

How to Make an Effective Reconstruction after Disaster ~ Case Study of Bam, Iran~

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1. Introduction

Over one year has passed since the earthquake disaster in Bam, Iran, which devastated the area with over 25,000 casualties according to Iranian official statistics. In the midst of various post-disaster assistance activities by both Iranian governments and international communities, Japan International Cooperation Agency (JICA) has assisted in the reconstruction of water supply system as Technical Cooperation. Following issues come to the front as a lesson learned from the experience of JICA's assistance (hereinafter referred to as "the study") in Bam.

- Earliest possible delivery of reconstruction project with keeping its quality
- Efficiency of a stepped approach to reconstruction by preparation of long-term plan

This paper presents a brief outlook of the study in Bam and discusses the above issues emerged throughout the implementation of the study.

2. Overview of Reconstruction Assistance

It is noted that the study was a continuous assistance from damage assessment to planning and reconstruction project. The below figure shows the procedure of the study.

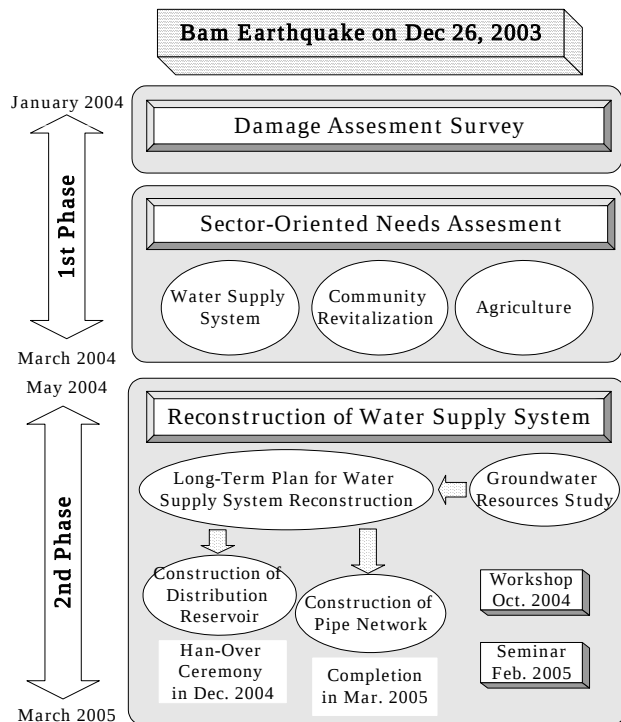


Figure 1 Procedure of the Study

To grasp the extent of damage and actual needs of both people suffered from the earthquake and Iranian authorities were the focuses in the early stage of the study. As a result of damage investigation and interview survey with Iranian authorities, it became clear that the most affected

sectors were water supply, agriculture and community revitalization.

Damaged infrastructure such as lifelines and qanat, a traditional irrigation system in dry region, seemed to require an immediate recovery, and community revitalization was also seen as essential to rehabilitate people's life. Among them, however, the reconstruction of water supply system was chosen as a reconstruction assistance project for the coming phase. Japan has an experience of urban earthquake disaster such as Kobe, 1995 and learned how difficult to recover water supply network compared to the other lifelines. In fact, the Iranian authority, Water and Sewage Company of Kerman (WSCK) considered at the early stage of recovery works that functional recovery would not take time. It was, however, about a month after the disaster when WSCK realized the necessity of total repair of pipeline network.

The objective for the 2nd phase of the study was set to introduce the seismic resistant and maintainable water supply system. Work items covered followings.

1) Preparation of Long-term Reconstruction Plan

Based on water resource development study, long-term reconstruction plan of water supply system targets the year of 2031, in accordance with the "Comprehensive Reconstruction Plan of Bam" prepared by the Ministry of Housing and Urban Planning in Kerman. Based on the long-term plan, following two construction projects were carried out.

2) Water Reservoir Construction

Capacity: 2,000m³
Structure: Reinforced Concrete
Construction Period: Approximately 5 months

Construction Management was adopted for this project, so as to control construction quality, safety and schedule. In designing, seismic resistant design was applied. Also, step pouring for concrete wall, which prevents concrete separation, was introduced to Iranian side, and this method is currently applying to the other construction site in Bam.

3) Distribution Pipe Installation

Length: Approximately 33 km
Pipe Material: High-density Polyethylene Pipe and Ductile Iron Pipe
Construction Period: Approximately 5 months

Construction Management was also adopted for this project. The installed pipes were procured by UNICEF, which pledged to assist water supply sector in UN Flash Appeal issued on January 8, 2004. The existence of the long-term reconstruction plan helped this donor coordination.

3. Distinctive Aspect of the Study

It is a common aspect in any disaster event that emergency response is a race against time. Numbers of Iranian and international organizations gathered in Bam right after the

event and conducted various assistance activities, most of which were categorized as emergency response, ie medical care, provision of primary living supplies and temporary equipments such as portable water tank and latrine.

Compared to those activities, the study had distinctive features described below.

- 1) Focusing attention on reconstruction from the beginning of the study

In emergency response phase, it is a bare fact that there was an unwelcome atmosphere at site for the activities such as damage and needs assessment. Most organizations were putting all efforts in providing medical treatment and emergency supplies, which seemed to have the highest priority. Mired in confusion, Iranian agencies also concentrated on recovery works right after the disaster.

Notwithstanding such circumstances, the damage and needs assessments were carried out in the study, from the perspective of the need for the swift shift to reconstruction. Preparation of action plans for long-term reconstruction plan for water supply system in Bam helped a prompt delivery of reconstruction projects. The construction duration was a record breaking in the region, and the water reservoir was handed over to Iranian side on the one-year anniversary.



Figure 2 Hand-Over Ceremony on Dec. 26, 2004

- 2) Utilization of action plans by other agencies

The study produced action plans for reconstruction in water supply, agriculture and community revitalization sectors within 3 months after the disaster. It was such a prompt response that Iranian authorities welcomed the study, and donor coordination and information sharing with UNICEF and JBIC were realized.

- 3) Saving times of preparing detail design for earliest possible delivery of the project

In order to implement the reconstruction project promptly, reservoir construction and distribution pipe installation projects were commenced after preparing basic designs.

- 4) Technology transfer

The main technologies, reconstruction procedure and quality control management, were transferred to Iranian officials, engineers and contractors through the course of the study. In particular, Iranian authorities realized the

importance of a stepped approach to reconstruction. WSCK, at the beginning, planned to conduct reconstruction works without well-prepared plan and design in order to save times. In the end, however, construction duration was remarkably short compared to their past practices.

4. Lessons Learned

- Need of quality control even for post disaster reconstruction

While prompt project delivery is needed after disaster, reconstructed structures should be durable for the future use. The study could manage to keep the quality and implementation schedule by discreet construction management at site, in spite of many changes and modification of original design. To reconstruct more seismic resistant structure is true to its name of the lesson learned.

- Importance of project implementation in accordance with long-term reconstruction plan

It was proven that a consistent project based on the long-term plan eventually saves times and efforts in its implementation. The presence of a well-prepared plan would help a smooth implementation of the actual reconstruction works on site.

- Need of strong leadership to promote and organize assistance activities

Due to the delay of preparation of authorized reconstruction plan by Iranian side and the absence of a strong leading organization for reconstruction, there existed many confusions and difficulties to conduct emergency response and reconstruction activities. In such cases, Japanese engineers shall actively involve in the reconstruction process, utilizing Japanese disaster management knowledge and experiences. In addition, an early commitment for reconstruction planning and a close coordination with key authorities are key factors for efficient reconstruction assistance. This effort could also assist the government of the disaster-affected country to bring out a strong leadership to coordinate and guide reconstruction movement.

5. Conclusion

This paper presented characteristics of the study to assist in the water supply system reconstruction in Bam, which is distinctive compared to other assistance activities in terms of type and promptness of assistance project delivery. Necessity of earliest possible project delivery with keeping quality, importance of long-term reconstruction plan and strong leadership are highlighted as a key factor for a smooth implementation of reconstruction assistance after disaster.

6. Acknowledgement

The article sources presented in this paper is partially drawn from the “The Comprehensive Master Plan Study on Urban Seismic Disaster Prevention and Management for the Greater Tehran Area in the Islamic republic of Iran, Final Report – The Study on Reconstruction Plan for Bam Water Supply System – ” published by JICA.