literature on disaster recovery by Smith and Wenger (2007) exhibited that many disaster recovery-based studies can be classified across the above six principles of sustainability. Many more recent studies on disaster recovery (e.g., Acosta and Chandra, 2013; Cox and Perry, 2011; Johnston *et al*., 2012; Miller and Rivera, 2011; Raju and Van Niekerk, 2013) can also be classified across these six principles. As an illustration, Kusumasari and Alam (2012) showed that the participation, cultures, and popular wisdom of locals contribute to satisfactory disaster recovery. This view is consistent with the sustainable development principle of using a consensus-building participatory process in decision-making.

Although the importance of sustainable development has been widely recognized in disaster recovery literature and its concepts and principles intensively discussed, several barriers to sustainable community development are present. Research indicates the difficulty for the idea of sustainable community development to take root in disaster-recovery communities (Passerini, 1998). Many barriers to sustainable community development in disaster recovery persist, such as insufficient funding (Childers and Phillips, 2002; Raju and Van Niekerk, 2013), lack of participation of local people (Huang et al., 2011), state and federal limitations to planning for resiliency (Berke and Campanella, 2006), and coordination inconsistencies (Raju and Van Niekerk, 2013).

Overall, sustainable development is likely to increase the capacity of people to offset risks and to facilitate harmony among environment, economy, and society in a disaster-affected community. Researchers have constantly advocated sustainable community development in disaster recovery. However, many barriers still exist to post-disaster

sustainable community development. Additional efforts should be invested to develop a better understanding of the successful application of sustainable community development in disaster recovery. In the next section, we will apply the six principles of sustainable community development to examine the recovery of the Wenchuan earthquake.

## 4. Case study of the Wenchuan earthquake recovery

On 12 May 2008, an earthquake measuring 8.0 on Richter scale hit Wenchuan County, Sichuan, China and its neighboring regions, which resulted in 69,226 known deaths, 17,923 missing people, and 374,643 injured ones (State Council, 2008). A total of 5.36 buildings collapsed, more than 21 buildings were damaged, and the total economic loss was estimated at USD 86 billion (US Geological Survey, 2012). After the earthquake, the State Council Headquarters for Earthquake Mitigation and Relief was immediately established to provide coordination, resource mobilization, and technical support for recovery. The State Council promulgated several documents such as the Regulations on Post-Wenchuan Earthquake Restoration and Reconstruction and the State Overall Planning for the Post-Wenchuan Earthquake Restoration and Reconstruction to set guidelines for recovery. Recovery issues, such as reconstruction funds, fiscal and assistance policies, infrastructure construction, urban reconstruction, rural construction, and public services, were elaborated in the documents.

The aim of the recovery by the central government was consistent with that of sustainable development. For instance, according to the State Overall Planning for the Post-Wenchuan Earthquake Restoration and Reconstruction, the objectives of the Wenchuan earthquake recovery should "[m]ake every endeavor to build a new homeland characterized by enjoyable life and work, eco-civilization, security and harmony, and lay a solid foundation for sustainable socioeconomic development" (p. 13). This document provided comprehensive planning that included the recovery of eco-environment, spirituality, infrastructure, industry, public services, and urban and rural development. The document points out that

recovery should consider the interests of the local people and the long-term development of quake-stricken areas.

Efforts were also made to measure sustainable development of the Wenchuan earthquake recovery. Liu and Teng (2012) developed an index of post-disaster sustainable development using the entropy-improved ant colony algorithm to study the recovery. The index included four categories of economic development, social development, eco-environment, and disaster relief and reconstruction and had a total of 43 items. Their research indicated that sustainable development in the five earthquake-affected areas (e.g., Wenchuan, Beichuan, Mianzhu, Dujiangyan, and Qingchuan) was basically good. However, the majority of the studies on Wenchuan earthquake recovery did not tend to support such a finding. To develop a better understanding of the sustainability of the Wenchuan earthquake recovery, the six principles of sustainable community development were applied to examine it.

For the maintenance or enhancement of the quality of life of the residents, the Wenchuan earthquake recovery built and provided new and improved facilities, houses, and infrastructures (Chongqin Daily, 11/05/2013; Dalen *et al*., 2012). These new structures would result in the improvement of the living conditions, which likely contributed to enhancing the quality of life of the survivors. The three surveys conducted in the Wenchuan earthquake areas between 2008 and 2011 jointly by the Chinese Academy of Science and Technology for Development and the Fafo, Institute of Applied International Studies in Norway demonstrated that in 2008 about 25 percent of people in seriously earthquake-affected areas and 16 percent of people in the less affected areas were satisfied with their lives respectively. In 2011, life satisfaction had returned to a level above 80 percent in both areas (Dalen *et al*., 2012). Dalen et al. argued that these findings implied successful recovery and that the lives of the survivors returned to normal. Notably, a few non-governmental organizations contributed to the Wenchuan earthquake recovery by providing various community services, such as organizing the survivors by using recreational activities (Huang *et al*., 2014). Their services strengthened the social network and social support among survivors (Huang and Wong, 2013) and accordingly would enhance the quality of life of the survivors. Research (e.g., Ke *et al*.,

2010) indicated that social support positively associated with the quality of life of Wenchuan earthquake survivors.

With respect to enhancing local economic vitality, the Wenchuan earthquake was estimated to have resulted in the loss of jobs of about 800,000 (China Youth Daily, 2008/09/12), but recovery tasks provided many job opportunities for the survivors (Zhao *et al*., 2010). From 2009 to 2013, the rate of economic development of earthquake-affected areas was higher than the average rate of development of Sichuan province (People Daily, 13/05/2013). However, at the end of recovery, only a few job opportunities might be available in the earthquake-affected areas (Zhao *et al*., 2010). The sustainability of economic development in earthquake-affected areas would then likely become a problem. On the one hand, the future for local industry tended to be bleak. Pu and Liao (2012) pointed out the lack of funding for local industry recovery in the Wenchuan earthquake-affected areas and the local government was already deeply in debt due to its investment in recovery. On the other hand, many survivors put their savings in reconstructing houses and had few financial capacities to invest in business, training, and other areas (Pu and Liao, 2012).

There was a lack of emphasis in the principles of social and intergenerational equality in the Wenchuan earthquake recovery probably due to the authoritarian regime as well as its sensitive nature in China. A few studies (e.g., Lin, 2012) indicated that some government officials and land developers illegally expropriated the farming lands of the survivors for post-Wenchuan earthquake reconstruction and development. Hence, social protests were staged to fight against corruption, unequal distribution, and quality flaws of the reconstructed houses. Lin also documented that a few social activists who advocated the investigation of the deaths of students and the quality of collapsed buildings in the earthquake were prosecuted and imprisoned. In short, the Wenchuan earthquake recovery decision-making largely lacked the participation of disaster survivors as well as ensuring social and intergenerational equality.

Little empirical research was done on the maintenance or enhancement of environmental quality during the Wenchuan earthquake recovery. A newspaper report stated that the quality of the natural environment of the

Wenchuan earthquake-affected areas had improved (Science and Technology Daily, 10/05/2013). It was indicated that the activity level of landslide tended to decrease, the risk of landslide dams was relieved, some damaged farmlands were recovered and replanted, forest recovered quickly, and roads, transportation and rivers returned to be normal. It seems that natural environment is recovering and it may take some time to return to the pre-earthquake level.

For the incorporation of disaster resilience and mitigation, it was argued that the central government's plan for the Wenchuan earthquake recovery included hazard mitigation, even though short-term recovery was insufficient to address long-term sustainable development issues in post-disaster urbanization process (Ge *et al*., 2010). It was also reported that no one reconstructed house after the Wenchuan earthquake was totally collapsed during the Yaan earthquake in 2013 (The Beijing News, 26/04/2013). This implied that the Wenchuan earthquake recovery incorporated disaster resilience and mitigation. However, some studies suggested different opinions. Focusing on the urban reconstruction of the Wenchuan earthquake, Guo (2012) demonstrated that resilience was not considered. Recovery lacked sufficient support for the integration of different stakeholders and for socio-spatially coherent and holistic redevelopment scenarios. It is likely that while the Wenchuan earthquake recovery incorporated disaster resilience and mitigation, much can still be done for improvement.

Regarding the use of consensus-building or a participatory process when making decisions, studies have demonstrated that the central government provided the lead and dominant role in the recovery. The local government mainly followed the central government's rules and regulations, and the participation of non-governmental organizations and local people was weak (Huang *et al*., 2009; Lin, 2012; Wong, 2012). With few restrictions on governmental power due to the one-party political system, the effectiveness, efficiency, and accountability of the recovery became doubtful. A report by the National Audit office of People's Republic of China (2009) revealed that among 76 major projects of the Wenchuan earthquake recovery, 33 were found to have complications. Furthermore, because of the weak participation of non-governmental organizations and local people in the recovery, some needs

were not considered (Wong, 2012). Wong showed that the inconsistency of some reconstructed rural houses with the living styles of survivors resulted in difficulties. For example, some reconstructed rural houses did not provide space to raise livestock and to plant vegetables, which were important food and income resources for many rural people.

To summarize, although the aim of the recovery of the Wenchaun earthquake in the central government's documents was consistent with that of sustainable community development, overall the principles of sustainable community development was actually not well implemented in recovery practice.

## 5. Discussion and Conclusion

This article addresses the disaster recovery and sustainable community development. The Wenchuan earthquake recovery was examined by using the principles of sustainable community development. The results indicated that overall, the principles were not well implemented probably due to the following reasons.

First, China is governed by the authoritarian Chinese Communist Party, which determines the characteristics of China's disaster management (Lin, 2012; Zhang, 2012). During the Wenchuan earthquake recovery, the government dominated the decision making process, while the survivors and non-governmental organizations were excluded. Without the active participation of different stakeholders, the needs of the some survivors might not be addressed properly, and corruption and unequal distribution of resources might occur. Accordingly, social and intergenerational equality were not ensured.

Second, it was demonstrated that social inequality and political entitlement affect human vulnerability through resource distribution and service delivery (Sen, 1981 & 1999). China implemented the *hukou* (household registration) system that divides people into agricultural and non-agricultural, or rural and urban *hukou*s. Social welfare was largely available for people with non-agricultural *hukou*. This system created a rigid social hierarchy or inequality that transmitted across generations, involving discrimination between urban and rural areas in economic,

social, civil, and cultural rights (Solinger, 1999; Wang, 2005). The *hukou* system also influenced the Wenchuan earthquake recovery. For example, the government arranged and implemented the restoration and reconstruction of houses for people with non-agricultural *hukou*. Households with non-agricultural *hukou* only received a subsidy of 15,000 to 20,000 Chinese yuan (US$ 2,400 to 3,200) from the government for rebuilding or restoring collapsed or damaged houses (Lin, 2012). Given that the recovery was partly based on such an unjust and unequal system, it was not surprising that recovery efforts manifested injustice and inequality.

Third, the rapid recovery of the Wenchuan earthquake-struck areas promoted by the government may make community development unsustainable. The State Overall Planning for the Post-Wenchuan Earthquake Restoration and Reconstruction proposed to achieve the major task of restoration and reconstruction in approximately three years. The provincial government of Sichuan attempted to complete the three-year recovery plan in two years. Such a rapid recovery process and construction-dominated approach prevented planners from considering local conditions or alternatives to the approach (Abramson and Qi, 2011). Therefore, the government might have focused on the completion of the construction of houses, roads, and other infrastructures without much time and energy in integrating the principles of sustainable community development into the recovery.

Fourth, China's government was not experienced in disaster management. Zhang (2012) summarized some problems about the management of the Wenchuan earthquake. These problems included lack of unified command and coordination, professional rescue teams, preparation and early warning, and disaster education. With respect to the Wenchuan earthquake recovery, few professionals were trained to involve in disaster recovery effectively, efficiently, and collaboratively such as social workers and nurses (Sim *et al*., 2013; Zhang, 2009). The lack of coordination and education in disaster recovery might result in the difficulty of conducting these processes in a professional and sustainable way.

Fifth, the natural environmental characteristics of the areas hit by the Wenchuan earthquake might make the recovery hard to be sustainable.

The earthquake-affected area is one of most ecologically fragile regions in China and the quake resulted in great negative impacts on ecosystems such as 122,136 $hm^2$ of forest, grassland, and wetland ecosystems being destroyed (Ouyang *et al*., 2008). Moreover, the Wenchuan earthquake induced secondary geological hazards and disasters, such as mountain collapse, landslide, mudflow, rock fall, and debris (Lei *et al*., 2014; Li *et al*., 2014; Qi *et al*., 2009). Additionally, because the area hit by the Wenchuan earthquake is located in the earthquake zone, new earthquakes might damage fragile ecosystems. For example, on April 20, 2013, a magnitude 7 earthquake struck Lushan, Yaan, Sichuan, which are the surrounding areas hit by the Wenchuan earthquake.

In conclusion, this article addresses disaster recovery and sustainable community development. Theories related to and models of disaster recovery were reviewed by focusing on sustainable community development. The principles of sustainable community development were also applied to examine the Wenchuan earthquake recovery. It was found that overall the principles were not well implemented probably due to China's political system, unjust social policy, rapid recovery process, lack of disaster recovery expertise, as well as the environmental characteristics of the Wenchuan earthquake-affected areas.

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