

Risk Management for the Recovery Project of Bam's Cultural Heritage

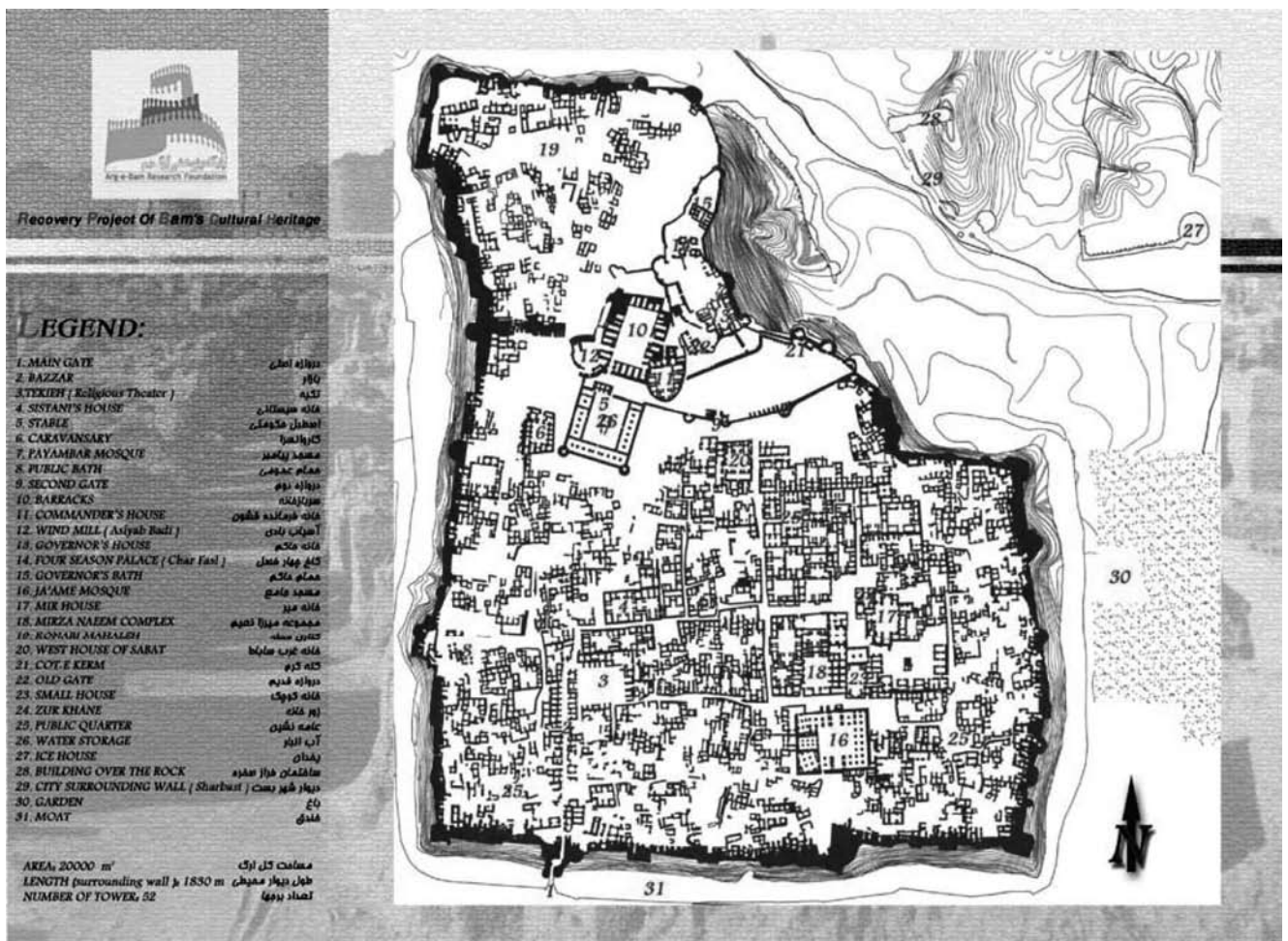
Introduction

A disastrous earthquake in the morning of 26 December 2003 caused the inhabitants of one of the oldest cities in Iran to mourn the deaths of almost half of its population. It caused serious and extended damage to one of the world's largest cities made of earthen architecture. The extent of the disaster was such that even now, nearly four years later, the people have not yet recovered spiritually or psychologically. No doubt, the suffering that resulted from this earthquake has caused many changes in the social and political structure of the city. All that has happened in Bam after the earthquake has been closely connected to the Arg-e Bam, which is the most important landmark of the city. The Arg and the other historic buildings in the city are symbols of Iranian art and tradition and stand for the will of a nation to create such a beautiful city by using the most elementary building material (fig. 1 and 2).



Fig. 1 The Arg and the other historic buildings of the city as symbols of Iranian art and tradition

Fig. 2 Recovery Project of Bam's Cultural Heritage, site of plan



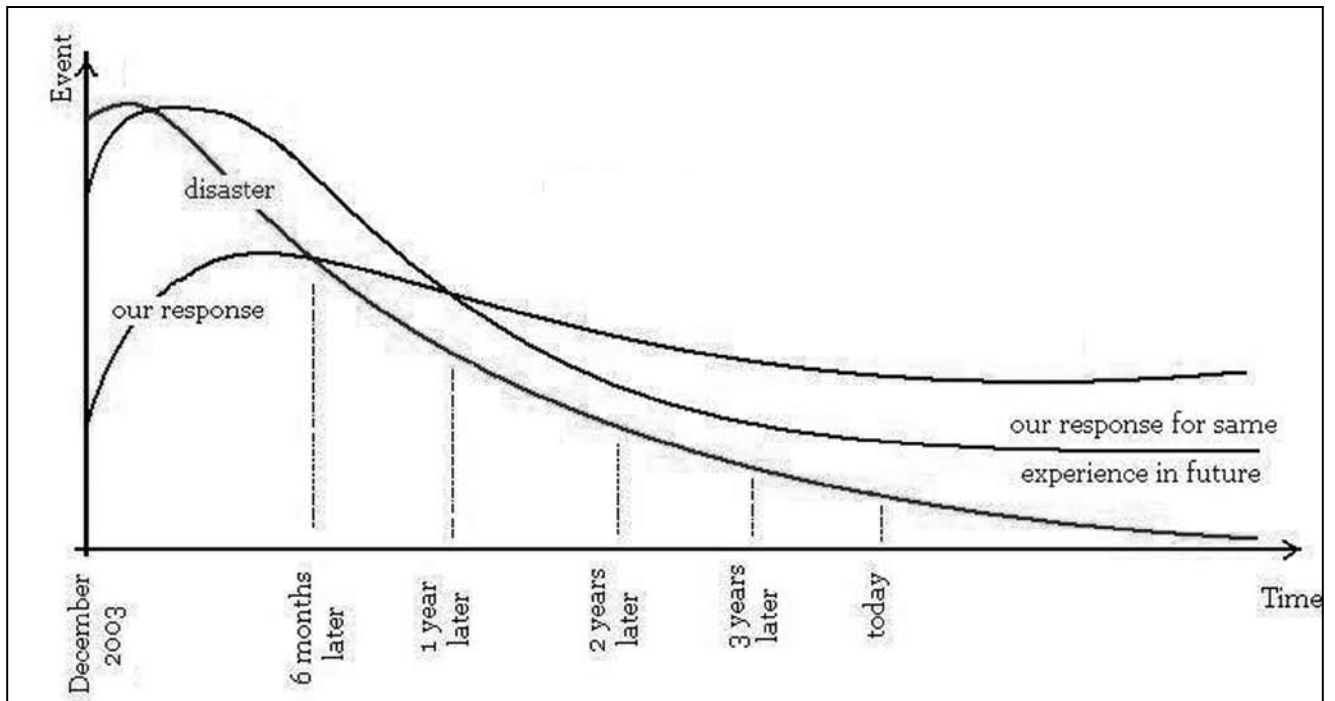


Fig. 3 Schematic graph of the December 2003 earthquake and the response of the Bam Cultural Heritage Rescue Project

After the earthquake, the rescue and restoration of these valuable historic buildings needed a comprehensive management plan, which was unprecedented in Iran. It was necessary to provide guidelines that could be implemented and adjusted as soon as problems occurred. If there were inefficiencies, other guidelines could then be prepared. In brief, although the Bam earthquake was in itself a bitter experience, it was also unique regarding its crisis management because it provided an arena for action in the most difficult conditions possible. After the earthquake, in order to rescue the cultural heritage of Bam, various studies and practical interventions were carried out, the most important of which were related to the experience of crisis management for Bam's cultural heritage on the one hand and the unanimity of international opinion on the other hand. The International Workshop in April 2004 and its final declaration paved the way for Bam to be inscribed on the World Heritage List with worldwide consensus and the support of UNESCO, the World Heritage Centre and ICOMOS. At the same time Bam was placed on the List of World Heritage in Danger. The evaluation of the three-year activities carried out to save the cultural heritage of Bam shows that such universal consensus is still strong. Today Bam remains the meeting point of all who are interested in the conservation of earthen heritage. It is also a venue for international and regional workshops for the exchange of information and new experimentation.

The purpose of this paper on the one hand is to present the experiences gained in managing the Bam Cultural Heritage Rescue Project from the beginning until today and, on the other hand, to categorise the above approaches so they could be applied in similar cases elsewhere in the

world. Regarding the issue of managing the Bam Cultural Heritage Rescue Project, first the methodology for dealing with the management structure will be pointed out and the comprehensive management plan will be presented. Then, considering the vastness of the project and its different phases, the programming of the project will be presented in the following three sections:

1. Planning during the crisis, immediately after the earthquake.
2. Planning after the crisis, short-term planning.
3. Comprehensive planning, long-term planning.

Methodology

As was mentioned in the introduction, the guidelines for the Bam Project had to be made during a critical period. Sometimes, when the best method was not available, the nearest possible solution was chosen and implemented. In this regard the accommodation of technical personnel in temporary places can be mentioned. The methodology applied in the presentation of the management plan of the Bam Cultural Heritage Rescue Project always includes the two general points below:

- Management of issues that were necessary but not important.
- Management of issues that were important but not necessary.

These points have always been faced as the Bam Project advanced. For example, appropriate working and living spaces for the expert team of the project have been, and still are, one of the most necessary issues, but they have no bearing on the restoration plan that could protect the Arg from natural disasters such as earthquakes. Another example would be the construction of a visitor's pathway immediately after the earthquake, which was an important issue but not a necessity. On the other hand, if constructing this passage is considered to be important for keeping the Arg alive after the emergency phase, then it would be deemed important because of its crucial role in revitalising the Arg. If the main aim of the Bam Cultural Heritage Rescue Project is to revitalise the Arg, restore its previous identity, and to use unbaked brick as its traditional building material, then the backbone of any project should be the above issue. But is it possible to achieve this important matter without considering other issues, such as those mentioned above? In the methodology used for an appropriate planning for short-term (necessary) and long-term (important) needs, the economic capacity of the project has always had an important role and there have always been attempts to strike a balance between the needs of the project (short-term/long-term) and the economic resources. Another important aspect in this context is the special conditions regarding international aid for the project. The special conditions of the loan donor are also important, and the existing needs of the project and major coordination should be considered in order to respond both to the needs of the project and the requests of the donor.

In brief, the methodology for presenting the plan, which consists of three different parts as explained below, is based on an important principle, which is to always use general knowledge (in Iran and abroad) and to be able to present a programme with as few mistakes and overlaps as possible. It should certainly also be mentioned that planning immediately after the crisis was not much influenced by this methodology. This is because the special conditions of the project in the immediate aftermath of the earthquake and the initial solutions did not allow much time for the choice of a long-term solution. In other words, planning after the crisis mostly dealt with necessary issues rather than important ones.

Figure 3 shows the earthquake of December 2003 and the project's response in a schematic way. This figure reveals that immediately after the earthquake efforts were focused on overcoming the crisis in the best possible way (with regard to costs and results), which continued for six months after the earthquake. The vicinity of historic buildings in Bam city has had a direct influence on the planning. As shown, after overcoming the crisis the response somewhat decreased and the status of the project was changed from a crisis response to a sustainable operation. It can be said that the experience gained in Bam has put

us in the condition that, were we to face a similar situation again, we would be better prepared. Furthermore, we would be able to stabilise the situation more quickly than we did in Bam.

»Planning during the crisis«: planning immediately after the earthquake

As expected, planning during the crisis includes all the actions taken in the Bam Cultural Heritage Rescue Project immediately after the earthquake. This planning phase lasted six months starting immediately after the earthquake.

The necessity to consider the quality of the buildings in the reconstruction plans on the one hand and the extent of their destruction in the city on the other caused a nationwide campaign for the reconstruction of Bam. Given that various teams of builders, consultants and experts had to come to Bam, the Bam Reconstruction Task Force arranged two daily flights to Bam which greatly helped in raising the quality of reconstruction in Bam. The presence of the builders and consultants in the city also improved the business of hotel services in the city. The capacity of the hotels has increased and, because of such interactions, the general public in Iran is now more familiar with Bam. In other words, the potential of tourism development is more advanced now than before the 2003 earthquake owing to reconstruction operations. It was decided that the Iranian Cultural Heritage, Handicraft and Tourism Organization (ICHHTO) would prepare a comprehensive tourism programme for the city of Bam, making use of the current potential.

Immediately after the earthquake, efforts were made to carry out the following actions:

1. Bring down the crisis situation from its peak to a suitable level before commencing the short-term planning.
2. Keep problems that are unexpected or dangerous for the buildings under control, such as looting, damage to remaining buildings due to passage of visitors, etc.
3. Equip a workshop and establish a base for the project as well as employ necessary human resources (fig. 4-7).
4. Coordinate international aid; as stated in paragraph 1 of the Bam Declaration of April 2004, Arg-e Bam as the most outstanding landmark in the cultural landscape of Bam became the site for carrying out the main activities.
5. Start fundamental studies in various scientific fields, such as geology, archaeology, anthropology, etc. (fig. 8 and 9).
6. Print and publish the activities and research carried out.



Fig. 4-7 Bam, equipping a workshop, establishing a base for the project and employing necessary human resources

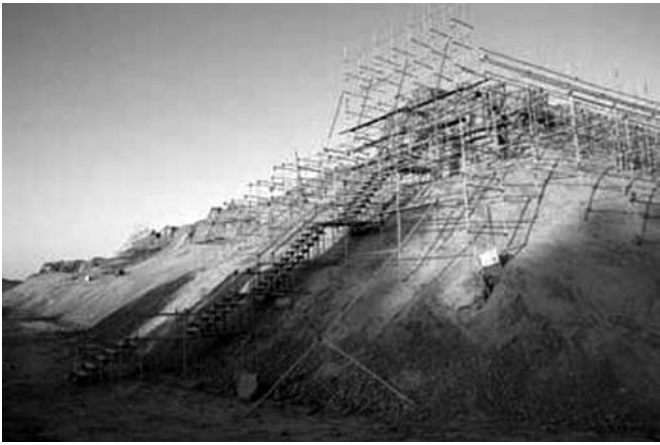
7. Invite international experts to present guidelines.
8. Provide emergency protection for crumbling buildings in order to preserve them until a comprehensive solution for their preservation is found.
9. Remove debris (fig. 10-15).
10. Secure and stabilise (fig. 16 and 17).
11. Prepare documentation.
12. Establish an earthen material laboratory (fig. 18 and 19).
13. Record testimonies and carry out archaeological investigations (fig. 20 and 21).
14. Establish an earthen material laboratory. The Bam earthquake caused such a deadly blow to the culture of building in earthen material that it will not be forgotten for a long time by the general public. However, the complete preservation of the earthen buildings that survived the earthquake has been among the first actions of ICHHTO for revitalizing the tradition of earthen architecture in Bam.
15. Establish an earthen material laboratory, relying on traditional know-how, so as to be able to produce appropriate earthen bricks. Actions such as establishing the laboratory and reconstructing religious buildings in unbaked earth were able to create some hope for the salvation of the culture of building in earthen material in the region. These actions have been helpful

- in reconsidering the tradition of producing unbaked brick and the technology of building in this material in Bam.
16. Put the area surrounding the Arg in order (fig. 22-25).
17. Establish a visitor passage (pathway), which was already taken into consideration in the early days after the earthquake and which later acquired a renewed image after the debris from the bazaar had been removed and the signs to show the boundaries and roads had been fixed.
18. Carry out actions focused mainly on the protection of the remaining earthen structures with maximum caution, as recommended in international conventions and charters.
19. Provide access to visitors (fig. 26 and 27). The earthquake in Bam did not reduce the number of visitors; in fact the number gradually increased. The particular condition of the monument after the earthquake attracted a number of enthusiasts to the Arg. Among

Figs. 8 and 9 Bam, basic studies in Bam include archaeology

Fig. 10-15 Bam, removal of debris





Figs. 16 and 17 Bam, securing and stabilizing walls and buildings



Figs. 18 and 19 Bam, establishment of an earthen material laboratory

Figs. 20 and 21 Bam, archaeological investigations





Fig. 22-25 Bam, putting the area around the Arg in order

the visitors, the experts coming to Bam were the most enthusiastic. The particular situation in Bam required that visiting the Arg would be without charge. The employees started keeping records and collecting statistics on the visitors as well as offering them guidance during the visit. In this respect one of the main actions after the earthquake, also praised by the participants in the April 2004 Workshop, was the building of a temporary wooden passageway through the debris for

visitors. This wooden structure was of great help for the safety of visitors and for providing access for experts to the various parts of the Arg.

20. Monitoring. The actions that were carried out according to the post-crisis plan immediately after the earthquake are briefly listed below:

- In order to protect the character of the historic buildings of the city of Bam a group of experts

Figs. 26 and 27 Bam, visitor access



started identifying the historic and natural values of the city immediately after the earthquake. According to these studies, first 64 and then 69 buildings were identified as being valuable. In addition to these buildings, gardens and Qantas were also put under protection and maintenance. The Ministry of Housing and Urban Planning established a technical committee called the Bam Council for Architecture with the task of supervising the quality of the reconstruction projects and site works. ICHHTO has become a permanent member of this Council.

- Blocking the street in front of the Arg and turning it into a pedestrian urban centre was one of the actions taken for the convenience of the visitors. At present this street, the playground park to its south and the adjacent gardens are fully available to visitors. Furthermore, another parking lot has been provided for the staff. All these actions will improve comfort for visitors. In the area in front of the Arg, other than making the park a tourist area, a space is also allocated for the exhibition of ceramic shards discovered during the removal of the debris so that visitors can be well informed of the archaeological activities and phases of documentation of archaeological finds in the Arg.

»Post-crisis planning«: short-term planning

After the crisis phase and overcoming the challenges of the »immediate« aftermath of the earthquake, the crisis management in the Bam Cultural Heritage Rescue Project first needed a short-term programme in order to prepare the project for long-term planning. In this phase the proposed visions were expected to respond to the following three fundamental questions:

1. How much time is needed to finish the restoration of the historic buildings of Bam City?
2. What funding is necessary to finish the project?
3. What is the best method for the restoration of historic buildings considering the seismic character of the region?

Every project, similar to the Bam Project, will certainly have to face these three questions. Statistically the second and third questions have always attracted the attention of people with different specialties in seminars and conferences or in expert meetings. With regard to time efficiency this phase can be considered to take from six months to four years after the earthquake. Here, obviously no logical or precise forecast can be proposed, but there is a change most clearly taking form in the implementation of the

project at present compared to the past three years after the earthquake. It is expected that by next year this process will arrive at the next phase with a very obvious change. Fortunately, the actions taken in recent years for rescuing the cultural heritage of Bam have opened new horizons in the conservation of earthen architectural heritage. A comprehensive analysis of the behaviour of earthen structures in the case of an earthquake, presently continued in Bam, offers the possibility for a better understanding of these structures. In fact, the comprehensiveness of the operations carried out in the conservation of the earthen structures of Bam after the earthquake has opened up a world of new experience.

The latest research activities include the use of new technology for stitching together the disintegrated earthen structures, a project which is presently being prepared in the restoration laboratories of Bam. These operations are benefiting from the study of the old structures, and the final aim is to enable the fissured and damaged earthen structures to bear the vertical load and possibly to block the lateral forces caused by the earthquake in a way that the authenticity of the structure can be maintained.

In brief, the short-term planning efforts have concentrated on the following actions:

1. Continuation of the crisis-phase operations that are in accordance with the needs of the comprehensive planning of the project.
2. Continuation of the crisis-phase operations (started immediately after the earthquake) that are not affected by time and must continue even after the crisis peak, such as transport of debris outside the Arg.
3. Compilation and correction of operations that had already started in the previous phase but had not been completed because of special conditions after the crisis, such as equipping the workshop.
4. Organization of expert meetings and preparation of numerous exhibitions.
5. Participation in conferences in Iran and abroad.
6. Carrying out fundamental studies regarding a better knowledge of the region of Bam, including studies on geology, seismology, environment and water resources as a completion of operational activities.
7. Inscribing Bam and its cultural landscape on the List of World Heritage in Danger has helped the project to have a more efficient role in improving the quality of the reconstruction of the city. Thus, besides the religious buildings (mosques, shrines etc.) and historic public buildings (bazaars, baths, mosques) the reconstruction of the public and governmental buildings as well as of residential housing has had to correspond to norms that provide hope that the identity of Bam can be preserved even after its reconstruction. This supervision and control is a difficult and complex process, but ICHHTO tries to have a word in all phases

of the reconstruction. Fortunately, by maintaining the structure of the city, including land-use and gardens, most of the protection of the city's heritage has been secured. Regarding the residential buildings, much effort has been made to preserve the identity of Bam by those responsible in the Task Force and the Ministry of Housing and Urban Planning, involving 20 groups of architectural consultants.

8. Prevention of speculation and unauthorised and incompatible building in the buffer zones of the Arg and other monuments. As a result it has been possible to fully preserve historic buildings and gardens.
9. Interaction with universities both in Iran and abroad and the use of existing national potential became a priority in the operations of ICHHTO. Facilitating the travel of international experts to Bam in order to study or carry out joint projects were some further actions. These operations were made possible with the support of the World Heritage Centre, ICOMOS, UNESCO Tehran Regional Office and other specialised national and international institutions and were carried out during the past three years. The April 2004 Workshop and its final Declarations should be remembered as one of the most effective examples of such operations.
10. Filming the activities of the project.

The following activities were carried out in this phase:

- Continuation of practical activities from the previous phase, including removal of debris, documentation and monitoring.
- Organisation of exhibitions, such as:
 - exhibition in Niavaran Palace, Tehran, presenting the activities carried out in Bam, on the occasion of the first anniversary of the Bam earthquake;
 - exhibition at the Faculty of Architecture, Tehran University, presenting the activities carried out in Bam;
 - exhibition at the Reconstruction Task Force engineering site of the city of Bam presenting the activities carried out in Bam;
 - exhibition at Saba House in Tehran presenting the cultural landscape of Bam, with the support of the Encyclopaedia of Art of the Islamic Republic of Iran;
 - exhibition at Khaneh-Honar, Tehran, presenting Bam and its cultural landscape;
 - exhibition on Bam and its cultural landscape, at the Conference on the Conservation of Earthen Architecture in Iran and Central Asia, University College London;
 - establishment of a workshop in the Bam building exhibition area for CRATerre Centre with the collaboration of ICHHTO and making a concrete and earthen building model.
- In April 2006 the Third Congress of the History of Iranian Architecture and Urbanism was held in Bam. The presence of more than 600 outstanding experts and professors side by side with students of architecture, archaeology, conservation and construction provided a good context for the presentation of the international activities for the rescue of the cultural heritage of Bam. The activities carried out in Bam after the earthquake give hope that through such experiences it will be possible to promote the knowledge of conserving earthen architecture. If this dream comes true it will be an important contribution to the cultural heritage of humankind, which we truly hope to achieve.
- During the previous year a model of the Arg in scale 1:60 was made so that visitors and especially children could have a more complete image of the Arg prior to the earthquake.
- The wooden passage for visitors, together with the lateral yellow protection rails and workshop scaffoldings, shows visitors the itinerary and also provides safety for the adjacent earthen structures. Presently this passage is appropriate, safe and ready for use by visitors. There are also guides at the project site to control and guide visitors. This passage ultimately leads to an open area in front of the second gate or the Governor's Quarter Gate. The people of Bam and other visitors have repeatedly expressed their satisfaction in the works carried out to guarantee safe passage for visiting the site. ICHHTO intends to gradually increase the area that can be visited, depending on the progress made in the removal of the debris.
- The World Heritage List inscription plaque for Bam was installed near the entrance bridge in front of the main gate of the Arg and the guide book of the Arg is given to visitors on request. Furthermore, local guides provide the necessary information to groups of visitors.
- The participation in international conferences and the organisation of expert meetings with scientific institutions and international centres have included:
 - Rome, Italy
 - Tokyo, Japan
 - London, England
 - Suzhou, China
 - Leipzig, Germany.
- Besides being active in the Bam Council for Architecture, ICHHTO was able to include in the master plan for the city of Bam the norms regarding the protection of the cultural landscape of the city, which were approved in 1382 (2003), one year after the earthquake. These norms strongly stress that land-use should be kept as it was prior to the earthquake; furthermore, they emphasise the protection and maintenance of the *Qantas*, the protection of gardens, as well as the protection of monuments and historic sites, and that the buffer zones of historic buildings should be respected.

- Other activities after the earthquake include the publishing of calendars and various catalogues on Bam; CDs with aerial photos of Bam; a map of important buildings of Bam on CD; maps prepared on the basis of aerial photographs by the Documentation Centre of ICHHTO; publications such as the two books *Archaeological Documentation of the Arg-e Bam* and *Between two Earthquakes*, the yearbook of the activities carried out for the rescue of the cultural heritage of Bam. Furthermore, ICHHTO intends to open an on-site bookshop to present these documents at the Arg.
- Apart from the long documentary film on Bam that was shown in the December 2005 workshop, channel 4 of the Iranian Television has prepared and broadcast comprehensive programmes on the post-earthquake activities in Bam. It has also made two documentary films for ICHHTO, which were shown at the technical meeting in Rome. The Japanese television network NHK has made a film on the different phases of international activities in Bam. Furthermore, professional documentary filmmakers have made various films taking different views of Bam and some of them are directly related to the cultural heritage. In addition to being shown on the nationwide television network these films have also been continuously shown at universities, higher education institutions, research institutions, international conferences and gatherings.

»Comprehensive planning«: long-term planning

As was mentioned in the previous section, this phase should be able to respond to the three questions regarding the necessary time for the final restoration of the buildings, the necessary funding and the acceptable methodology. If this phase can be started with a precise programme, it will be possible to claim that the Bam Cultural Heritage Rescue Project will become a »university« for the restoration of historic buildings in Iran. The long-term planning has two fundamental aims: firstly, completion of the practical part of the Bam Cultural Heritage Rescue Project through a precise plan of action and appropriate planning process, and secondly preparation of fundamental guidelines for the restoration of historic buildings (especially earthen structures in Iran and elsewhere in the world). In brief the planning work is aimed at the following goals:

1. finishing the practical part of the Bam Cultural Heritage Rescue Project;
2. compiling a charter for the restoration of earthen architecture;
3. building the first institute for the restoration of earthen architecture in Bam;
4. establishing an earthen architecture conservation laboratory;
5. training of experts at different levels of master courses and establishing a PhD programme for ICHHTO;
6. acquiring a vibration table in Bam for carrying out dynamic experiments on masonry structures.

Analysis

As has been briefly mentioned in this paper, the Bam experience has produced extensive and valuable scientific and technical results that can be presented for possible use in similar situations. It is obvious that the guidelines prepared for this particular crisis situation require a specific methodology for their implementation and adjustment during the process. These aspects have been inseparable from the start. If we set aside the special conditions in the post-crisis situation, the remaining issues that have emerged during the process in the Bam Cultural Heritage Rescue Project involve management and project control, technical and scientific issues, and the relationship of the project with the city of Bam.

The technical and scientific results have been of two kinds. First are those that have been identified and defined as aims and needs of the project from the beginning, and secondly there are those that have been obtained as a result of collaboration with colleagues in Iran and abroad. When a research proposal is made, there is always an effort to provide ways to implement it, even though it may not correspond exactly to the previously defined aims of the Bam project. Regarding management and project control, a wide range of important results have been obtained through multi-faceted interaction and the use of expert knowledge and experience from Iran and abroad. At the same time, it has been important that every decision in the Bam Cultural Heritage Rescue Project has been seen in its context, i. e. in relation to the city.

Conclusion

The experience of the Bam Cultural Heritage Rescue Project is rare in the conservation of historic buildings around the world. The reason for considering this project exceptional in comparison to others can be found in its dimensions, in the importance of its historic structures, the uniqueness of the architectural spaces of its buildings, the extent of damage and the close and profound cultural relation of its people with the cultural heritage of Bam city, especially with the Arg.

If recovery from the bitter experience of the destruction

of the historic buildings of Bam continues according to the established management principles, it can be expected that this experience will result in the progress and improvement of the quality of crisis management. This would not only be suitable for historic buildings, but also for cities exposed to natural disasters and would provide an appropriate context for collaboration and coordination of professional experience in the operations of different organizations. The variety of and interaction between the various professionals, in Iran and abroad, will surely contribute to this important result. In brief, the valuable aims listed below can be considered to be achievable in the management of the Bam Cultural Heritage Rescue Project:

- a framework for collaboration and interaction between experts in various fields and at different levels;
- an appropriate framework for collaboration and interaction between Iranian and foreign experts;
- an appropriate framework for benefiting from the knowledge and innovative technology for the restoration of earthen architecture and their seismic resistance;
- an appropriate framework for training experts and improving the efficiency of the use of human resources in Iran as a valuable asset for ICHHTO (mitigation of problems in field work based on a sound knowledge of theory and extensive operational experience);
- compiling a charter on the conservation of earthen structures;
- compiling professional guidelines for crisis management of historic buildings.