

The Role of Community Knowledge in Disaster Management: The Bam Earthquake Lesson in Iran

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Introduction

The rapid world population growth is likely to further boost the impact and severity of any disaster. Disaster management, as such, needs to be placed within a holistic setting to insure that each and every disaster is viewed as a shared responsibility. To this end, it is imperative to consider a number of influences, which include “economic, social, cultural, institutional, political, and even psychological factors that shape people's lives in disaster situations” (McEntire et al. 2002, Trim 2004).

The Bam earthquake experience in Iran underlines the need for devising a comprehensive approach toward severe disasters that could occur in the future. In this endeavor, the role of communities assumes utmost importance from several perspectives. One example would be communities playing the dual role of victim-rescuer at the response phase of a severe disaster. The present paper uses empirical findings that support the notion of community engagement in disaster management. For example, one study shows a positive correlation between the people's level of education and their preparedness to deal with a possible earthquake. When it comes to interaction between communities and organisations, studies indicate that people lack comprehensive knowledge of earthquake relief organisations, such as the Red Crescent Society. Understandably, the extent of community engagement in disaster management is directly linked to the level of people's education. In addition, the level of community trust in an organisation is also associated with the level of community engagement in that organisation's activities. In essence, a broader and more inclusive definition of disaster management is essential to cover community engagement.

Severe disasters affect the entire society and communities and, as such, can be understood and dealt with through collaboration among several academic disciplines. Engaging communities in disaster management is, furthermore, practically understood within a comprehensive model of action. Consequently, integrating the findings of academic disciplines in studying severe disasters constitutes a macro level of analysis and translating these findings into a model of action is possible in a holistic paradigm. In addition, considering the advantages of the past disaster management approaches is an integral part of a holistic approach toward a 'disaster knowledgeable community'.

Approaches to disaster management

McEntire et al. (2002) reviewed the literature of disaster management and identified four models, including the disaster-resistant community, the disaster-resilient community, sustainable development/sustainable hazards mitigation and invulnerable development concepts. Concluding that these models are incomplete, they presented the 'comprehensive vulnerability management' concept in order to provide a holistic approach to disaster management. The present paper puts forth another model called 'disaster knowledgeable community'. Three tables offer a comparison of these models. Table 1 compares the models in terms of type and phase of disasters. Table 2 compares the approaches to disaster management by highlighting the role of actors and variables. Finally, Table 3 compares the academic dimensions of the approaches, including the interest of discipline and the level of analysis.

Table 1. Comparison of paradigms in terms of type and phase of disasters

		Hazards	Phases/ functional areas
A	Disaster-resistant community	Natural, technological, civil, biological	Mainly preparedness and response
B	Disaster-resilient community	Natural	Mitigation
C	Sustainable development and sustainable hazards mitigation	Natural	Recovery and mitigation to a lesser extent
D	Invulnerable development	Natural (especially flooding) and technological to a lesser extent	Mitigation and recovery
E	Comprehensive vulnerability management	Natural, technological, civil, biological	Mitigation, preparedness, response, and recovery
F	Disaster knowledgeable community	Natural, technological, civil, biological	Mainly preparedness and response

Source: McEntire et al. (2002)

Table 2. Comparison of paradigms in terms of actors and variables

		Actors	Variables
A	Disaster-resistant community	Mainly the public sector (particularly emergency managers and first responders)	Mainly physical
B	Disaster-resilient community	Mainly the public sector (particularly urban planners and engineers)	Mainly physical
C	Sustainable development and sustainable hazards mitigation	Mainly individuals and groups involved in recovery from the public, private, and nonprofit sectors	Social and physical to a lesser extent
D	Invulnerable development	Urban planners, engineers, insurance agencies, non-government organisations, environmentalists, and citizens	Physical and social to a lesser extent (depending on the scholar and due to the excessive focus on hazards)
E	Comprehensive vulnerability management	Most, if not all, organisations from the public, private, and nonprofit sectors, as well as citizens in general	Physical and social
F	Disaster knowledgeable community	Mainly citizens in multiple aspects, as well as organisations	Social and physical

Source: McEntire et al. (2002)

Table 3. Comparison of paradigms in terms of academic disciplines and level of analysis

		Disciplines	Level of Analysis
A	Disaster-resistant community	Mainly sociology and public administration	Macro in a lesser extent (local) and meso
B	Disaster-resilient community	Mainly geography and engineering	Macro in a lesser extent (local) and meso
C	Sustainable development and sustainable hazards mitigation	Mainly psychology, sociology, and economics; geography and engineering to a lesser extent	Macro in terms of development
D	Invulnerable development	Geography, engineering, and environmental science; anthropology, economics, and sociology to a lesser extent	Macro in terms of development
E	Comprehensive vulnerability management	The vast majority of fields as well as epidemiologists	Macro and meso
F	Disaster knowledgeable community	The vast majority of fields as well as epidemiologists	Macro in terms of disaster (national and local) and meso and micro

Source: McEntire et al. (2002)

The disaster-resistant community model is defined as a “means to assist communities in minimizing their vulnerability to natural hazards by maximizing the application of the principles and techniques of mitigation to their development and/or redevelopment decision-making process” (Geis 2000, p. 152 cited McEntire et al. 2002). The disaster-resistant community model is helpful in understanding how to face severe natural disasters; however, it has its own drawbacks. The disaster-resistant community model assumes a passive role for the community, as it is more relevant to the decision-making process than to engaging the communities. In addition, as McEntire et al. (2002) mention, the disaster-resistant community approach is more pertinent to disciplines such as geography, engineering, and urban planning. Consequently, it is not a holistic approach to disaster management, as it ignores the contribution of many academic disciplines, such as public administration, sociology, economics, political science, anthropology and psychology.

The disaster-resilient community cannot be as easily and clearly defined as the disaster-resistant community. What is clear in the literature, however, is that the concept of resilience

refers to the ability to recover normality after a disaster. The concept of resilience, moreover, emphasises reaction to natural disasters at the early stage of disaster cycle. In comparison with the disaster-resistant community concept, the concept of resilience more specifically covers the social variables. Consequently, the disaster-resilient community concept encompasses more academic disciplines like sociology, economy, anthropology and psychology. The concept is, however, mainly about natural disasters and adopts a reactive approach to disasters. The concept of resilience ignores mitigation and preparedness functions, such as community education, planning, training and exercises (McEntire et al. 2002).

The sustainable development approach to disasters is not limited to disaster management, as it places disaster management in the wider perspective of development. The concept of sustainable development emphasises the needs of future generations while responding to the modern day development programs. The sustainable hazard mitigation concept, which is very similar to sustainable development concept, appears to be more related to disaster management in this approach. Sustainable development and sustainable hazard mitigation view disasters from a broad perspective and connect the issue of disasters to other problems. These concepts provide a wider approach to disaster in comparison with disaster-resistant community and disaster-resilient community. They are not, however, holistic because they ignore man-made disasters (McEntire et al. 2002).

As already mentioned, Tables 1 to 3 compare the approaches to disaster management. McEntire et al. (2002) introduce comprehensive vulnerability management as a holistic and complete approach to disaster management. This approach includes all hazards, actors, phases, and disciplines. The present paper attempts to develop another model based on lessons learned from the Bam earthquake in Iran. The proposed model is by no means claimed to be comprehensive in terms of types of hazards and phases of disaster management. Nonetheless, it further emphasises the role of community. In other words, the model proposed in this paper differs from the holistic approach of comprehensive vulnerability management. The next section provides more details about the 'disaster knowledgeable community model'.

Developing the Disaster Knowledgeable Community model

This section attempts to explore the concept of 'disaster knowledgeable community' by primarily examining the meanings of community and knowledge. People's engagement in disaster management is widely believed to open new windows to public decision-making. Different countries define people's engagement differently. For instance, people's engagement in Iran means involving the whole society in (responding to) disasters. In the United Kingdom and Australia, people's engagement may be defined as community

engagement. The concept of community usually refers to people at the local level. For example, Buckle (2004) defines *community* as people at a local level who are not organised by emergency services but who have skills, resources, and capacities that allow them to provide services to people at risk in disasters. The notion of volunteerism is inherent in Buckle's definition of *community* engagement in disasters. Cultural differences among countries should, of course, be considered in understanding and learning from various earthquake experiences.

The complexity of transferring experience about community engagement is emphasised here. The culture of volunteerism and the sense of neighbourliness drive community engagement in Australia (Buckle 2004). A similar culture of volunteerism and a sense of neighbourliness can be observed in Iran, which also enjoys a culture of nationalism and a sense of brotherhood. The culture of nationalism suggests that engaging the community may be translated into engaging the nation. In other words, planning people's engagement in disaster management can be centralised and widely promoted throughout the country. This, however, does not mean that the operations should also be directed from the centre. A solution for Iran might be the approach of 'planning nationally and operating locally'. It is helpful to review the patterns of people's engagement in the Bam earthquake. The Bam earthquake experience indicated that community engagement in a severe disaster had different patterns. These patterns were structured in different forms, including victim-based, corroborative provinces and national media-based. The people of Bam were engaged seriously in disaster as victims and rescuers. The surviving relatives of the victims constituted the effective aid force, but lacked any organisation or training. This part of community was the core of engagement. The second circle of engagement was formed by corroborative provinces. Corroborative province refers to the communities surrounding the Kerman Province, in which the city of Bam is located. The surrounding provinces formed a circle around the core of disaster. This form of engagement was rather well organised, and trained people were engaged in the rescue, recovery, and relief operations. The national media-based engagement refers to the media, especially the radio and television, which informed the entire nation of the disaster and encouraged donations, as well as rescue, recovery, and relief aid. In the early stage of the earthquake, this engagement had an indirect impact because of distance from the core of disaster. Volunteer organisations, like the Red Crescent Society and rescue committees, collected people's donations from all across the country.

The disaster knowledgeable community model emphasises the distribution of knowledge among communities. The disaster knowledgeable community conceptualisation considers both the internal and the external dimensions of knowledge. External dimension of knowledge refers to the absorbed understanding of knowledge at the society level. Rooney et al. (2003, p. 9) define knowledge within a complex system of knower, interpretive relational context, social relational context, situation, and knowledge itself. The amalgamation of knower, the

situation, and the environment present knowledge in a process and relational format. This sociological perspective of knowledge supports the 'disaster knowledgeable community' concept. Knowledge is widely believed to be a function of history and the interlinking of people with people, people with knowledge, and knowledge with knowledge (Rooney et al. 2003, p. 12). Consequently, the knowledge held by universities and research centres about disasters needs to be widely and thoroughly communicated to communities. Policy making about disasters necessitates considering knowledge in a broad perspective that includes social context and environment. As Rooney et al. (2003, p. 9) state, social capital is also important because the value of knowledge will increase through interaction among individuals and organisations. From a social perspective, then, knowledge is valuable only when it is understood and transferred to the society. For example, the communities' trust in organisations involved in disasters plays a major role in enriching the exchange of knowledge. Clearly, people should understand and trust the organisations to be able to cooperate with them. This understanding is also important for organisations in transferring their accumulated knowledge to communities.

Public education affords a major way to transfer knowledge to communities. Natural disasters have a low probability of occurring with a high probability of effects. Public education is essential in mitigation programs. In public education, even simple instructions play a vital role in disaster mitigation (Abolshams Asghari 2004). Elliott et al. (2003) state that community education, engagement, and awareness are the most important factors in improving flood warnings in Australia. Similarly, Davoodi et al. (2004) regard public education as the core of any disaster planning, because individuals are the basic units of communities. Mahalati and Kaveh (2004) performed a survey in order to examine people's preparedness for earthquake in the metropolitan city of Tehran. Their study shows a positive correlation between the people's level of education and their preparedness for earthquake. The study also found that people's knowledge about organisations related to earthquake, such as the Red Crescent Society, was very low. Understandably, the level of community engagement in disaster management is associated with the level of public education. Public education needs to be designed in a progressive way in which appropriate feedback from the communities boosts the effectiveness and efficiency of education. In addition to public education, specific knowledge improvement methods are required for elites in any community. For example, complex approaches such as 'progressive discourse' and 'perspective taking and perspective making' (Heiskanen 2004) should be considered as complementary methods for key players that have higher education.

The model of Disaster Knowledgeable Community in practice

The 'Disaster knowledgeable community' concept is introduced in this paper as an appropriate approach or model for the Iranian society. Developing a comprehensive theoretical model may create confusion for practitioners and communities. As Schneider

(2002) notes, emergency management practitioners and community leaders may not always view the post-earthquake action in a wider framework. Apparently, the 'disaster knowledgeable community' model needs explanation to be translated into action. The metaphor of waves is used here to bridge the gap between the theory expounded in relevant literature and actual translation of the theory into practice. Observations of the early stage of the Bam earthquake constitute the practical experience leading to the metaphor of waves. There are several post disaster waves: physical, social, economic, political, and medical.

'Physical wave' is a force that not only destroys properties but also moves the other waves. The physical wave is sometimes known as the disaster itself, particularly in natural disasters, such as earthquakes and floods. Evidently, controlling the physical disaster wave in Iran could prevent the other disaster waves from being set in motion.

'Social wave' refers to the force that damages the structures and functions of a community's social order. For example, families as solid cells of community do not function normally. Specific social groups, such as women, children, the elderly and the handicapped need special attention, and their numbers increase suddenly. Balali et al. (2004) note that the majority of disaster preparation plans are devised with the ordinary citizens in mind, while children, the disabled, pregnant women, and people with special needs are ignored. They suggest including these groups in mitigation programs. Maintaining communication is very important in disasters. The Bam experience proved the vulnerability of public communication systems, such as telephone lines, to severe disasters. Hesam and Mehrabi (2004) suggest that developing a limited personal communication system would be very helpful in practice. This would be a technology providing effective communication service for a small group of people, such as members of a family, in crisis situations. The system should function even without electricity to connect members of a group or a family and also link any small group with the wider public systems.

'Economic wave' disturbs the normal and ordinary economic life. In this wave, distribution and supply of goods and services comes to a halt, losing its normality. Early response to this wave includes aid provided from new sources, usually outside the affected community. The main concern at this stage is equal distribution of goods and services in the short term. In the long term, funding becomes a serious problem for public officials. Damaged properties increase the level of poverty. Funding the reconstruction of properties becomes a long-term concern.

'Political wave' affects public officials and decision-makers at national, provincial, and local levels. This wave is sometimes very strong at the local level as it destroys local public entities and institutions. For example, almost all local officials were victims of the Bam earthquake. Consequently, officials of nearby cities were in charge of controlling the disaster outcomes. The national and provincial authorities, as well as public officials, were seriously involved in

the disaster. Following the Bam earthquake, the cabinet held its meetings near Bam to facilitate communications and speed up decision making.

Perhaps the real meaning of emergency is captured in the 'medical wave'. Rescuing is the vital function of disaster response at the impact stage. The medical wave affects medical systems in a vast area of the country. The experience of the Bam earthquake proved that collecting and evacuating those injured was very difficult in a severe disaster. Almost all medical teams and hospitals neighbouring cities were involved in rescue and relief activities. In addition, many international and national medical teams were also engaged in rescue operations. Coordinating medical teams within the affected area and the rest of the country was a complex task. This wave is less manageable from the top. Eshraghi (2004) states that the normal medical system is vulnerable to severe disasters. The Bam earthquake ruined the city's hospitals and medical services. Local people in the affected area play an important role in responding to the medical disaster wave. Eshraghi underlines the need for self-organising medical teams in the early days of severe disasters. Trained individuals with required equipment can render medical services to the victims early after the disasters. These individuals can also move and form medical teams in the affected areas.

There are two waves in severe disasters — one wave, demanding medical attention, moves from the centre of the disaster, while the other wave supplies and responds to medical needs of the affected area. These two waves move in opposite directions. The meeting of these waves may or may not be managed properly. The interaction between these two waves was observed in hospitals that provided services to the victims of the Bam earthquake.

According to Safari et al. (2004), the majority of hospital personnel servicing the victims of the Bam earthquake complained of the aggressiveness and impatience of those accompanying the victims. Hospitals are designed to service a limited number of patients, not a huge number of people, including impatient relatives. Public education and public arrangements are required to deal with such situations. One way is employing volunteers who live near public organisations such as hospitals. These volunteers can help the personnel in directing people as to where they need to go. In essence, volunteers bridge the gap between organised people and unorganised communities. They sometimes work as a shield in protecting organisations from restless and unruly communities. For example, informing relatives of the patients and controlling them are serious tasks facing a hospital servicing a large number of victims. Another way is enforcing a well-designed public education system for disaster management. A well-educated community plays a major role in the responding phase of disasters. People should be aware of the vital role of hospitals in disasters. The hospital personnel should not be exhausted by having to interact with the relatives of victims. Sometimes, they have to work for days without rest. The hospitals emergency programs should, therefore, be linked with community programs.

Conclusion

In an attempt to develop an appropriate model of coping with disasters, the 'disaster knowledgeable community' model was proposed here based on lessons learned in the Bam earthquake. The tables that follow compare this model with other models. The conceptual development of the model was supported by empirical studies. What made the proposed model distinct from other models was the way it considered the role of society and community. Plainly, the proposed model emphasises the need for the education of communities, considering the important role society and community knowledge play in any disaster. Consequently, public education was understood as the main concern for Iranian society to cope with disasters. Several waves, including physical, social, economic, political and medical, were used to portray and translate the proposed model into action.

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