

GLOBAL BLUEPRINTS FOR CHANGE

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The Global Blueprints for Change contain guidance for working together to improve the capability to identify indicators of physical, social, enterprise, and environmental vulnerabilities throughout the world and to select and implement realistic solutions to reduce them towards acceptable levels.

**Theme A: LIVING WITH NATURAL AND TECHNOLOGICAL HAZARDS
Topic A.11: Reducing Risk to Cultural Heritage**

"Reducing the Geo-environmental Effects on Historical and Archaeological Monuments and Sites"

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REDUCING THE GEO-ENVIRONMENTAL EFFECTS ON HISTORICAL AND ARCHEOLOGICAL MONUMENTS AND SITES

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Abstract: This Blueprint for Change will provide guidance to communities throughout the world that are seeking cost-effective ways to preserve and protect historical buildings, antiquities, monuments, and other national treasures from the potential impacts of natural and environmental disasters. It was prepared on the basis of experience in Algeria, for improving and implementing the professional practice of reducing the risk to cultural heritage throughout Algeria and adjacent countries. The aim is to provide guidance that will assist communities throughout the world in becoming sustainable over time to the threats posed by the disaster agents generated by natural and environmental hazards. A sustainable community is the result of a long-term process based on coordinated anticipatory planning and collaborative actions at the local level by community stakeholders and policy makers who are working together to pre-empt the unthinkable, control the controllable, and plan for the inevitable.

Background

Improvement and implementation of techniques for reducing risk to cultural heritage are urgently needed because disasters over time are becoming more frequent, more devastating, and more complex than in the past. Many natural and environmental disasters have regional, national, and international ripple effects and adverse consequences in addition to the obvious local impacts and consequences; therefore, it is imperative for communities to maintain critical skills and to develop new and improved skills in order to protect the world cultural heritage and to cope with all the potential impacts of disasters.

The principal issues include:

- a) establishing protocols for cooperation and collaboration among different local, regional, and international public- and private- sector groups,
- b) enhancing local, regional, national, and international competencies, and
- c) using advances in sciences and new technologies for reducing the risk to cultural heritage.

As any other form of action in favor of protection, social and sustainable economic development, the prevention and attenuation of the natural and environmental disasters should be based on research through a national strategy of management of natural and environmental catastrophes. It is well accepted nowadays that science and modern technology allied to a enlightened social policy are able to mitigate considerably the negative effects of natural and environmental disasters.

For this purpose, a clear definition of the national strategy of the management of disasters is primordial, for a government, for the establishment and the maintaining of adequate

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arrangements to respond efficiently to all aspects of the disaster threats to historical and archaeological monuments and sites. That is valid to all levels of the national structure, from the central government to the local authorities or local associations. If this strategy is not well defined, the preventive measures to reduce the negative effects of the calamities will be non adequate; consequently, the human lives and material losses including the cultural heritage will increase and the country globally will suffer.

A strong and clear strategy will provide the following advantages:

- Direct involvement of the government in the affairs concerning all types of geo-environmental disasters,
- A foundation for an appropriate legislation and associated regulations to deal with cultural heritage,
- A real organization and a clear attribution of responsibilities at all level of the government structure,
- A general directorate to insure an optimal use of the necessary resources and a rigorous assessment of the threat,
- A national competence and a self-reliance which will breed an adequate international assistance when the country eventually asks for it.

Humanity history is as whole represented partially by the cultural heritage found across the globe and for sure preservation should be taken as a priority. Each day, cultural heritage will become more historical than yesterday, and thus it must be preserved as far in time as possible. The vulnerability of cultural heritage is increasing every day, due to ageing, deterioration of materials by geo-environmental conditions as well as by men intervention. Particularly, from the last century, a great interest has been given to the preservation of the cultural heritage as many programs were initiated by various governments as well as by international organisations such as UNESCO.

The growing concern in human values awareness these last two centuries, world cultural heritage is accepted internationally as universal and should be preserved to next generations. The restoration and the preservation of cultural heritage should constitute a priority.

Most of world cultural heritage is located in hazardous areas in terms of geologic and environmental phenomena which increase the vulnerability of the historical and archaeological constructions. These constructions are subjected to earthquakes, landslides, caving zones, atmospheric conditions, age, floods, human interaction, etc.

It is of interest to mention since these monuments and sites are still standing today, for sure ancient communities have built their patrimony according to some preventive measures accepted at that predominant time. The first thing to do is to rediscover these techniques and analyse them, confront them with today's standards and knowledge and eventually use them again to protect and preserve these historical constructions.

2. What should we do to improve political and technical capacity on this topic?

The first step in the preservation and protection of the historical buildings, antiquities, monuments, and other national treasures from geo-environmental phenomena is to understand how ancient civilisations have built their cities. For sure, the ancient inhabitants developed

protective measures gradually over time, in empirical way, for recurrent natural and environmental disasters.

In terms of technical capacity, it is important to start with the following tasks:

1. The re-evaluation of the history of natural and environmental disasters that had occurred in the past in the region or site under investigation,
2. A detailed evolution study over time of the typology and morphology classes of the construction system and the material and mortar used in these constructions; this should be done in respect to the frequency and intensity of these disasters that occurred during the period of time of interest,
3. Confronting those days topology classes and material with today's standards,
4. Whenever possible, use the ancient methods to preserve historical buildings.

In terms of political capacity, it is important to achieve the following tasks:

1. Political accept that even in ancient times, ancient communities were aware of natural and environmental risks,
2. Decision makers should be convinced that cultural heritage is not only objects to look at and to preserve but they are also a significant scientific source,
3. Bring together representatives from professional disciplines, government at all levels, academia, insurance, tourism industry and to establish protocols for co-operation and collaboration among the various and rich competencies at the local, regional, national and even international levels.

3. How should we implement these strategies?

1. Give real value to cultural heritage,
2. Promote cultural heritage to general public, schools, etc.
3. Promote tourism industry in cultural heritage so these monuments and sites can fund their preservation by themselves
4. Contribute in the understanding of the construction process of ancient communities,
5. Integration of cultural heritage in national codes of construction,
6. Characterisation of natural and environmental disasters in the region or site considered,
7. Make scenarios of impact on cultural heritage of most probable natural and environmental disasters,
8. Transfer traditional protective measures to decision makers and end users,
9. Provide end users (engineers, architects, decision makers, politicians, civil protection, etc.) effective and comprehensible description of the ancient building and protective process,

4. Preservation philosophy based on scientific research

1. Geological and technical considerations of the archaeological monuments and sites
 - 1.1 Types and geological ages of rocks and soil layers,
 - 1.2 Earthquakes events, faults, cracks, tectonic movements,
 - 1.3 Natural phenomena affecting the sites as flooding, erosion, climate conditions, erosion factors,

- 1.4 Effects of geo-environment on cultural heritage
2. Mechanical and geotechnical investigation for the archaeological sites
 - 2.1 Lithologic, physical and mechanical properties of the rock petrological features
 - 2.2 Geo-technical hazard effects on the archaeological sites and the detection of instability zones, geo-tectonic fractures and collapse, areas of deep slope and cliffs, caving zones, ...
 - 2.3 Determination of the geo-technical units for the archaeological sites according to the geo-technical rock units properties.
 - 2.4 Establishing geo-technical plans for the archaeological sites
3. Phases of the project
 - 3.1 Problems determination and geo-technical study necessary for the archaeological sites
 - 3.2 Control, study of the physical rock movements (slipping, collapse, corrosion and erosion, flood, ...)
 - 3.3 Topographic maps and tectonic collapse
 - 3.4 Necessary solutions and proposals to protect the historical and archaeological sites
4. Main needs for the project execution
 - 4.1 Field geo-technical investigation
 - 4.2 Archaeological reading of the archaeological sites
 - 4.3 Collection of samples of the soil and rock large enough for laboratory testing
 - 4.4 Sufficient team of engineers, architects, archaeologists, geo-technicians, geological consultants, historians, etc.
5. Expected results
 - 5.1 Co-operation and exchange of experience between the countries in terms of protection of historical and archaeological sites
 - 5.2 Deep investigation of geo-environmental problems affecting these sites
 - 5.3 Proposal of solutions to protect the archaeological and historical sites

5. Barriers to implementation?

1. Long term strategies are not accepted by decision makers which are essential for the preservation of cultural heritage,
2. The barriers to implement a strategy to preserve cultural heritage may arise from misunderstanding the need and the value in preserving these sites,
3. Cost of preservation seems too high to bear in short time for politicians,
4. Neglect of the importance in terms of culture as well as a tourism investment by both the government and the population alike, short vision in investment,

5. Lack of funding,
6. Lack of awareness in the population and the government alike,

6. Recommendations to overcome these barriers

1. Getting National and International funding of project to reduce the risk in cultural heritage,
2. UNESCO and other national or international organisations should define a clear strategy for the preservation of cultural heritage by associating research laboratories and Universities,
3. Needs to promote awareness and the need to keep cultural heritage standing at the national and international levels,
4. Establish a world database for cultural heritage and its need to be preserved in all countries,
5. Establish an international program for the reduction of geo-environmental risks in cultural heritage,
6. Declare the next decade as International Decade for Disaster Reduction in Cultural Heritage (IDDRHC) under the authority of UNESCO -World Heritage,
7. Develop a sound culture of disaster risk reduction for cultural heritage,
8. Promote cultural heritage tourism at the national and international levels,
9. Vulgarise cost effective and social impacts of the preservation and the protection of cultural heritage,
10. Develop a world manual for all known preservation techniques to help governments and population alike in their work,
11. Encourage governments to include cultural heritage studies in the schools programs,
12. Encourage knowledge transfer of preservation techniques to official institutions, entrepreneurs, architects, engineers and also for training needs for qualified workers in cultural heritage intervention,
13. Establishing a legislative and statutory approach,
14. Establishing a national administrative structure in charge of implementation and co-ordination of the national policy in order to reduce the risk in cultural heritage,
15. Establishing a general framework and strategy for implementing a long-term collaborative effort,
16. Establishing an international network between countries, through the main cities, for the sharing of experiences and exchanging data between users,