

SCHOOL OF CIVIL PROTECTION

MODULE BI-4/C

PROTECTION OF CULTURAL HERITAGE



HANDBOOK



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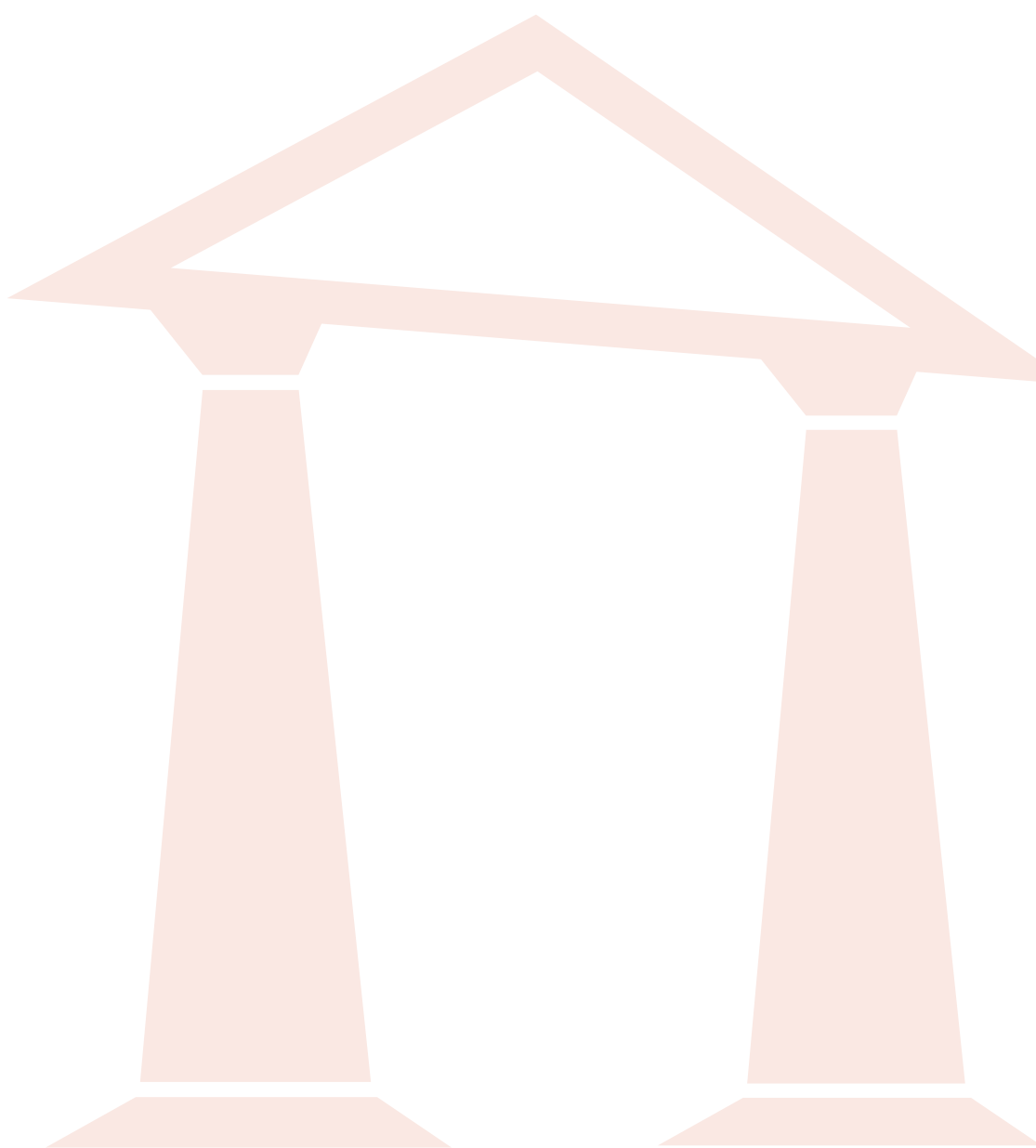
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1. Cultural heritage and risks

Risk preparedness for the protection of cultural heritage is a priority for our society. In the framework of the European Network for Scientific Co-operation, PACT¹ (Sciences and Techniques for the Cultural Heritage) a working party on the protection of monuments and ancient buildings against seismic events was set up. On the occasion of the establishment of the EUR-OPA Major Hazards Agreement of the Council of Europe, a European Centre in Ravello - the European University Centre for the Cultural Heritage (CUEBC)² - was created. The activities of this European Centre focus on the problem of the protection of the cultural heritage in risk areas.

On 15-17 November 1989, a colloquy on the Protection of the Architectural Heritage against Natural Disasters was jointly organised at the European University Centre for the Cultural Heritage in Ravello by the Intergovernmental Steering Committee for integrated Conservation of the Historic Heritage and the EUR-OPA Major Hazards Agreement. On 23 November 1993, the Committee of Ministers of the Council of Europe adopted a Recommendation N° R (93) 9 on the Protection of the Architectural Heritage against Disasters, recommending to the Governments of the member States to adopt *“all legislative, administrative, financial, educational and other appropriate measures, with reference to the principles”* as set out in Appendix 1 for conserving the architectural heritage.

In 1996 four non-governmental Organisations (the International Council for Archives /ICA/, the International Council of Museums /ICOM/, the International Council on Monuments and Sites /ICOMOS/, the International Federation of Library Associations and Institutions /IFLA/), founded the International Committee of the Blue Shield (ICBS). The mission of ICBS which has taken up the emblem of the Hague Convention of 1954 for the protection of cultural property in the event of armed conflict is to collect and disseminate information and to coordinate action in emergency situations. On the occasion of the second anniversary of the great Hanshin-Awaji earthquake, an international Symposium was organised in Kobe and Kyoto on Risk Preparedness for Cultural Properties. A Declaration was adopted to enhance international collaboration in the field and to identify strategies and actions at national and international levels with a view to minimising losses of cultural heritage due to catastrophes of both natural and human origin.

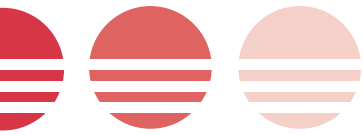
A well documented manual for risk preparedness for the cultural heritage has been prepared by Herb Stovel on behalf of the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), the United Nations Educational, Scientific and Cultural Organisation (UNESCO), the International Council on Monuments and Sites (ICOMOS), the World Heritage Centre (WHC) and was published by ICCROM in 1998. We present below the content of chapters 3 and 4.

¹ PACT: Réseau "Sciences et Culture" (Sciences physiques et de la nature appliquées à la préservation-valorisation du patrimoine culturel, association 1901 - FER)

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2. Principles of risk preparedness for cultural heritage

2.1 Background

The heritage conservation field places great importance on the use of principles in guiding practitioners to appropriate interventions for heritage properties. Conservation professionals recognize these principles as being contained within the family of doctrinal texts loosely linked to the Charter of Venice (1964), for which ICOMOS is generally recognized as custodian. ICOMOS has taken responsibility, primarily through the efforts of its specialized international Scientific Committees, for extending the basic general principles presented in the Venice Charter by elaborating complementary texts in related fields.

ICOMOS has developed charters and guidelines in the areas of cultural tourism, underwater archaeology, historic towns, archaeological heritage management, historic gardens, recording and documentation, training and education, and - in the context of the World Heritage Convention - authenticity. This represents the first attempt since the writing of the Venice Charter to draft a set of universal principles. The principles are embodied in the *Nara Document on Authenticity*, which was first adopted in November 1994. It focuses on the need to interpret authenticity within specific cultural and heritage, i.e. typological contexts. Currently, doctrinal texts are now being developed for conservation of vernacular architecture, structural systems, and wood.

The ten salient principles

1. The key to effective protection of cultural heritage at risk is advance planning and preparation
2. Advance planning for cultural heritage properties should be conceived in terms of the whole property and provide integrated concern for its buildings, structures, and their associated contents and landscapes
3. Advance planning for the protection of cultural heritage against disasters should integrate relevant heritage considerations within a property's overall disaster prevention strategy
4. Preparedness requirements should be met in heritage buildings by means which will have least impact on heritage values
5. Heritage properties, their significant attributes and the disaster-response history of the property should be clearly documented as a basis for appropriate disaster planning, response and recovery
6. Maintenance programmes for historic properties should integrate a cultural heritage-at-risk perspective
7. Property occupants and users should be directly involved in development of emergency-response plans
8. Securing heritage features should be a high priority during emergencies
9. Following a disaster, every effort should be made to ensure the retention and repair of structures or features that have suffered damage or loss
10. Conservation principles should be integrated where appropriate in all phases of disaster planning, response and recovery



While the Kobe-Tokyo Declaration calls for development of a set of principles for cultural heritage at risk, these are not yet in place. Nevertheless, the existing ICOMOS doctrinal texts provide some guidance in treating questions relevant to improving risk-preparedness for cultural heritage. Though few articles focus directly on risk-preparedness, some references to related issues may be found, including to the importance of maintenance and to the value of recording as a form of ‘insurance’, (meant to retain valuable information in the undesirable event of loss of the heritage); both are important components of a cultural-heritage-at-risk framework.

Principles appropriate in improving risk-preparedness for cultural heritage acknowledge the most important ideas to emerge from the recent Blue Shield discussions:

*given recent international Declarations promoting the integration of improved risk-preparedness for cultural heritage in existing disaster-preparedness infrastructures, principles should be placed within the **context** of existing structures and practices to protect life and property in the face of disaster or armed conflict; and as noted in the Introduction to this Manual, built-heritage **conservation** principles have been developed primarily to guide thinking about **intervention**, i.e., about curative approaches to heritage. Principles relevant to **improving** risk-preparedness for built cultural heritage need to be devised **for** preventive approaches, concerned with improving the general conditions **for** the long term survival of cultural heritage and its significant messages*

2.2 Principles

Ten salient principles are given in the box. These are the desirable characteristic approaches for the better management of the heritage attributes of **particular** properties. Each principle and its implications in risk planning, response and recovery is considered in the following.

- ▶▶▶▶ **The key to effective protection of cultural heritage at risk is advance planning and preparation**
 - the best means to protect cultural heritage at risk is to ensure that adequate attention in advance planning is given to identification of heritage attributes, the risk to these attributes and appropriate response measures for these risks
- ▶▶▶▶ **Advance planning for cultural heritage properties should be conceived in terms of the whole property and provide integrated concern for its buildings, structures, and their associated contents and landscapes**
 - no distinction should be made in planning between a property’s movable and immovable cultural heritage components; there should be one integrated response plan for the property rather than one for its structures, another for its collections and a third for its landscape
- ▶▶▶▶ **Advance planning for the protection of cultural heritage against disasters should integrate relevant heritage considerations within a property’s overall disaster-prevention strategy**
 - a property’s disaster-prevention strategy should fully integrate concern for the cultural heritage within it, both in terms of the planning process used to develop and update the strategy, and the particular response plans which might result; there should be one fully integrated response plan for a property
 - property managers must be able to work with inhabitants, administrators and planners to resolve conflicts and to develop conservation strategies appropriate to local needs, abilities and resources



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➡ Preparedness requirements should be met in heritage buildings by means which will have least impact on heritage values

- requirements to contain risks and hazards should not be reduced in order to maintain heritage character; to heritage purists, a sprinkler system might be offensive in a historic structure, but its effective use can save lives, property and heritage
- the key concerns from a heritage perspective should be the design and installation of disaster-protection systems or mechanisms in ways which will minimize impact on heritage values. Hence, approaches to preparedness design that remain sensitive to heritage will generally require review of a large range of alternatives, in order to ensure that the least-impact option has been identified

➡ Heritage properties, their significant attributes and the disaster-response history of the property should be clearly documented as a basis for appropriate disaster planning, response and recovery

- analysis should make reference to cultural and use significance, and the relationship of structures or elements to their setting. This information should establish priorities for protection of a property and guide fire brigades and civil defence officials to handle sensitive areas with care in responding to emergencies. It should also provide a record which would allow the accurate recovery (if warranted) of lost or damaged elements
- property inventories established to protect heritage should, however, be used carefully. Property elements not listed, or 'low' in priority, should not be perceived as disposable. The heritage values of heritage properties are more than the sum of the aggregate values of component parts, and efforts should be made to ensure that disaster-response plans are focused on preserving not only 'significant' elements but the totality of the property
- significant attention in planning for risk-preparedness should be given to obtaining and studying documentation of the performance of a structure of property during past disasters, in order to benefit fully from lessons relevant for planning for the future. Post-disaster recording can also help clarify property losses and priority needs for stabilizing and securing the property and its constituent elements
- the existence of a complete record of the property should not substitute for all possible efforts to protect the property from the consequences of decay of disaster, or be permitted to relax vigilance against risk

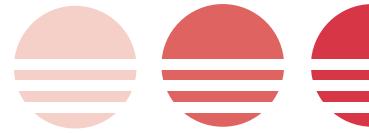
➡ Maintenance programmes for historic properties should integrate a cultural heritage-at-risk perspective

- maintenance programmes are often conceived in terms of the daily causes of deterioration of a property, e.g., visitor and occupant use and the impact of weather conditions (temperature, humidity); this perspective should be expanded to include analysis of all possible human and natural sources of decay and loss, the degree of risk associated with each and appropriate measures to reduce or mitigate risk

➡ Property occupants and users should be directly involved in development of emergency-response plans

- the first line of defence and response in urgent situations will always be property occupants and users. Their involvement in planning increases their understanding of the purpose of proposed measures and the likelihood of effective

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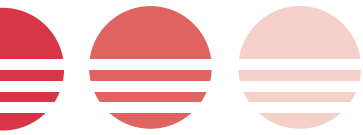


response. Their involvement also brings their first-hand knowledge and experience of the property to the process of developing a response plan

- ▶▶▶ **Securing heritage features should be a high priority during emergencies**
 - while efforts to preserve heritage should never compromise efforts to preserve human life in an urgent situation, nevertheless, heritage - as the tangible and intangible record of all past and current lives - deserves the utmost care in emergency response

- ▶▶▶ **Following a disaster, every effort should be made to ensure the retention and repair of structures or features that have suffered damage or loss**
 - the involvement of qualified conservation professionals, experienced in post-disaster assessments, is critical to retention of damaged buildings and elements. For lay observers, visible damage often appears to be of greater concern than its actual condition warrants, and there is a tendency to believe recovery is either impossible, or too expensive. Condition assessments must come from heritage professionals experienced in looking at similar situations. It is important that the response plan for the property identifies in advance individuals capable of being called upon rapidly for such assessments.
 - assessment by a qualified specialist should result in recommended measures for immediate and urgent stabilization and protection of cultural heritage. Budget provisions for such stabilization should be part of advance planning for improving property disaster-preparedness.
 - relevant building codes and standards should be applied flexibly in post-disaster assessments. In the interests of public security, the officials responsible often quickly condemn damaged properties, citing relevant standards and codes. Without compromising public safety, heritage properties should be given the benefit of the doubt until assessment by qualified and experienced professionals can determine the true condition of the site, remedial measures required and their urgency.

- ▶▶▶ **Conservation principles should be integrated where appropriate in all phases of disaster planning, response and recovery**
 - conservation principles should be used to guide property documentation before, during and after emergencies; documentation should be secure (i.e., stored in several locations), reliable (i.e., its accuracy should have been verified independently of those carrying out the initial recording) and readily accessible
 - conservation principles should be included among the legal and normative instruments applied in actions needed for damaged heritage elements, in order to ensure integrated response to post-disaster needs
 - as with all facets of risk-preparedness, property managers and emergency-response officials should ensure that conservation principles are an integral part of the overall set of principles applied in risk planning, response and recovery. The decisions made should be balanced judgements based on shared principles, accepting responsibility for safeguarding the heritage resource.
 - appropriate expertise should be sought. Managers should recognize when advice must be sought from specialists, such as for wall paintings, sculpture and objects of artistic and historical value, or particular building materials and systems. The experts involved should work as part of multidisciplinary teams.



3. Developing a sound approach to risks-preparedness for cultural heritage property

3.1 Planning framework for risk-preparedness

Developing a sound approach to risk-preparedness for cultural heritage requires a planning framework for examining particular aspects of risk-preparedness in a consistent fashion.

The essential phases of that planning framework - Preparedness, Response, Recovery - are described in the following.

3.1.1 Preparedness phase

Efforts to improve preparedness for cultural heritage can include those focused on:

- the hazards themselves and the reduction of related risks
- the reinforcement of the property itself to increase its resistance to potential risks
- the use of detection and early warning systems
- improvement of the ability of both property occupants and users and emergency - response professionals to respond in urgent situations

Reducing risks at source

This involves efforts to eliminate hazards or to reduce vulnerability of a property to particular hazards, or both. In essence, measures here are aimed at improving the ambient conditions within which the cultural heritage sits. Examples would include elimination of fire sources in a property, or reduction of hazardous activities.

Reinforcing the ability of a property to resist or contain the consequences of disaster

This includes efforts to strengthen and reinforce a structure and its component parts. Examples would be the use of a sprinkler system for fire, or structural reinforcement to counter the forces imparted by an earthquake.

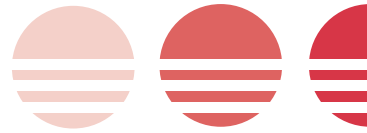
Providing adequate warning of impending disaster

Efforts here involve the use of sensors to record or predict the onset or likelihood of disaster. Examples include smoke detectors (to warn of fire), or networks of earthquake sensors intended to give advance indication of seismic activity. Risk mapping can also be part of preparedness measures to reduce the impact of disaster.

Developing emergency-response plans

This should bring together occupants and emergency-response officials in developing an emergency-response plan for a property. The plan should be based on shared understanding of a property, its qualities, its condition, and its needs in disaster situations, as well as preparing on-site individuals for assuming appropriate responsibility before, during and after disaster. Preparatory activities in support of the response plan would include occupant fire drills and property documentation establishing priorities for salvage or other actions during disaster.

The result should be competent disaster-response authorities and brigades having adequate awareness of the nature of a property's heritage qualities, and appropriate means to limit damage to these qualities during response, without compromising human life or safety. Activities promoting these objectives would include awareness courses for fire officials, on-site disaster simulations, and ensuring heritage-sensitive emergency vehicle access routes across properties.



3.1.2 Response phase

Generally, response is a function of the adequacy of preparedness measures including appropriate response plans and training for occupants and emergency response personnel. Many actions taken during 'response' could also be understood as part of the early phases of recovery.

Ensuring availability of the response plan

The response plan should have been prepared well in advance. It is important to ensure that all may have ready and immediate access to it in the event of emergency. It is also important that the response plan be familiar and comfortable for all involved. Ongoing rehearsals and simulations are important to ensure readiness for use of the plan in the event of an emergency.

Mobilizing the Conservation Team

A list of qualified and available conservation professionals should already have been prepared. Mechanisms should be in place to mobilize one or more members of a conservation team immediately following onset of the disaster, as needed.

3.1.3 Recovery phase

Again, the effectiveness of recovery measures is in large part a function of measures planned and implemented in advance of the disaster. The quality of mitigation activities, focused on reconstruction, for example, depend on the quality of documentation prepared for the building before loss. The framework should include concern for mitigation, for rebuilding and for reinstatement of enhanced preparedness measures.

Efforts to mitigate the negative consequences of the disaster

Efforts here focus on means by which the full negative impact of a disaster can be reduced or compensated for. Examples include exhaustive recording prior to demolition of unsecurable elements, efforts to stabilize structure and contents following a disaster, efforts to remove or undo negative consequences (e.g., to remove flood waters and debris), and provision of temporary housing to accommodate those who might have lost homes.

Efforts to rebuild the physical components of the property and the social structure of those using the property and its community

Activities should focus on the physical reconstruction of buildings, neighbourhoods and infrastructure, as well as efforts to rebuild a sense of stability, well-being and purpose in the minds of those affected by the disaster. Examples here would include the reconstruction of a fire-damaged structure, or the use of personal counselling to support the victims of loss.

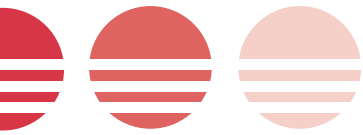
Efforts to reinstate and enhance preparedness measures

This involves assessment of the adequacy of preparedness measures in place before the disaster, and the implementation of preparedness measures enhanced to reflect the lessons learnt. Monitoring programmes to evaluate risk-preparedness effectiveness are important in achieving such improvements.

The effectiveness of the various elements of this planning framework may be examined at local (site), municipal, regional and national levels.

Factors present at the local (site) level are evidently of the highest importance; nevertheless, policies, mechanisms and initiatives operating at the other levels may have a positive or negative impact on risk-preparedness and hence merit close attention.

The following chart provides an indicative matrix for an appropriate risk preparedness strategy for cultural heritage properties to be developed within this framework, in relation to various hazards.



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The cultural heritage risk preparedness strategy matrix

RESPONSE LEVEL	LOCAL (SITE)	MUNICIPAL	REGIONAL	NATIONAL
PREPAREDNESS				
1. Reduce risk				
2. Strengthen resistance				
3. Advance warning				
4. Response plan developed				
RESPONSE				
5. Response plan available				
6. Conservation team				
RECOVERY				
7. Mitigation				
8. Rebuilding				
9. Preparedness re-instatement and enhancement				

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3.2 Risk-preparedness for different forms of cultural heritage

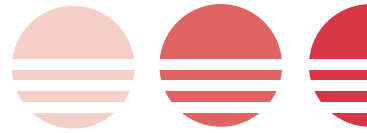
In the next chapters this Module focuses on necessary preparatory, response and recovery measures for particular hazards. While its recommendations are provided for heritage properties in general, these are formulated for the most part in terms of single structures or buildings. Where significant differences exist for historic urban ensembles, archaeological sites or cultural landscapes, these are noted.

This section attempts to define both the common elements to be taken into account in planning appropriate risk-preparedness measures for different types of heritage and also their essential distinguishing characteristics.

The World Heritage Convention offers a definition of cultural heritage useful for distinguishing among various forms of cultural heritage:

- **monuments:** architectural works, works of monumental sculpture and painting, elements of structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding value from the point of view of history, art or science
- **groups of buildings:** groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science
- **sites:** works of man or the combined works of nature and of man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological points of view

The categories of buildings, groups of buildings and sites can be understood to roughly correspond to the categories examined below, namely monuments (single structures, buildings or complexes), historic settlements, and cultural landscapes. This Module also separates out archaeological sites (a special case of monument) as deserving particular attention.



The particular planning concerns held in common in seeking to improve risk-preparedness for cultural heritage are noted below first, followed in turn by particular planning concerns applicable to monuments, archaeological sites, historic settlements and cultural landscapes.

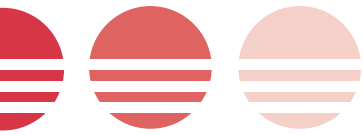
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3.2.1 Cultural heritage Disaster Planning

Effective disaster planning for cultural heritage should be characterized by the following:

- emphasize preparation, and be positive in tone and content
- use a phased approach to planning - develop the plan, test the plan, adjust and re-test until satisfactory and confirm the plan
- raise awareness and appreciation of the values of cultural heritage among community members and the officials involved
- adopt only the highest principles of good conservation practice
- develop in the community a good understanding of significant hazards and the related vulnerability of cultural heritage
- balance risks against heritage values when determining acceptable levels of risk and in defining priorities for response
- try out plans, including through regular use of simulations and drills involving all those who might be affected; test scenarios should be realistic and reflect known patterns of disaster response in populations, e.g., during disasters, urban and rural populations tend to have different responses - the former cluster, the latter flee - and similar responses are probably predictable in relation to specific sites
- anticipate, be aware of and update appropriate line-of-command relationships, among, for example, Ministries of Culture, of Defence, of Planning and of Transport (to form an Emergency Council at national level, for instance), and between local, regional and national context, since these are often unclear and therefore difficult to establish during disaster
- establish a single point of authority, and links between that focal point and different sources of aid that may be needed in emergency situation (e.g., technical services, civil security, social support for the community)
- give priority to investing in people, awakening their understanding values, needs and possibilities; do not just plan for structures
- take care to develop policies and approaches that attempt to maintain balance between heritage, lives and livelihood in planning response and recovery
- provide risk-preparedness professionals with a clear picture of the nature of heritage goals in tangible terms (e.g., maintaining material authenticity)
- use mechanisms that are realistic and focus on achievable objectives



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International support is also important, but rarely at the moment of disaster international links are best used to develop and improve longer-term approach and measures, through comparative studies of risk-preparedness tools and mechanisms (e.g., recording, monitoring, risk assessment, etc.) elsewhere.

Emergency-Response Planning

- emergency response plans must be location specific, based on the particular physical and cultural circumstances of the heritage being care
- an important part of building an emergency response plan for cultural heritage is that of integrating community support - improving social and cultural awareness, and community vigilance and security. Structuring and planning community support requires considerable finesse in building sustained social support for initiatives

3.2.2 Monuments

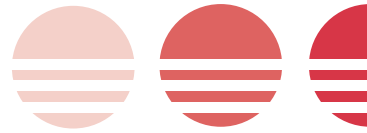
- while having a single identifiable ownership offers some advantages in the care of monuments by providing a centre of expertise and a focus for operations, it is still important to ensure that the planning process places management of risk-preparedness measures for a monument in its larger geographical and political contexts, and ensures adequate links to national and regional support networks and mechanisms
- disaster planning for monuments should integrate understanding of, and respect for, their particular heritage values, and the various elements and patterns which carry these values
- special concerns for monuments include the need to focus attention on the interest and capacities of private owners (who do not necessarily share the resources or experiences of public-sector owners), the need to deal with single sites managed in partnership (horizontal integration), and the need to ensure that proposed measures link all the individuals and entities involved with monuments, from top to bottom, from maintenance staff to directors (vertical integration)
- planning for monuments should make reference to the principles contained in relevant conservation charters and doctrinal texts, including the 1964 Charter of Venice and the many subsequent ICOMOS national and scientific texts, ICOM Guidelines and documents of other international and regional organizations, e.g., the Council of Europe

3.2.3 Archaeological sites

Archaeological sites may best be understood to be in their present condition as the result of past disasters or neglect, and so their care should be seen in a long-term perspective.

Planning should concern itself particularly with site security, i.e., the potential for vandalism and arson, potential for looting and illicit removal of heritage objects or fragments, safety of visitors and residents.

- planning should be guided by respect for the heritage values of a site and its various constituent elements in ways which can guide response during times of disaster. For example, analysis should distinguish between documentary values and presentation values; it should clarify existing site integrity and it should focus on remedial action in appropriate ways to maintain desired integrity and authenticity



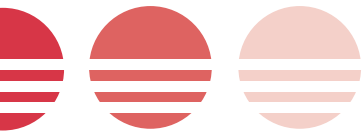
- planning should focus on establishing acceptable levels of risk for particular threats in specific conditions, e.g., the stability of ruins, prevalent climatic conditions, the impact of fire, water or other agents on the particular materials of the resources (clay, masonry, wood, etc.), vulnerability to flooding, etc.
- planning should focus on preventive aspects, including public education; in some cases where human settlements exist within archaeological sites, such as Ayutthya (Thailand), the possibility for 'neighbourhood' watch involvement exists
- planning for archaeological sites should make reference to the principle contained in applicable conservation documents, including the UNESCO Recommendations for Archaeological Sites (New Delhi, 1956, but currently under revision); the 1972 Council of Europe Convention on the Protection of the Archaeological Heritage; and the ICOMOS Charter Archaeological Heritage Management (Lausanne, 1990)

3.2.4 Historic settlements

- management planning must address overlapping responsibilities and potential competition to avoid conflict in response situations; it should be recognized that the tension between development and conservation which characterizes every-day planning in historic settlements is also present in disaster recovery, and that the development community, without guidance, can easily exploit disasters; the best way to avoid needless conflict with those entrusted with recovery is to establish clear recovery guide lines before the event, trying to anticipate the dilemmas that might accompany a disaster
- disaster planning in historic settlements should acknowledge the heritage values of the settlement and the particular elements, traditions and uses through which these values are manifest
- disaster planning in historic settlements needs to reflect different economic and legal contexts (market economy, transition economy, centrally planned economy) and particular ownership and responsibility patters traditions and mechanisms
- in working closely with individual owners, it is important to recognize that individual owners may not initially share heritage values import, to a community; efforts should be made to avoid expert vs. owner conflicts
- planning efforts should involve all potential actors with a stake in community, including tourism companies, the media, insurance companies, etc
- disaster planning for historic settlements should take into account direction given by appropriate conservation charters and doctrinal texts including the ICOMOS Charter on Historic Towns (Washington, 1978)

3.2.5 Cultural landscapes

- Effective risk-preparedness for cultural landscapes involves collaborative strategies that bring together private landowners, government leaders and others. In all likelihood, effective risk-preparedness among so many partners will require creation of a strong coordinating mechanism: perhaps a coordinating committee or commission with a mandate to develop and support implementation of an effective response plan.
- Effective planning requires efforts to strengthen appreciation of the particular values of cultural landscapes among residents and users of the landscape, and also among officials responsible for risk-preparedness.



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- Effective planning should define in tangible ways the particular attributes and practices important in sustaining the values of the cultural landscape so that these may be respected and maintained as much as possible in planning response and recovery.
- Effective planning should make reference to accepted conservation principles and practices in the cultural landscape field, including the results of UNESCO's Expert Meetings on the subject and the commentaries and definitions

BL - 4/C

APPENDIX: **Recommendation No. R (93) 9 of the Committee of Ministers to member States on the protection of the architectural heritage against natural disasters**

/adopted by the Committee of Ministers of the Council of Europe on 23 November 1993 at the 503rd meeting of the Ministers' Deputies/

The Committee of Ministers, under the terms of Article 15.b of the Statute of the Council of Europe,

- ▣▣▣▣ Considering that the aim of the Council of Europe is to achieve a greater unity between its members
- ▣▣▣▣ Having regard to the *European Cultural Convention* signed in Paris on 19 December 1954
- ▣▣▣▣ Having regard to the *Convention for the Protection of the Architectural Heritage of Europe* signed in Granada on 3 October 1985
- ▣▣▣▣ Having regard to the *European Convention (revised) on the Protection of the Archaeological Heritage* signed in Valletta (Malta) on 16 January 1992
- ▣▣▣▣ Having regard to the UNESCO Convention for the Protection of Cultural Property in the Event of Armed Conflict adopted at The Hague on 14 May 1954
- ▣▣▣▣ Having regard to Recommendation 1042 (1986) of the Parliamentary Assembly of the Council of Europe on protecting the cultural heritage against disasters
- ▣▣▣▣ Having regard to Resolution (87) 2 setting up a co-operation group for the prevention of, protection against, and organisation of relief in major natural and technological disasters
- ▣▣▣▣ Having regard to its previous recommendations:
 - on the specialised training of architects, town planners, civil engineers and landscape designers [No. R (80) 16]
 - on the promotion of the crafts trades involved in the conservation of the architectural heritage [No. R (86) 15]
 - on control of physical deterioration of the architectural heritage accelerated by pollution [No. R (88) 5]
 - on measures likely to promote the funding of the conservation of the architectural heritage [No. R (91) 6]
- ▣▣▣▣ Recognising that the architectural heritage constitutes an irreplaceable expression of the richness and diversity of Europe's cultural heritage

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- ▣▣▣▣ Emphasising that the lack of specific legislation and measures for protection of the architectural heritage against the effects of natural disasters would lead to irreparable losses of Europe's heritage
- ▣▣▣▣ Stressing that in this field human life and its quality always takes priority
- ▣▣▣▣ Convinced that strategies for the protection of the architectural heritage can also protect human life
- ▣▣▣▣ Bearing in mind the work of other international organisations, especially UNESCO, in this field
- ▣▣▣▣ Stressing the importance of international co-operation

Recommends that the governments of the member states adopt all legislative, administrative, financial, educational and other appropriate measures, with reference to the principles set out in the Annex to this recommendation, as part of their general policy for conserving the architectural heritage.

Instructs the Secretary General to transmit the text of the present recommendation to the non-member states party to the European Cultural Convention and/or the Convention for the Protection of the Architectural Heritage of Europe and of the European Convention on the Protection of the Archaeological Heritage (revised), and to members of the Open Partial Agreement on the prevention of, protection against, and organisation of relief in major natural and technological disasters.

ANNEX to Recommendation No. R (93) 9

Principles and measures

1. Scope and definitions

- ▣▣▣▣ "*Architectural heritage*" comprises monuments, groups of buildings and sites as defined by Article 1 of the Granada Convention, as well as movable objects having particular historical or aesthetic association with the protected buildings.
- ▣▣▣▣ "*Natural disaster*" means the occurrence of a natural phenomenon which causes extensive loss of, and damage to, the architectural heritage.
- ▣▣▣▣ "*Hazard*" means the probability of occurrence, within a specific period of time, of a natural phenomenon which could damage buildings or objects. These hazards are: seismic activity, volcanic activity, tsunami, flooding, land, earth and mud slides and avalanches, storms, fires and explosions. Secondary hazards are often created as the result of the occurrence of a primary disaster
- ▣▣▣▣ "*Vulnerability*" means the degree of damage or loss to a given element-at-risk or a set of such elements resulting from the occurrence of a natural phenomenon (or fire).
- ▣▣▣▣ "*Risk*" means the expected damage to, or loss of, the architectural heritage due to a particular natural phenomenon or combination of phenomena, and is consequently the product of "hazard" and "vulnerability".

2. Legal and administrative framework for disaster protection

- ▣▣▣▣ Each state should establish and complete the compilation of lists of the buildings, objects and monuments of interest. Copies of the lists should be deposited with all the appropriate authorities.
- ▣▣▣▣ In recognition of the variety and extent of the architectural heritage, priority should be given to those buildings and objects of greatest importance and to those most at risk.



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- ▣ All items on the lists should be recorded, and inventories, as detailed as possible, should be produced.
- ▣ Owners of items on the lists should maintain their property in good condition, by means of structural surveys and by the implementation of regular schedules of maintenance and repair and of risk assessment studies.
- ▣ Authorities responsible for the architectural heritage should be empowered to ensure that the necessary surveys, maintenance and repair work are undertaken.
- ▣ Authorities should be empowered to enforce measures to reduce risks which jeopardise the building.
- ▣ If an owner cannot be traced, or is unwilling to undertake the work, the authorities should have the right to undertake the work, at the expense of the owner, or to effect the compulsory purchase of the property.
- ▣ The issue of risks should be a material consideration in the assessment of town planning and land use proposals. Proposals to alter or extend historic buildings, which are likely to increase the risks, should be refused.
- ▣ Authorities responsible for the architectural heritage should be responsible for disaster prevention and mitigation in their field of competency. They should employ trained staff to: produce and maintain records; monitor disaster activity and produce protection strategies; implement salvage, recording and emergency work; provide educational and technical assistance and guidance; and plan and implement restoration projects after the disaster.
- ▣ Authorities should be empowered to raise, or be provided with, the resources to undertake the functions required for disaster prevention and mitigation.
- ▣ Prescriptive building and safety codes should not automatically apply to the architectural heritage. Safety measures and standards should be attained by the application of performance requirements which employ an optimum and flexible choice of organisational, technical and structural measures.

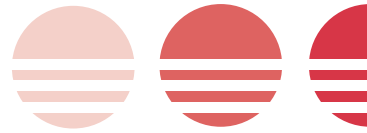
3. Financial and insurance measures

3.1 Financing disaster prevention and mitigation

Adequate and quickly accessible resources should be established both for planned maintenance, upgrading and preventive work and for contingency funding in the event of a disaster, for instance by setting up national and local funds.

3.2 Insurance

- ▣ States should remove any legal obstacles and facilitate the insurance of buildings and objects, which comprise the architectural heritage, against loss and damage caused by disasters and against theft and arson.
- ▣ All steps to encourage, support and facilitate full and appropriate insurance cover should be taken.
- ▣ Policies should ensure that the sums insured shall represent the full cost to be incurred at the time of the loss or damage, in order to repair, restore or reinstate the buildings or objects to their condition before the disaster, using materials, workmanship and techniques according to best conservation practice. If a policy stipulates an excess or co-insurance, the insured should prove that he/she has the means to cover such sums out of his own funds.



- ▣▣▣▣ The buildings and objects should be inspected regularly by experts and insurers and the conditions and warranties stipulated in connection with such inspections should be binding.
- ▣▣▣▣ Efforts should be made to ensure full co-operation and the exchange of information and expertise between the authorities and the insurance companies.

4. Education and training

In order to improve risk awareness, education should be promoted at different levels: to the general public through informed media coverage and in the school systems as part of the curriculum; to the professionals and technicians through general training and in specialist courses; and, to owners and occupiers of the architectural heritage by the provision of guidance.

- ▣▣▣▣ Education and training should be given a high priority and be provided with an adequate level of resources.
 - ▣▣▣▣ Training, at a professional and technical level, must take into account the following considerations:
 - a) only specially qualified and experienced teachers should be used to provide the specialist knowledge and training required
 - b) all professionals should be taught general principles and practice at pre-qualification or undergraduate level and specialist postgraduate courses should be undertaken by those who wish to, or have to, specialise or practice in this field;
 - c) the general principles must stress the importance of:
 - i. the determination of the probability of an event
 - ii. the evaluation of vulnerability
 - iii. the assessment of risks
 - iv. preventive and protective actions and measures to minimise or eliminate vulnerability and/or risks
 - v. conservation repair and maintenance methods and techniques
 - ▣▣▣▣ All courses should be multidisciplinary.
 - ▣▣▣▣ All practitioners should undertake continuous professional training in order to keep abreast of new events and developments.
 - ▣▣▣▣ The fire brigade, civil defence and all other public emergency services, including the military, should be made aware of the importance of the architectural heritage in their region.
 - ▣▣▣▣ Other interested parties such as insurance companies should be offered specialist training.
 - ▣▣▣▣ The international and regional exchange of teaching staff and circulation of ideas and information should be encouraged.
 - ▣▣▣▣ Specialist research programmes should be initiated.
- ## 5. Risk assessment
- ▣▣▣▣ Risk assessment should be adopted and implemented as part of the maintenance of property, at a series of management levels, by all owners, occupiers and authorities responsible for the architectural heritage.



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- Fire risk assessment and prevention/mitigation strategies should essentially be undertaken at local level by the owners and occupants of the architectural heritage.
- The role of the authorities should be to decide on statutory matters, to co-ordinate, to provide advice and education, to provide technical and financial assistance and to provide emergency support.
- For hazards other than fire, the authorities should undertake co-ordinated research and the publication of advice at regional, national and international levels.
- For each of the natural hazards, it is essential to quantify and assess the probability of occurrence, notably through the production of distribution studies and zoning maps, according to time and space.
- Information should also be held on computer and be subject to constant monitoring and updating.

6. Disaster prevention and mitigation strategies

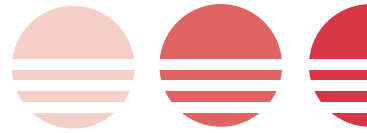
- Disaster prevention and mitigation strategies should be developed for the architectural heritage. All parties involved must be made responsible for the strategies but the degree and extent of involvement and responsibility will vary according to the type of hazard and disaster.
- There are two approaches to the mitigation of risks, neither of which is exclusive:
 - a) to reduce the hazard or prevent the occurrence of the disaster
 - b) to minimise the loss or damage which will result from the disaster
- Risks are reduced by the planned application of a choice of organisational, management, technical and structural measures which must be developed on a case-by-case basis for each building, according to each disaster.
- Guidelines and checklists for disaster prevention and mitigation strategies are described in the accompanying appendices.

TECHNICAL APPENDICES

Appendix I: Disaster prevention and mitigation strategies

Organisational measures – General

- Disaster prevention and mitigation strategies require preparation and planning and the implementation of technical and physical measures, in order to prevent or reduce loss or damage, both in the event of disaster and in the aftermath. It is recognised that it is impossible to prevent or to predict the occurrence of some disasters. Nevertheless, in all cases, probability studies and a thorough understanding of the risks are vital for the formulation of a strategy.
- The success of a strategy depends on the effectiveness of regional/national/international co-operation and co-ordinated policy, as well as on the vigilance and good housekeeping/maintenance by the owners and occupiers of historic buildings. It is important that bodies responsible for the architectural heritage should adopt a major role and establish disaster protection units. “Disaster plans” should be developed and implemented immediately. They must include an evaluation of the risks, based on a thorough knowledge of the hazard, and an assessment of the vulnerability of the historic buildings. To date, risk assessment for buildings



has concentrated on codes for new structures and there has been little attention paid to the collection and analysis of information specific to historic buildings.

- The local or regional authority dealing with the architectural heritage, the civil defence or other emergency services, in consultation with the representatives of the central architectural heritage authority, should identify and train staff to deal with disaster prevention and mitigation planning and with disaster assistance. These staff should be present during or immediately after the disaster, in order to supervise salvage and recording operations (the use of photogrammetric surveying is particularly useful) and they should be involved in any decisions on demolition and/or in the control of emergency repairs and making safe or good. According to local law and practice, staff should liaise and co-operate with contingency planning, civil defence, and emergency services in the establishment of plans and priorities and in the publication of guidelines and advice on all aspects of disaster planning.
- The fire, civil defence and emergency planning services, as appropriate, should be trained and made aware of the importance of the architectural and cultural heritage in their region. They should be provided with the following information:
 - a) full lists of buildings and objects which comprise the architectural heritage, including details of contents
 - b) copies of salvage plans and priorities concerning objects of particular interest
 - c) plans of the buildings which indicate means of escape routes, the location of access points, fire-fighting equipment, power points and other services, and of hazardous or fragile materials
 - d) advice on the likely effect of the various extinguishing agents (water and gas) on delicate or fragile historic fabric, structure and materials – wall paintings, panelling and so on

Appendix II: Fire protection measures

Organisational measures - General

- For each historic building a named member of staff or of the household, with deputies, must be made responsible for fire safety. This fire safety manager, who might also be responsible for security and health, should initiate and oversee all aspects of the fire prevention or mitigation strategy or plan, in liaison with the fire brigade staff and with professional advisors (architects, surveyors, engineers, planners, specialists on historic buildings) and representatives from the insurance companies. The strategy should be subject to constant rehearsal and review, and records of all activities should be made.
- The main objective is to reduce the risk by undertaking systematic fire prevention. A balanced series, or optimum choice, of organisational, technical and physical measures should be employed. Specifically, the strategy will seek:
 - a) to assess the risk of outbreak of fire, to minimise that risk and to prepare a plan of action in the event of a fire
 - b) to ensure safe and orderly means of escape for all occupants
 - c) to protect the historic structure and to prevent the fire from spreading
 - d) to establish a staff structure with clearly defined responsibilities in the event of a fire



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- e) to train and educate staff in fire-fighting and evacuation procedures, and in the implementation of salvage priorities and plans, including regular and monitored practice drills
- f) to prepare and maintain documentation on the layout of the premises, including detailed plans which indicate the location of fire-fighting facilities, of means of escape routes, and of fragile, important and valuable structures and fittings
- g) to ensure that the uses of the building are consistent with safety requirements
- h) to encourage good housekeeping and maintenance standards in order to reduce the risk of ignition
- i) to ensure that fire safety systems are correctly maintained and operational
- j) to ensure that the building and its curtilage are not subject to either arson or vandalism
- k) to keep records of protection activities and to evaluate the effectiveness of the strategy

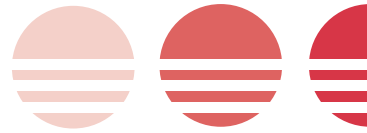
➡ The nature of fire prevention and mitigation strategy can neither be fixed nor prescribed by rigid codes of practice. It must be flexible and in each case fire safety measures should be implemented which guarantee the necessary means of escape, whilst at the same time not impairing the character and value of, or inflicting damage upon, the historic building. Individual strategies will vary but in each case the emphasis will be on prevention, preparation and vigilance rather than on provisions requiring structural alterations.

➡ All structural alterations and the installation of mechanical, electrical or other systems associated with prevention, detection and fire-fighting must be agreed with the authorities responsible for the architectural heritage. The aim is to minimise the amount and effect of “passive”, physical, structural or preventive works in the interest of the historic building or artefact. A systematic approach which treats each case and building on its merits and which employs a flexible package of organisational and technical measures will reduce the need for major physical works, while, at the same time, meeting the safety legislation and requirements. Essentially, this represents a strategy of vigilance and prevention, coupled with early detection and the orderly application of evacuation and fire-fighting procedures.

Technical and practical measures

- ➡ The sources of ignition should be identified and eliminated or minimised.
- a) All parts of the building should be kept clear of waste and rubbish. In particular, attics, basements, stairwells and areas under stairs, cupboards and empty storerooms should be inspected regularly, cleared of unnecessary material and kept clean.
 - b) Cleared strips or zones in grassland, heath or forest areas should be provided, if acceptable in aesthetic terms.
 - c) Electrical installations, circuits and equipment should be regularly tested, properly maintained, utilised and overhauled. Circuits should not be overloaded and faulty equipment and wiring should be replaced. It is advisable that main cable and fuse boxes are located in a separate fireproof room or area.

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- d) Naked flames from heat and light sources such as candles, torches, gas lighting and open fires or stoves should be avoided. Where their use is to be permitted, there should be careful monitoring, strict control and the provision of safety guards when unattended. The provision of suitable fire-fighting equipment nearby is essential.
 - e) Only trained workmen should be allowed to undertake maintenance, repair and improvement work on historic properties. They should be made aware of the importance of the building or its fittings and should be supervised by a senior and responsible member of staff. Smoking should be banned and hot-work (blowlamps, cutting, welding, etc.) should be allowed only if there is no alternative. Any acceptable hot-work should be subject to a permit which identifies responsible parties, and allows control of the nature, location and duration of the work and which ensures that combustible materials are removed or protected. In addition, extinguishers and alarm systems must be provided and the work supervised and monitored at all times, with provision for checks for a period after the work is completed.
 - f) Lightning conductors (arresters or rods), properly designed and maintained, should be fitted.
 - g) Chimneys should be swept regularly. All hearths, flues and ducts should be maintained in a sound condition. All cookers, heaters and boilers should be serviced regularly, be kept clear of combustible materials and be provided, where appropriate, with fire and safety guards. Kitchens, plant and boiler rooms should always be provided with suitable fire-fighting equipment and the rooms should not be used for storage.
 - h) Smoking should be discouraged in historic buildings or confined to specific fire-protected rooms or areas, installed with fire-fighting equipment and alarm systems.
 - i) Provisions should be made against arson and, in particular, premises and their curtilages should be secure against unauthorised entry. Temporary staff and visitors should be vetted and supervised, and flammable and waste materials kept out of reach.
- ▣▣▣▣ Fire detection and alarm systems should be installed. The bare minimum should be fire bells or an electrically operated system. Preferably, automatic and active fire detection systems should be installed and connected to an alarm centre and to the local fire brigade. Each individual detector should be identifiable and the systems should be provided with the ability to monitor faults and false alarms. Smoke, heat and flame detectors can be installed and connected to alarm centres either electrically or by radio-link. The casings for the detectors should be unobtrusive, as small as possible and adapted in shape and colour so as not to impair their historic setting. In some cases (thatch or timber-cladding, for example) external heat detectors might be recommended. In all cases, detectors and alarms must be properly and regularly maintained and responsible staff trained to understand and handle the systems.
 - ▣▣▣▣ Fire-fighting facilities should be provided and maintained.
 - a) Fire fighting by staff or occupants should be encouraged with the provision of regular and monitored programmes of awareness and training. Premises should be fitted with fire buckets and hand-held extinguishers which must be suitable for both general and special risks. Extinguishers should be inspected and overhauled on a regular basis.



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b) Automatic fire-fighting systems should be installed wherever possible if it can be proven that the risk would be reduced, but only where there is likely to be little or no impact on the special interest of the historic buildings. Attics and roof spaces, spires and towers on churches could be possible locations inside buildings. However, the danger of collapse or decay following operation must be carefully assessed. Industrial, commercial, transport and military premises might be capable of greater intervention than domestic properties. The installation of devices on roof ridges (particularly on thatch, grass, reed or straw) and on cornices could be considered. In dense urban areas, dry sprinkler systems in narrow gaps on facades will assist in preventing the spread of fire in urban areas. The use of copper pipes with hidden joints should be encouraged. Modern fast-response sprinkler systems, based on zone signalling, should be employed. Regular maintenance, with the identification and elimination of faults, must be undertaken. The use of sprinkler systems, particularly in areas of fragile construction, containing delicate fabrics, panelling, furniture, works of art, and so on, and in unventilated areas, must be carefully assessed.

c) Access at all times for the fire brigade is vitally important. Roads and access points should be made and maintained wherever possible. In historic gardens and landscapes the maintenance of “green ways” might suffice. Fast and reliable routes between fire stations and historic buildings and centres should be identified and reported on maps. Water supplies should also be identified, including all main water sources: wells, reservoirs, storage tanks and water towers, ornamental canals, ponds and lakes, swimming pools and natural sources such as rivers, streams and lakes. If there is no ready and nearby supply, then consideration should be given to the establishment of such or to the provision of an emergency storage tank of adequate capacity, suitably located, hidden or disguised. Immediate access to, and within, the building should always be reviewed and improved, for example by creating roof hatches and by ensuring that doors can be unlocked and opened.

➡ In some circumstances, in particular in relation to the provision of a safe and adequate means of escape, physical alterations might prove necessary. These might include:

- a) the enclosure of stairwells, where appropriate, and protection of the means of escape
- b) alternative ways of protecting the means of escape, such as air over-pressure systems, to prevent the penetration and spread of smoke and flames
- c) the installation of smoke vents and hatches, which will also allow improved access for fire-fighting
- d) lobbies, with new partitions incorporated around existing features
- e) adequate fire-resistant doors including self-closers, fire-stops and intumescent strips to doorways
- f) the application of intumescent paint and other finishes to panelling or cast iron columns, for example
- g) the installation of automatic emergency lighting and signs which are independent of the normal electricity circuit



- h) the construction of barriers where they would not detract from the character of the building, for example in undivided roof spaces, and by the reinstatement of missing partitions

The approach adopted should begin with a package of “soft”, non-intrusive measures, with the application of “hard”, intrusive measures only where all other measures are obviously inadequate and jeopardise human life and the architectural heritage.

- After a fire the following action should be taken:
 - a) the minimum of making safe in order to allow inventory-taking, salvage and rescue work
 - b) valuable artefacts and fittings, including those either dislodged or in danger of collapsing, should be recorded in situ and then carefully removed, under the supervision of conservation specialists, to a safe place for urgent conservation measures
 - c) emergency inventory-taking by appropriate means, at least plans and photographs, but photogrammetric surveying is to be encouraged
 - d) damaged roofs should be covered temporarily, for example, with tarpaulins, and the property secured against unauthorised personnel and theft
 - e) residual water should be removed by mechanical and physical methods (suction pumps, sponges, cloths, etc.) and the building should be thoroughly dried by the maintenance and improvement of ventilation and, where possible, by the use of dehumidifiers
 - f) investigation, by non-destructive techniques, of hidden structure and fabric must be undertaken and the installation of hygrometers should be considered
 - g) all alarm systems and fire-fighting equipment should be reinstated
 - h) any further structural works, including proposals for restoration and repair, or for demolition, must only be undertaken after full consultation with, and the approval of, the authorities for the architectural heritage

Appendix III: Organisational measures against earthquakes, volcanism, tsunami, floods, storms, avalanches and landslides or flows

Disaster plan

The “disaster plan” should comprise a number of stages:

- Understanding the hazard including precise data on the probability of occurrence, type, location, zoning, estimation of intensity and return period. This must be undertaken on the basis of present day and long-term scientific research into causes and events and their monitoring and, also, of an analysis of documentation on past disasters. Information should be published in map form, with computer archiving. All material should be kept in a safe place.
- Understanding other geological, hydrological, meteorological and natural processes and factors – water courses and levels, soil characteristics and sub-surface geology, their behaviour in the event of disaster and their effects on the architectural heritage. Microzoning and site effect studies and maps should be produced.
- Incorporating seismic, meteorological, hydrological and geological data into the administration of the architectural heritage and of town and land use planning in order to:



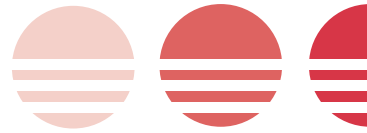
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- a) identify and assess the vulnerability of the architectural heritage to hazard (by means of vulnerability and damage graphs and matrices) and assess the risks and the probable damage or loss
- b) minimise vulnerability by developing and implementing plans for assistance (technical and financial) with the strengthening, repair and maintenance of the architectural heritage
- c) control proposed alterations to, and the use or change of use of, historic buildings where the risk is already high or might be increased
- d) control proposed alterations to the use of land in the vicinity (local and regional) of major or numerous elements of the architectural heritage, where there is a demonstrable risk created by that land use practice

- ▣▣▣▣ Training and preparing staff, including those from the civil defence and all other public services in the country, according to local law, in recording, salvage and emergency repair, shoring, propping and emergency protection methods and practice, and in the implementation of security measures to counter theft, arson and other criminal activity. This must include the publication of technical advice, of reconnaissance maps, inventories, surveys and regular practice and exercises.
- ▣▣▣▣ Encouraging and controlling the quality of maintenance and repair of historic buildings by the initiation of action plans, in co-operation with local communities and individual owners/occupiers.
- ▣▣▣▣ Preparing plans and priorities for salvage, removal, storage and emergency conservation work of movable property.
- ▣▣▣▣ Identifying and marking buildings of special interest.
- ▣▣▣▣ Preparing and implementing plans and priorities for full restoration in the aftermath of a disaster.
- ▣▣▣▣ Ensuring that there is an adequate supply of materials for protection, conservation and restoration.
- ▣▣▣▣ Ensuring that emergency teams of specially trained conservation professionals (architects, engineers, surveyors, planners, archaeologists and historians), craftsmen and builders as well as responsible members of the local communities are identified and trained for action.
- ▣▣▣▣ Monitoring, evaluating and improving the “disaster plans”.

Preventive/technical measures

- ▣▣▣▣ Measures for the protection of the architectural heritage against natural disasters should begin with the development of specifications and guidelines for the assessment and upgrading or strengthening of historic buildings. It is imperative that any works intended to improve the resistance of a building do not result in an unacceptable intervention into or loss of the special interest of the building. In order to achieve this goal it is important to ensure complete survey and recording, and detailed inspection and understanding of the historic building, as well as its structural system and constructional materials and techniques, its evolution and history and its conservation. Preventive measures fall into two categories:
 - a) site specific – maintenance, improvement and emergency works to the historic building or object (the first two are undertaken on a regular or planned basis and the third, although prepared in advance, is undertaken at the time of a disaster)



- b) site general – local or regional control of, and alteration to, land use patterns and local or regional preventive measures and works (to be planned and implemented as part of a co-ordinated programme to minimise the frequency of specific disasters, such as flooding, avalanches, mudflows and landslides)
- ▣▣▣▣ Good maintenance is the single most effective means of reducing the amount of potential damage or loss. Therefore, it is essential that quality maintenance work, undertaken on a periodic basis after regular inspections (on a cycle of at least five to ten years) and employing traditional and compatible techniques and materials, be advised and specified. The use of mortars and grouting in masonry structures and the issues of tensile resistance, bonding, tying of floors and roofs to walls, and wind and water tightness in all structures, are the paramount considerations.
- ▣▣▣▣ All alterations intended to improve resistance must be agreed by the authorities for the architectural heritage, which should produce technical guidelines, after undertaking experimental, analytical and comparative research into:
 - a) the resistance of historic structures and materials
 - b) historic concepts and methods of improving resistance
 - c) the behaviour of different structures and materials – timber-frame, rubble or ashlar masonry, earth structures, etc.
 - d) the implications and likely behaviour of building defects, both intrinsic and extrinsic, in the event of a disaster
 - e) the evaluation of previous “modern” strengthening practice and techniques
 - f) the assessment of different levels of disaster intensity and of the frequency of occurrence
- ▣▣▣▣ The criteria and guidelines must specify that:
 - a) the degree of works proposed should not result in the total or partial impairment of the special interest or integrity of the historic building
 - b) the existing structural systems and materials are retained, respected and enhanced, if necessary
 - c) traditional materials and techniques are preferred
 - d) if new materials and techniques are proposed these should be compatible with the existing ones, durable and reversible, as far as is practicable; where these conditions cannot be met, alternative proposals should be commissioned and evaluated
 - e) each building and any proposed works are assessed on their own merits and that works will be undertaken on the basis of performance requirements, not according to a prescribed code, with due consideration given to the possibility of improved and more sensitive methods in the light of technological development
 - f) the proposed works are designed according to realistic probability assessments of disaster occurrence and intensity, and graduated according to different levels of risk

The opportunity to undertake works to improve resistance should always be investigated and the work implemented before a building is considered for a major programme of repairs or of alteration and extension.

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Existing inappropriate or unauthorised forms of construction, extension or alteration should be removed, where possible, by the use of legislative and financial measures.

All improvements and strengthening work should be fully documented and allow for long-term review, with the aim of establishing international standards.

- ▣▣▣▣ Preparation for emergency action in the event of a disaster should identify the specific action to be undertaken. It is essential to co-operate with other authorities, both civil and military. Provision should be made for:
 - a) fire-fighting and protection against water damage
 - b) immediate safety works of shoring and propping
 - c) closure and supervision to ensure protection against land and water flows, air-borne debris, adverse weather and criminal activity
 - d) marking important objects and structures
 - e) clearing debris, taking care to record in situ and to recover movable and displaced or fragile objects
 - f) emergency conservation work and removal to a safe place of important, movable, displaced or fragile objects
 - g) full recording, preferably by photogrammetry, of damaged structures
 - h) the reinstatement of fire and safety equipment, the provision of emergency power supplies and adequate transportation

For the long term, a full survey and inspection of the damage must be organised in order to plan, develop and implement restoration, repair and conservation of the architectural heritage.

- ▣▣▣▣ Site general work should follow the identification of those elements of the architectural heritage most at risk from preventable disasters, such as flooding, avalanches and landslides. In these cases, prevailing landuse practices – agriculture, forestry, communications, industry and general development – should be assessed and remedial measures undertaken in order to minimise the risk. Particular attention should be paid to deforestation, soil abuse and degradation, and the use of, and alterations to, ground and underground water.

In certain circumstances, physical prevention works must be planned and implemented. These should include: levees, dykes, dams, tree screens, consolidation of slopes and diversionary barriers.

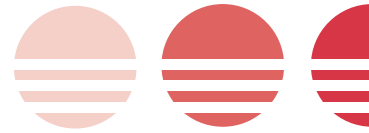
CHECKLISTS

The following checklists are recommended:

Earthquakes

Seismicity

- geotectonic studies and mapping
- historical earthquake information
- instrumental recording
- active and inactive phases (seismic trends)
- seismic gaps
- seismicity and hazard zoning maps of suitable sophistication
- microzoning considering the adverse effects of subsoil



Seismic damage to the architectural heritage

- quality of structural elements (brick, stone, mortar, steel and iron, wood, reinforcement and tiles, concrete)
- quality of non-structural elements (brick, mortar, stone, timber, tiles, all cladding and infill materials, roofing materials, services)
- compatibility and behaviour of various materials
- ease of repair and availability of materials
- availability of experienced and qualified professionals, craftsmen and labour
- supervision and control of essential repair and upgrading work
- foundation (type, vulnerability, intrinsic safety, differential settlement)
- damping
- soft or stiff or mixed structures
- symmetry (plans, elevations, openings, roofs)
- natural period of buildings according to the probable periods of the subsoil
- emergency shoring and propping; removal of artefacts

Volcanic activity

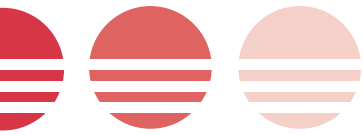
- characteristics and eruptive history
- eruption probability
- instrumentation to record, monitor and to provide early warning
- proximity of the architectural heritage, according to the assumed magnitude of eruption
- the possibility of diversions to, and the cooling of, lava flows
- vulnerability of the architectural heritage to lava flows, bombs, glow avalanches, ash deposits and corrosive gases
- emergency protection of roofs and of openings; removal of artefacts

Tsunami

- probability of this kind of event in the region or in nearby locations which might affect the region
- probability of its height and penetration inland; zoning maps showing areas submerged by various run-up heights
- sensitivity of the architectural heritage to waves of tsunami type
- the possibility of coastline protection

Flooding

- probability and return periods of flooding, not only on the basis of past events but also in view of changes in land use
- systematic mapping; publication of torrent and flooding registers
- reliability and adequacy of records
- seasonal variations
- effect of climatic trends and changes in maximum short-term precipitation and floods
- infiltration (soil, vegetation and sealed areas) and disturbance to infiltration (cropping, deforestation, removal of top-soil, traffic)



PROTECTION OF CULTURAL HERITAGE

- topography of site (distance to watershed, slopes, elevation, probability of ponding)
- effect of water and rain on the architectural heritage, water-tightness of buildings, damage to elements and the effects of increased humidity
- effects of flooding on foundations and lower floors, on structural elements (walls and floors), on non-structural elements and on fixtures and fittings – possibility of improved drainage of the area
- provision of protective dykes, levees, channels, and in an emergency, cofferdams and sandbags as well as pumping and dehumidification equipment; removal of artefacts
- control of landuse/exploitation

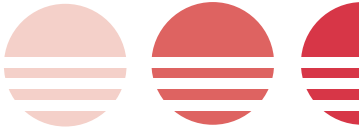
Avalanches, landslides and mudflows

- assess slope stability, including type and composition of surface layers and the general hazard of the layers to slide (past events)
- existing slope angle in relation to safe angle
- exposed slopes in case of avalanches
- obstacles in the path of slides, flows and avalanches
- extraneous factors such as water saturation, interference by construction works, seismic activity
- systematic mapping; publication of registers
- possible protective measures and works to include:
 - drainage slopes and reduction of infiltration and percolation of water
 - obstacles, retaining basins, deflectors
 - retaining walls
 - planting
- research to understand better the function of forests
- control of landuse/exploitation

Wind-forces and storms

- evaluation of probabilities and maps
- return periods for given velocities in gusts
- distribution and prevailing direction of high winds
- topographic features which protect or expose the architectural heritage
- effect of other structures, vegetation and other items on the exposed element
- roofs and supporting structures (strength, fastenings or tiles), cladding
- towers, spires, pinnacles, cupolas, parapets and other exposed elements (additional anchoring)
- large, laterally unsupported walls
- windows and openings (shutters and other temporary means of closure against flying debris)

PROTECTION OF
CULTURAL HERITAGE



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Design:

