

Earthquake Emergency Management: Policies for Sound Emergency Response

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SUMMARY:

This paper is about earthquake emergency management in Bam experience (2003) in Iran. Bam Earthquake was one of the most devastating events in recent decade with many important experiences that could be useful in similar situations. In this paper, the emergency management response in Bam experience in areas such as search and rescue, emergency shelter, community participation, social and mental health and debris removal is discussed. The paper objectives are how emergency response management affects disaster preparedness and is influenced by the level of preparedness and how a sound emergency response plan could improve disaster rehabilitation and recovery. Emergency management phase that starts immediately after the occurrence is very critical in saving lives and properties. While several tasks co-occur in emergency phase, sound management policies could lead to sufficient use of time and resources.

Keywords: Emergency response, Disaster preparedness, Bam, Iran.

1. INTRODUCTION

In this paper earthquake emergency management in Bam Earthquake (2003) in Iran is discussed. Main topics in emergency management response in Bam experience include search and rescue, emergency shelter, community participation, social and mental health and debris removal. The objectives of this paper are:

1. How emergency response management affects disaster preparedness and it is influenced by the level of preparedness;
2. How a sound emergency response plan could improve disaster rehabilitation and recovery.

The method of the paper consists of four sections:

First: Introducing Bam City, including features and characteristics of the City (natural, physical, social and economic). This section's information is based on national statistics and public reports on Bam City.

Second: The earthquake features and characteristics in Bam City, including the earthquake effects and damages in the City and how earthquake consequences affected the City. This section's information is based on official reports and documents and the City's visits as well.

Third: Emergency response management in Bam City, including search and rescue operations, emergency shelter, community participation in emergency response, securing the social and mental health of affected people and debris removal. This section's information is based on official reports, documents and field visits in Bam City.

Fourth: Based on previous sections' information, conclusions are made and some guidelines for formulating management policies in emergency management phase are presented.

2. BAM CITY FEATURES AND CHARACTERISTICS

Bam is a small city in south eastern part of Kerman Province located approximately 200 km southeast of Kerman City (the capital of Kerman Province). Apart from the adjacent city of Baravat (population about 15,000) and some settlements scattered in the neighboring area, it is surrounded by a sweep of desert; (Iran CAO) see Fig. 1.



Figure 1. Image of Bam city (Iran CAO)

The City's square is about 20000 km² and its population is about 100,000 people (only city).

The main active economic sections in the city are agriculture and gardening. The city has very large orange and date palm gardens. There are several underground water sources that are used as Qanat. About 51.5% of the City's water is provided through Qanats (Housing Foundation 2004).

Arge-e-Bam (Bam Citadel) which is a historical monument with 2500 years age located at the northwest of the city. This monument was an example of a typical Iranian large urban complex of ancient earthen architecture in an arid environment and one of the tourist attraction centers in kerman Province; see Figures 2 and 3.



Figures 2. and 3. Arge-e-Bam, an ancient monument and tourist attraction center

3. EARTHQUAKE FEATURES

On December 26, 2003 at 05:56 (local time), a devastating earthquake of Mw=6.5 occurred in South-West of Bam City. This earthquake caused catastrophic damage to the Bam city and neighboring villages with a collective population of about 142,000. More than 26,000 people were killed, 30,000 people injured, about 75,000 left homeless, and 85% of the housing and infrastructure were destroyed.

Arge-e-Bam was heavily damaged by the 2003 Bam earthquake. The level of destruction was about 70% on major parts of this huge monument.

The volcanic hills outcrop at the north and southwest of the Bam City and are composed of Granodiorite rocks. Most of the Bam City is located on the Quaternary alluvial soils. According to the conducted geophysical survey (jafari et al. 2004), the depth of engineering bedrock (with shear wave velocity 650-750 m/s) varies between 5 to 37 m in the area. The Quaternary alluvial soils mostly consists of fine sand and silt as well as coarse grain gravel deposits of flooded plains. Arg-e-Bam, is the only site where a rock is outcropping. This outcrop consists of Andesite and Basalt without considerable effects of weathering; see Fig. 4.

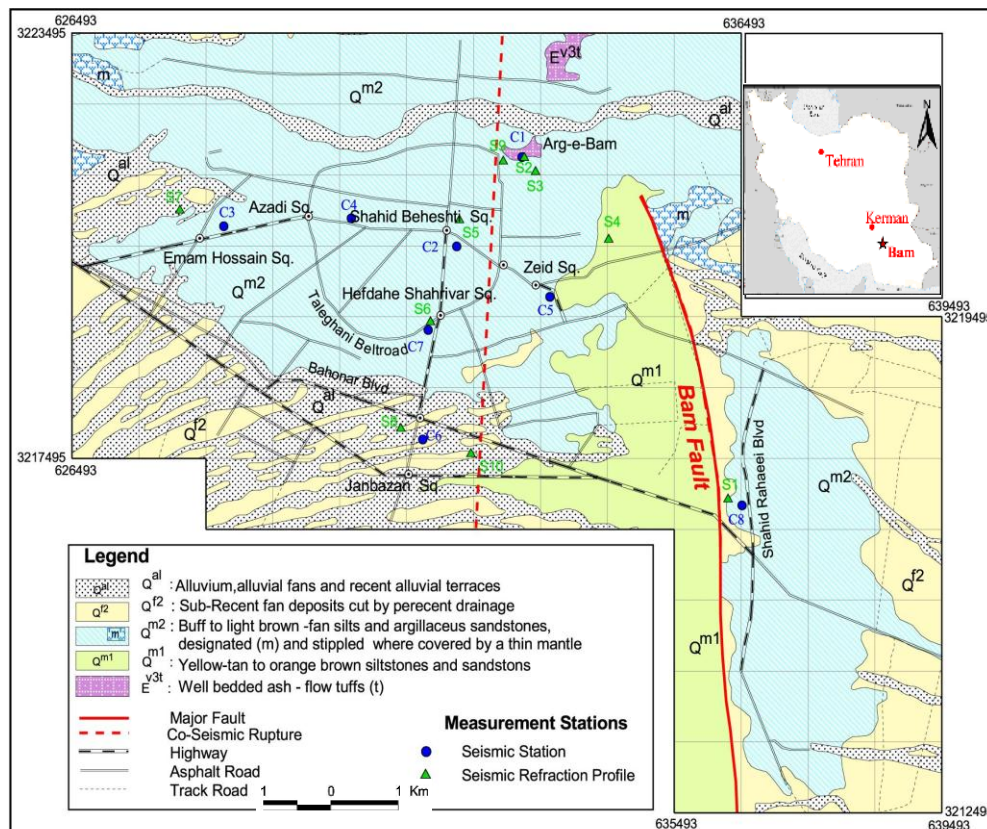


Figure 4. Geological map of Bam City and its surroundings (jafari et al. 2004)

4. EMERGENCY RESPONSE IN BAM EXPERIENCE

4.1. Rescue and Relief

Since the rescue and relief teams entered rather late to the City, the residents started rescue and relief by themselves. While many people rescued in this way but at the same time due to unfamiliarity with proper rescue methods, some problems occurred as well.

Like other experiences in the country, there were many volunteers in Bam City, but lack of suitable programs made these people to leave the City very soon.

Some foreign rescue and relief teams entered the city as well. These groups arrived rather late and could only be helpful in finding dead bodies. Some of these groups had carried out some complicated engineering facilities that were useless in the City. Due to mentioned matters, many rescue teams were inactive and after a short period left the City.

Some rescue and relief infrastructures such as fire fighting stations had been demolished and consequently were useless.

In general, the local residents and military forces were effective in rescue and relief operations. (Towfighi, 2004)

4.2. Emergency Shelter

Tents were used as emergency shelter and some camps were established as well. Residents did not wish to move into the camps and stayed near their destroyed houses; see Fig. 5. The main reasons that people did not move into the camps were:

- Some camps had been located in far distance from residential areas and people had difficulties in commuting.
- The residents preferred to stay next to their demolished houses to protect their properties. But living next to the demolished houses had some secondary dangers in case of aftershocks occurrences.
- People thought that if they settle down in camps, they would deprive from government contributions.



Figure 5. People lived next to their demolished houses

Lack of enough temporary baths and toilets had caused unsuitable hygienic condition. People could not use baths about two weeks and lack of clean water was another problem in this regard.

Safety and security issues were not taken into consideration adequately that along with mental pressures of the residents especially for children and aged people intensified their situation.

Some people took some necessary stuff and went to other cities to live with their relatives. Some rural residents immigrated to Bam City to receive tent and other contributions. Due to this situation the demand for tent and other necessary stuffs was higher than the estimated amount. This situation caused some problems for the provision of emergency shelter.

The main challenges during emergency settlement were weak coordination in distribution of tents, insufficient infrastructures, and movement problems in the city due to pitching tents, safety, security and mental pressures. (Red Crescent, 2004)

4.3. Community Participation

Although local residents rescued their family members and neighbors actively, but after a short period of time residents were not interested to participate. Many volunteers that had come to the affected areas left the areas after awhile. There are some reasons in this regard:

- Authorities did not consider community participation and they did not assign any specific task to residents. In fact, authorities did not believe that community participation could improve the emergency situation.
- Some people were not interested to participate due to the mental pressures. Authorities did not pay much attention in such matter.
- The way that rescue and relief teams treated people, led people to consider themselves as receivers that is a passive manner. Some rescue teams disappointed people and consequently they lost any interest in participation.
- The distribution of goods and services did not accomplish in a proper way and consequently a feeling of discrimination was created among residents. Such feeling made them disinterested to participate.

4.4. Social and Mental Health

There were several social and mental pressures after the event such as feeling of loneliness, stress and anxiety, forgetfulness, nightmares and fear.

The State Welfare Organization (SWO) performed some programs to improve the social and mental health of residents. The SWO set up a committee to present counseling services and mental health securing. This committee performed some programs in cooperation with UNICEF such as preparing an educational pamphlet for kindergarten instructors and preparing another educational pamphlet for public.

The other program was opening some social and mental health centers in whole affected areas. In each center there were psychologists and counselors. But due to unfamiliarity of the psychologists and counselors with the social and cultural environment, native volunteers were employed as executive personnel (Samadi, 2004).

The Iranian Red Crescent Society (IRCS) also performed some programs to improve the mental health of residents. The IRCS sent social-mental support groups to affected areas and at the same time the social-mental support system activated in Tehran. To secure required specialists, the IRCS contacted directly with the Iranian Psychiatrists and Psychologists Association, universities and Ministry of Health to send specialists to Bam City.

The main activities in this regard were as:

- Holding individual counseling sessions in different areas in the city.
- Informing residents about their missing family members.
- Broadcasting movies and animations, donation of books and distribution of toys.
- Holding counseling sessions for girls without guardian.
- Mental support of children at different ages through group games, holding competitions and gift presenting; see Fig. 6.



Figure 6. Mental support programs for children

In addition participating in funeral ceremonies by mental support groups helped the affected people to recover from mental pressures much better. These groups helped people to pass the mourning period in proper ways.

4.5. Debris Removal

Immediately after the rescue and relief period, debris removal started in urban and rural areas. Since Bam reconstruction was based on on-site construction, the debris removal was important. For this purpose the Housing Foundation and other public and private organizations mobilized their machines and facilities. The most important matters in debris removal were as follows:

- Using debris removal machines in first few hours in post-quake caused some dangers for those who were buried under debris.
- Environmental concerns on debris removal were at high levels during the first few weeks after the event.
- Some NGOs tried to teach residents on how to reuse remained construction material but time was very limited.
- Some houses had been located in the gardens inside the city so, debris removal was very difficult and some gardens were damaged as well.
- In debris burial, access to the areas and existence of open and vacant spaces had been taken into consideration. Other issues such as geological and seismological condition, Qanats' status, wind direction, population dispersion and natural resources in the area did not paid much attention. (Environment Protection Organization, 2004)

5. CONCLUSION

Emergency response is very important since decisions made at early stages in post event such as demolition or relocation would profoundly affect the stricken areas. In this experience there were different problems in emergency response like local community did not participate properly in emergency response or local sources did not used appropriately and outside sources were used instead. Most problems in emergency response of Bam are originated from following matters:

1. Lack of a comprehensive and integrated emergency response plan, due to this situation much time and opportunities in post-quake get lost. If such plan had been prepared in pre-event, damages and losses would be reduced and emergency response could be implemented more efficiently.
2. Lack of preparedness for such event, there was no preparedness among residents and authorities to confront this earthquake and consequently many difficulties emerged as well. If disaster preparedness has been taken into consideration in pre-event both residents and authorities could overcome the event impacts more appropriately.
3. Responsible authorities in emergency phase were not familiar with the affected area and consequently they did not consider local sources and even residents in emergency response. Local sources (human/material) are very effective in disaster recovery from the early stages in post-quake. Unfamiliarity of authorities causes ambiguity and confusion.

Based on Bam Experience the following guidelines for emergency response management are proposed:

- Pre-event planning for emergency response: emergency response plans need to be developed in advance at national and local level. Such plans should acknowledge the potential need to apply different standards to different situations following the earthquake. Such plan should be integrated into the other planning and program efforts since any planning could be expanded to include analysis on disaster vulnerabilities and implementation programs to address those vulnerabilities.
- Improving community capacity in confronting potential hazards: capacity building at community level leads to more resiliency. This can be achieved through community based organizations, holding preparedness workshops and drills, preparing community based disaster response plan and

information distribution among people and decision makers. Communities need to assess their resources and devise ways of linking the community organizations with governments to establish in advance the relationship that invariably will congeal following the earthquake.

- Investigating about suitable patterns of emergency shelter based on environmental and cultural characteristics: emergency shelter is usually used longer than expected and even sometimes is used as temporary shelter. This indicates that emergency shelter should be accountable for different needs of a household. A proper emergency shelter should be durable in environment and comfortable for residents.
- People involvement in emergency response is critical albeit time consuming and politically challenging: Residents' participation in emergency response can make significant contributions. If people perceive threats in their environment, they will take risk reduction steps toward their safety and consequently risk reduction is achievable at macro-level.
- Earthquake recovery need to be integrated in emergency response: for example long-term housing needs should be evaluated in light of post-quake immediate conditions and incorporated into other long-range planning documents such as general plan. Therefore disaster recovery is impacted in emergency phase. Decisions in emergency phase affect transitional and reconstruction phases and could accelerate or decelerate disaster recovery.

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