HERITAGE AND RESILIENCE

Issues and Opportunities for Reducing Disaster Risks

International Strategy for Disaster Reduction

MARSH

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International Council on Monuments and Sites
Conseil International des Monuments et des Sites

INTERNATIONAL SCIENTIFIC COMMITTEE ON RISK PREPAREDNESS
ICORP

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United Nations Educational, Scientific and Cultural Organization

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World Heritage Centre

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PREFACE

Heritage is usually not taken into account in global statistics concerning disaster risks; nevertheless historic cities, monuments, archaeological sites, museums and cultural landscapes are increasingly affected by threats both natural and man-made. The progressive loss of these places as a result of floods, mudslides, fire, earthquakes, civil unrest and other hazards has become a major concern. Heritage contributes to social cohesion, sustainable development and psychological well-being. Protecting heritage promotes resilience.

A considerable wealth of experience exists in protecting heritage from disasters and in harnessing the potential of a well maintained historic environment to strengthen the resilience of communities. The initiative and commitment of national and local governments, businesses and communities around the world is increasingly apparent. Their efforts need to be further encouraged. UN Agencies, NGO's and a wide range of universities and technical institutions have been organizing additional support and guidance. Nevertheless, with a few notable exceptions, efforts to protect heritage from disaster risk remain fragmented and efforts to draw on heritage as an instrument for building resilience remain inconsistent.

This paper has been prepared by the International Scientific Committee of ICOMOS[1] for Risk Preparedness in collaboration with the United Nations Office for Disaster Reduction (UNISDR), UNESCO and ICCROM[2] on the occasion of the Fourth Session of the Global Platform on Disaster Risk Reduction (Geneva, 18-23 May 2013). It also includes contributions from a wide range of committed leaders and organizations including MARSH International, a global re-insurance company, and a group of European Mayors who have committed to work together to protect heritage and build resilience in their cities.

This paper presents the current thinking in the field as well as various examples – from different regions of the world - of how heritage can be better protected from disasters while contributing to the resilience of societies. It aims to bring these important issues to the attention of the larger disaster risk reduction community and to stimulate wider discussion in the context of ongoing consultations around a post-2015 framework for disaster risk reduction (referred to as Hyogo Framework

for Action 2 or HFA2) and a post 2015 development agenda. In advocating for integration of these issues within both disaster risk and heritage conservation policies and practices, this paper promotes strategic partnerships that bring the knowledge and capacities of actors in the fields of cultural heritage and disaster risk together and encourages support to the initiatives of local governments and, most importantly, communities that safeguard our shared cultural heritage for resilience.

FOREWORD

The safeguarding of cultural heritage is important and must be ensured for future generations, not only because it is a source of the cultural identity of a local community, but also because cultural heritage is a driving force of the economy.

Natural events may become disasters if we are unprepared, and the preparation includes a proper maintenance of historical centres of cities, where the most important art works and cultural assets of a community are hosted. In addition, a well maintained and living historic environment is very resilient to natural phenomena.

The recent earthquakes in Abruzzo (2009) and Emilia Romagna (2012), only the latest in a long chain of disastrous events that have occurred in Italy, caused not only losses of human life but also damage to a unique and irreplaceable cultural heritage. The population of these territories is asking now not only for a shelter for the families, but also the reconstruction of the symbols of their community, which are the monuments, the historical buildings, the art works. They represent the identity of a territory that cannot be abandoned.

In the case of my city, Venice, famously affected by a disastrous flood in 1966 and by the recurrent 'acqua alta' (high tide) phenomenon, the cultural patrimony belongs to a much wider community, extended to the whole world.

Through the centuries, Venice developed a singular capacity to adapt itself to the natural phenomena, which allowed the growth of its political and economical prosperity, as well as the accretion of an inestimable cultural patrimony in architecture and arts. This led to the inscription of the city on the UNESCO World Heritage List in 1987, together with the cultural landscape of its lagoon, symbolizing the Italian commitment to safeguard this outstanding property for present and future generations.

Joining the UNISDR Campaign as a role model for cultural heritage protection, the City of Venice is interested both to share its special experience with other cities of the world and to improve its capacity to face difficult environmental conditions and climate change issues, maintaining at the same time its prerogative to be a cultural capital and a bridge between the territory and the rest of the world.

The Conference on 'Building Cities' Resilience to Disasters: Protecting Cultural Heritage and Adapting to Climate Change', held in Venice on 19-20 March 2012 and organized by the European Office of UNISDR and the Municipality of Venice, was a unique opportunity to discuss cultural heritage and disaster risk reduction. The main result of this international

event, that brought together several representatives of worldwide cities, was the adoption of the Venice Declaration. This Declaration affirms some important principles, such as the need to raise awareness about the potential of cultural heritage as an asset for building resilient communities and the necessity to integrate heritage concerns in disaster mitigation plans.

The Declaration stimulated policy and scientific debates on the protection of cultural heritage, at local and international levels. Cooperation initiatives among cities that share common concerns regarding the safeguarding of their important cultural heritage have been launched. The City of Venice formalized exchange programmes with the City of Byblos and with the City of Dubrovnik. The challenge now is to use the Declaration to maximize its impact on national and local disaster risk reduction policies and plans.

The status of Venice as a World Heritage city, as well as my personal role as a Champion in Europe for Cultural Heritage Protection in the UNISDR Campaign "Making Cities Resilient – My City is Getting Ready!", obliges me to urge all my colleagues Mayors and the National Authorities to act in a concrete and effective way for considering the protection of cultural heritage from disaster risks as a relevant, not facultative, part of their many duties.

Giorgio Orsoni

Mayor of Venice

World Heritage Site of Bam; the largest adobe citadel in the world suffered damage during 2003 earthquake.
SOURCE: Francesco Bandarin, UNESCO, 2004.
http://whc.unesco.org/en/list/722/gallery/

1. INTRODUCTION

This paper examines the unique role of cultural heritage in disaster risk reduction. It introduces various approaches to protect heritage from irreplaceable loss and considers ways to draw upon heritage as an asset in building the resilience of communities and nations to disasters. The paper proposes ways forward and builds on the current momentum provided by the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters" (HFA) and the advancement of a post-2015 framework for disaster risk reduction (HFA2) and the post-2015 development agenda.

Cultural heritage is often associated with grandiose monuments and iconic archaeological sites that can hold us in awe of their beauty, history and sheer scale. However, the understanding of cultural heritage has undergone a marked shift during the last few decades in terms of what it is, why it is important, why it is at risk and what can be done to protect it.

Cultural heritage today encompasses a broader array of places such as historic cities, living cultural landscapes, gardens or sacred forests and mountains, technological or industrial achievements in the recent past and even sites associated with painful memories and war. Collections of movable and immoveable items within sites, museums, historic properties and archives have also increased significantly in scope, testifying not only to the lifestyles of royalty and the achievements of great artists, but also to the everyday lives of ordinary people. At the same time intangibles such as knowledge, beliefs and value systems are fundamental aspects of heritage that have a powerful influence on people's daily choices and behaviors.

Heritage is at risk due to disasters, conflict, climate change and a host of other factors. At the same time, cultural heritage is increasingly recognized as a driver of resilience that can support efforts to reduce disaster risks more broadly. Recent years have seen greater emphasis and commitment to protecting heritage and leveraging it for resilience; but initiatives, such as the few examples that are presented here, need to be encouraged and brought more fully into the mainstream of both disaster risk reduction and heritage management. These are issues that can be productively addressed in a post-2015 framework for disaster risk reduction and, likewise, in the post-2015 development agenda.

2. Why Protect Heritage?

2.1 Heritage drives sustainable development and local economies

Today, as in the past, cultural heritage continues to perform its irreplaceable role as a source of meaning and identity for communities and individuals. Heritage is not a relic of the past, but is increasingly instrumental in steering sustainable development and the wellbeing of communities. This was recognized in the outcome document of United Nations Conference on Sustainable Development (Rio+20), *The Future We Want*, in particular where it stressed how "many people, especially the poor, depend directly on ecosystems for their livelihoods, their economic, social and physical well-being, and their cultural heritage" (Fig.1), or where it calls for the "conservation, as appropriate, of the natural and cultural heritage of human settlements, the revitalization of historic districts and the rehabilitation of city centres"[3].

Fig.1 Rice Terraces of the Philippine Cordilleras.
SOURCE: Feng Jing, UNESCO.
http://whc.unesco.org/en/list/722/gallery/

Certainly, the safeguarding of cherished cultural heritage sites and of the ensemble of intangible cultural expressions, knowledge and skills that, collectively, define a community, can be considered in itself a contribution to human wellbeing. Cultural heritage, however, also makes a direct and significant contribution to sustainable development across its economic, social and environmental dimensions. Cultural heritage is also a powerful asset for inclusive economic development, by attracting investments and promoting green, locally-based, stable and decent jobs related to a wide range of sustainable activities in areas such as tourism, conservation, construction, food production, traditional healing and, the production of crafts of all kinds and the arts in general.

In Europe, for instance, heritage is vital to the competitiveness of tourism, which is valued at 586 billion euros (€) per annum and employs 9.7 million people[4]. In addition, €5 billion per

year is invested in conservation activities, benefiting the companies involved in the sector. Heritage contributes to regional development as well. In northern Portugal, home to important Romanesque architectural heritage, 'The Romanesque Route' project, launched in 2000, promotes integrated and sustainable development of the region. The cornerstone of the project is the active engagement of local people in the restoration of more than 50 distinctive Romanesque constructions, with the broader mission to drive the development of the region and promote territorial competitiveness, cohesion and identity[5].

Finally, cultural heritage appears also to be closely connected to the fundamental components of an inclusive social development. As a vehicle to express values and identity, and organize communities and their relationships through its powerful symbolic and aesthetic dimensions, cultural heritage is essential to the spiritual wellbeing of people. The acknowledgment and conservation of the diversity of cultural heritage, fair access to it and equitable sharing of the benefits deriving from its use enhance the feeling of place and belonging, mutual respect and sense of collective purpose, and ability to maintain a common good, which has the potential to contribute to the social cohesion of a community and reduce inequalities.

2.2 Disasters are driving losses to heritage

Cultural heritage is exposed to a number of threats from urbanization, development pressures, socio-economic transformations, unsustainable tourism and lack of resources. The impact of disasters on heritage can also be severe. Indeed, more cultural heritage is lost in disasters than is ever fully accounted. These sentiments were echoed by Yasumichi Murakami, Director of the Cultural Assets Office, Hyogo Prefecture Board of Education, citing the impacts of the Kobe earthquake in Japan 10 years after the event: "There has emerged a growing awareness that the loss of cultural properties and their values as society-related capital is essentially the loss of a common catalyst that creates a 'sense of place' for all generations of people"[6].

Each year disasters caused by natural and human-induced hazards result in the destruction of countless historical properties, museums and archives that hold the history of humanity within their walls. Cultural landscapes and natural heritage are being destroyed, and with them valued ecosystem services. These risks may be extensive, spanning entire countries or regions, or they may be more localized, such as those posed by fires, floods or landslides where they regularly affect particular heritage sites. Often, disasters also affect traditional knowledge, practices, skills and crafts that ensure

Fig.2 World Heritage Site of Bam; the largest adobe citadel in the world suffered damage during 2003 earthquake.
SOURCE: Francesco Bandarin, UNESCO, 2004. http://whc.unesco.org/en/list/722/gallery/

Fig.3 Damage to one of the turrets at the Castle of Ferrara during the earthquake in 2012, Italy.
SOURCE: Claudio Margottini, 2012.

the cultural continuity of cultural heritage, as well as the means for its maintenance and conservation.

Recent earthquakes in Iran (2012) (Fig.2), Italy (2012), Turkey (2012), Japan (2011), New Zealand (2011) and Haiti (2010) have caused extensive damage, including to significant heritage sites such as Christchurch Cathedral in New Zealand, the historic city of Ferrara in Italy (Fig.3) – which is inscribed on the World Heritage List – and the historic colonial town of Jacmel in Haiti. Hydro-meteorological hazards such as floods and storms have had dramatic impacts on historic structures, including those at the Ayutthaya World Heritage Site in Thailand (2011), and in Leh, India, which in August 2010 succumbed to an unprecedented cloudburst (Fig.4). Fires continue to devastate wildlands, including in Greece (2007), as well as numerous structures, including the Wangduephodrang Dzong in Bhutan (June 2012), Krasna Horka Castle in Slovakia (2012), and Srinagar's Dastgeer Sahib Shrine in India (2012)[7].

These cases are not isolated events. In 2011 the World Bank presented a paper during the 11th Congress of the Association of World Heritage Cities in Sintra, Portugal, which included a comprehensive assessment of flood and landslide risks to World Heritage Cities(Fig.5 & Fig.6)[8]. Similarly, the Research Center for Disaster Mitigation of Urban Cultural Heritage, at Ritsumeikan University in Kyoto, Japan, assessed seismic risk to World Heritage sites in 2008 by overlaying world heritage sites on earthquake zones(Fig.7)[9].

Fig.4 Damage to Cultural Heritage in Leh (RIGHT), India due to Cloud Burst in 2010
SOURCE: Tara Sharma

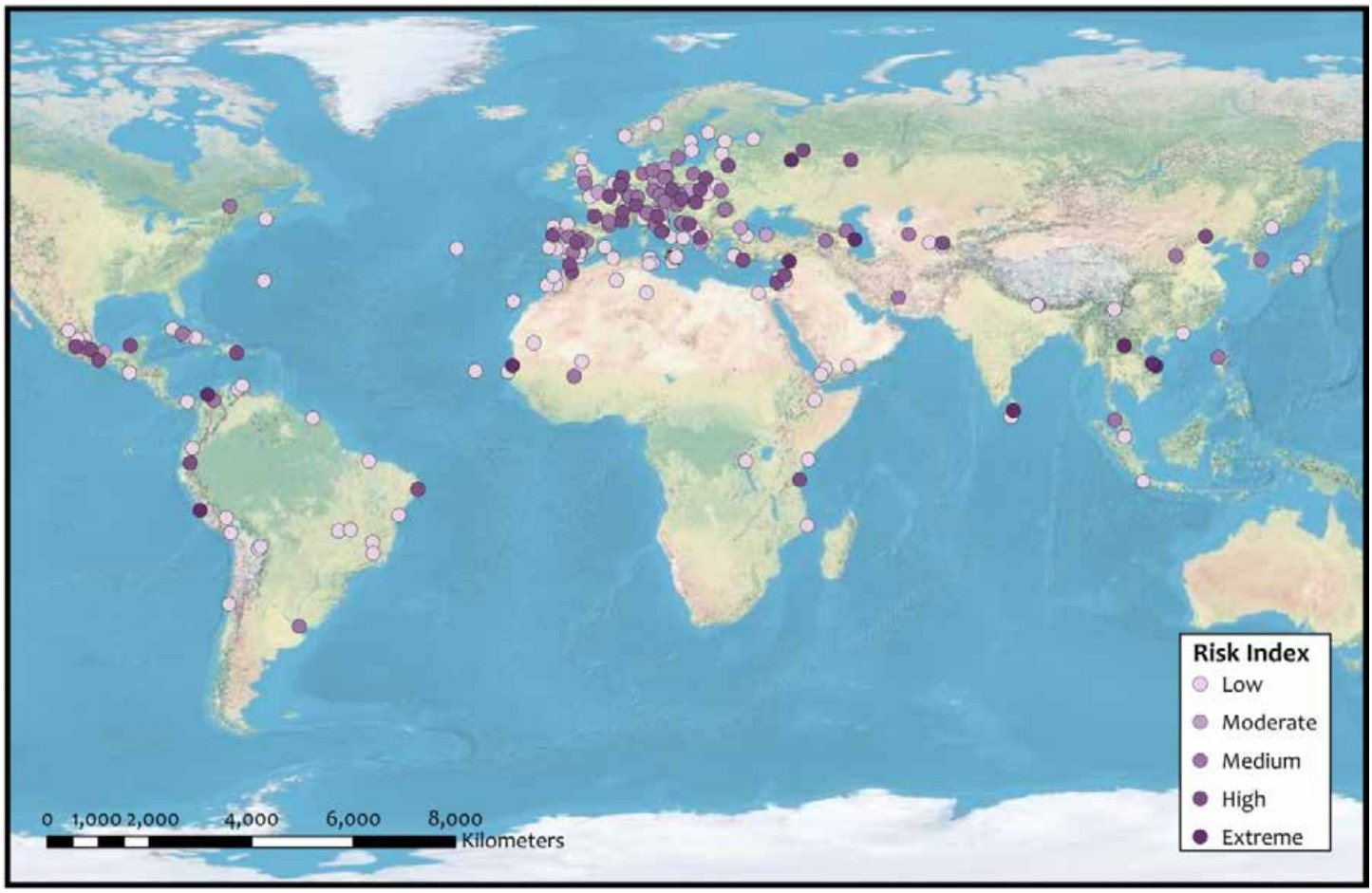


Fig.5 Flood Risk to World Heritage Cities.
SOURCE: Bigio et al, (2011). The World Bank

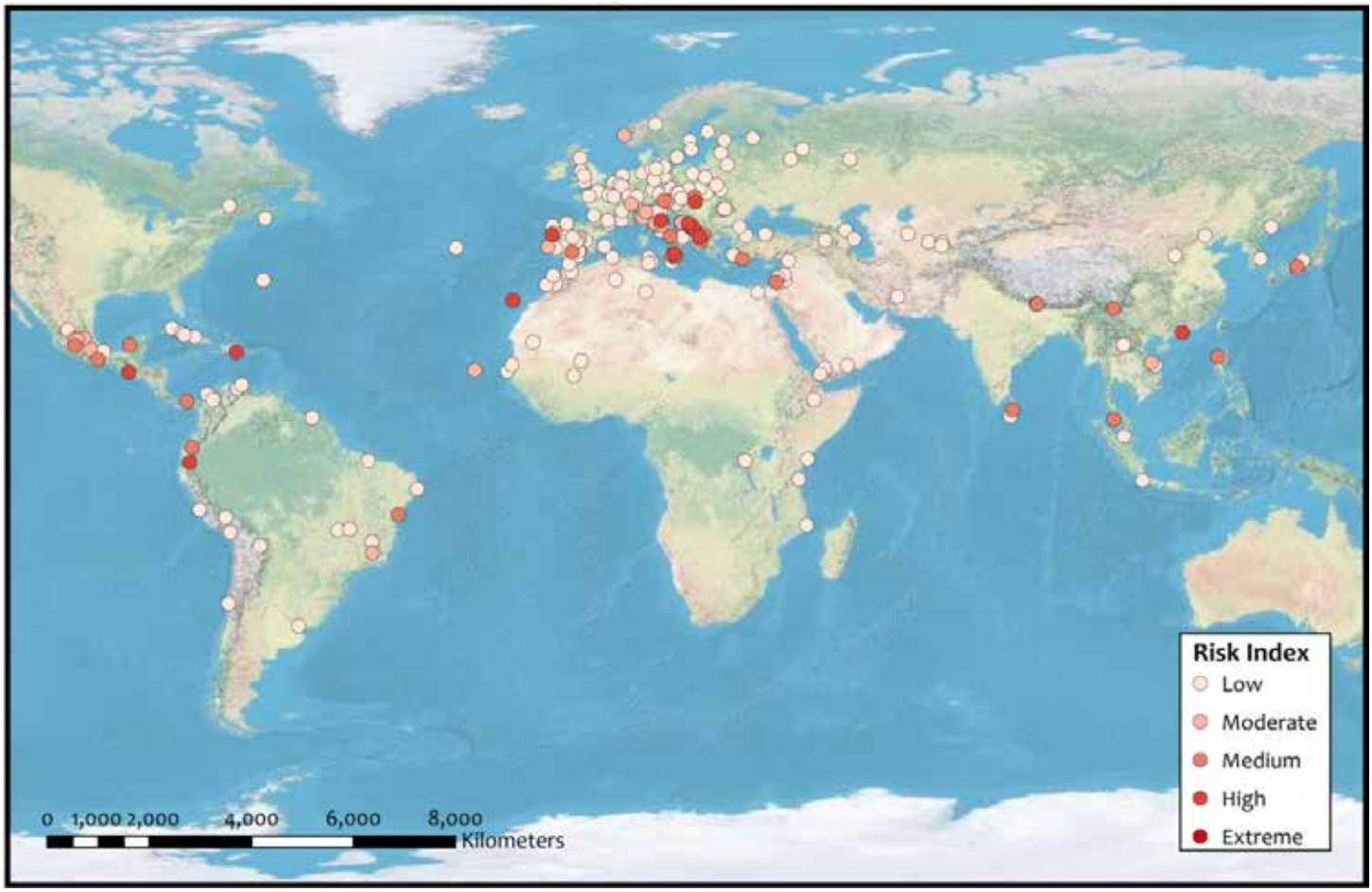


Fig.6 Landslide Risk to World Heritage Cities. *SOURCE: Bigio et al, (2011). The World Bank*

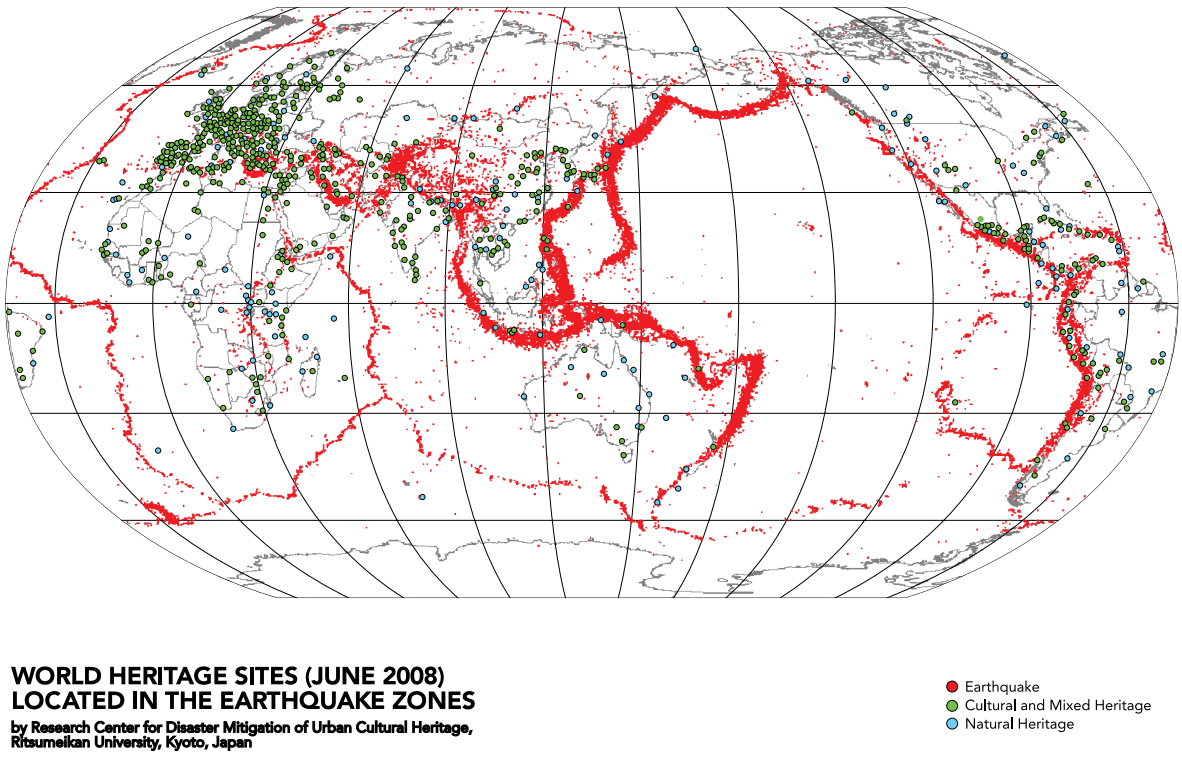


Fig.7 Map showing location of heritage sites with respect to earthquake risk areas. *SOURCE: Kathmandu Symposium. Weise, K. (ed.), 2009*

2.3 Climate change and conflicts threaten heritage

Since 1988, at least 76 per cent of all disaster events have been hydrological, meteorological or climatological in nature. They have accounted for 45 per cent of deaths and 79 per cent of economic losses caused by natural hazards globally[10]. The Intergovernmental Panel on Climate Change (IPCC) special report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation confirms the likelihood of increased weather extremes in the future, suggesting that the number as well as the scale of weather-related disasters may also increase. Moreover, climate change impacts, such as rising water levels and changing levels of moisture in some regions, constitute underlying risk factors that can affect heritage.

A survey was launched by the World Heritage Centre in 2005 among all States Parties to the World Heritage Convention to assess the extent and nature of the impacts of climate change on World Heritage properties and to identify the actions taken to deal with such impacts. Of the 110 responses received from 83 States Parties, 72 per cent acknowledged that climate change had had an impact on their natural and cultural heritage. A total of 125 World Heritage sites were mentioned specifically as threatened by climate change. Building on this survey, and integrating a considerable number of case studies, a comprehensive report was published in 2007 by the World Heritage Centre on the impact of climate change to World Heritage[11].

An increasing body of research is now focusing on the impact of climate change on the physical attributes of cultural heritage. One example is the Noah's Ark project in Europe, which describes the effects of climate change on built heritage over the next 100 years. It has produced a major publication: *The Atlas of Climate Change Impact on European Cultural Heritage: Scientific Analysis and Management Strategies,* which contains vulnerability maps for cultural heritage[12].

Conflicts and political tensions often have a disastrous impact on cultural heritage. The events associated with the so-called 'Arab Spring', and the serious consequences they have had on cultural heritage, are only a recent example of a long-standing issue which has not received the attention it deserves within heritage policies and management strategies.

Often, heritage is caught between belligerent parties, at others it is the victim of pillage and looting in times of chaos and political unrest. This was unfortunately the case for the National Museum of Baghdad in 2003, or more recently for the ancient *souq* of Aleppo (Fig.8), the ruins of Palmyra, the Crac des Chevaliers crusader castle, and the ancient northern villages (or Forgotten Cities) of Syria, to mention only a few among the most renowned sites.

Fig.8 The Citadel at Aleppo, Syria has suffered major damage due to ongoing conflict
SOURCE: Silvan Rehfeld, UNESCO.
http://whc.unesco.org/en/list/21/gallery/

Fig.9 Repair work at Timbuktu, Mali. The World Heritage site has suffered significant damage during recent civil unrest
SOURCE: Francesco Bandarin, UNESCO, 2005.
http://whc.unesco.org/en/list/119/

Sometimes, however, heritage is the target of deliberate destruction intended to obliterate the very identity of individuals and groups, severing their links to the land and breaking the bonds that unite them as a community. Such destruction occurred to the Buddha statues of Bamiyan in Afghanistan, in 2001, and more recently in the northern region of Mali (Fig.9).

In addition to causing the loss of the benefits associated with the enjoyment and stewardship of one's heritage, these acts of willful destruction will make reconciliation between conflicting parties much more difficult in the future, and hold societies back from turning the page towards peace.

2.4 Heritage contributes to resilience

In the same way that biological diversity increases the resilience of natural systems, cultural diversity has the capacity to increase the resilience of social systems. The maintenance of cultural diversity into the future, and the knowledge, innovations and outlooks it contains, increase the capacity of human systems to adapt to and cope with change[13]. Cultural heritage, as a key component of cultural diversity, is a critical consideration for any strategy to build the resilience of communities.

The recent Special Report of the Intergovernmental Panel on Climate Change, "Managing Extreme Events and Disasters to Advance Climate Change Adaptation" defines resilience as: "the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions"[14] . Resilience applies to both people and the built and natural environment and is shaped by both physical and social factors.

Experience has shown that degradation of natural resources, neglected rural areas, urban sprawl and poorly engineered new construction increase the vulnerability of communities to disaster risks. On the other hand, a well-conserved natural and historic environment, based on traditional knowledge and skills, considerably reduces underlying vulnerability factors, strengthens the resilience of communities and saves lives.[15]

Traditional knowledge systems embedded in cultural heritage can play a significant role in disaster prevention and mitigation, thereby contributing to a more sustainable development. Lessons learned from what has been done in the past and from what is resilient to local hazards, provide knowledge that can be used in restoration work as well as in new construction. Traditional knowledge, developed over centuries, enables certain communities to recognize subtle changes in the atmosphere, or the behaviour of flora and fauna, and prepare themselves accordingly.

Traditional knowledge often also equips communities to better face natural hazards through lifestyles, customs and traditional livelihoods. For instance, certain coastal communities over the centuries have not only become capable of foreseeing natural hazards, but are also better equipped to deal with them through measures such as building on stilts and constructing wind-resistant structures.

When traditional skills and practices are kept alive and dynamic they can contribute to the rebuilding of resilient communities after disasters. Local masons and craftspeople can rebuild shelters using local knowledge and resources, salvage and re-use materials from collapsed structures, help the community to reduce its dependency on external

support, and provide livelihood sources crucial for sustainable recovery. In this sense, cultural heritage optimizes locally available resources and the socio-cultural needs of communities. The symbolism inherent in heritage is also a powerful means to help victims recover from the psychological impact of disasters. In such situations, people search desperately for identity and self-esteem. Traditional social networks that provide mutual support and access to collective assets are extremely effective coping mechanisms for community members.[16]

Therefore, the protection of cultural heritage should be promoted, not only because of its intrinsic historic or artistic value, but also because of the fundamental spiritual and psycho-social support and the sense of belonging it provides to communities during the disaster recovery phase, as well as the contribution it makes towards building resilience to the increasing frequency and intensity of disasters and adaptation to climate change.[17] The virtues of heritage should be recognized and built upon, while at the same time, those aspects of heritage that contribute to physical, social and attitudinal vulnerability should be appropriately addressed through efforts to promote a robust culture of prevention.

2.5 Heritage is not being sufficiently protected

While many efforts are under way to reduce the vulnerability of heritage to disasters, a 2006 report prepared by the World Heritage Centre at the request of the World Heritage Committee stated that: "most World Heritage properties, particularly in developing areas of the world, do not have established policies, plans and processes for managing risks associated with potential disasters".[18]

More recent research[19] has examined the extent to which disaster risk reduction is considered within the management systems of various World Heritage properties, focusing in particular on those which appear to be the most exposed to disaster risks. The study, which surveyed 60 World Heritage properties, identified 41 properties spanning 18 countries as most at-risk from natural and human-induced hazards, according to the World Risk Index[20]. Information held within UNESCO archives on the management systems established for these World Heritage properties was then examined in order to determine the extent to which the relevant disaster risks are identified and addressed. The following graphic summarizes the results of this research (Fig.10).

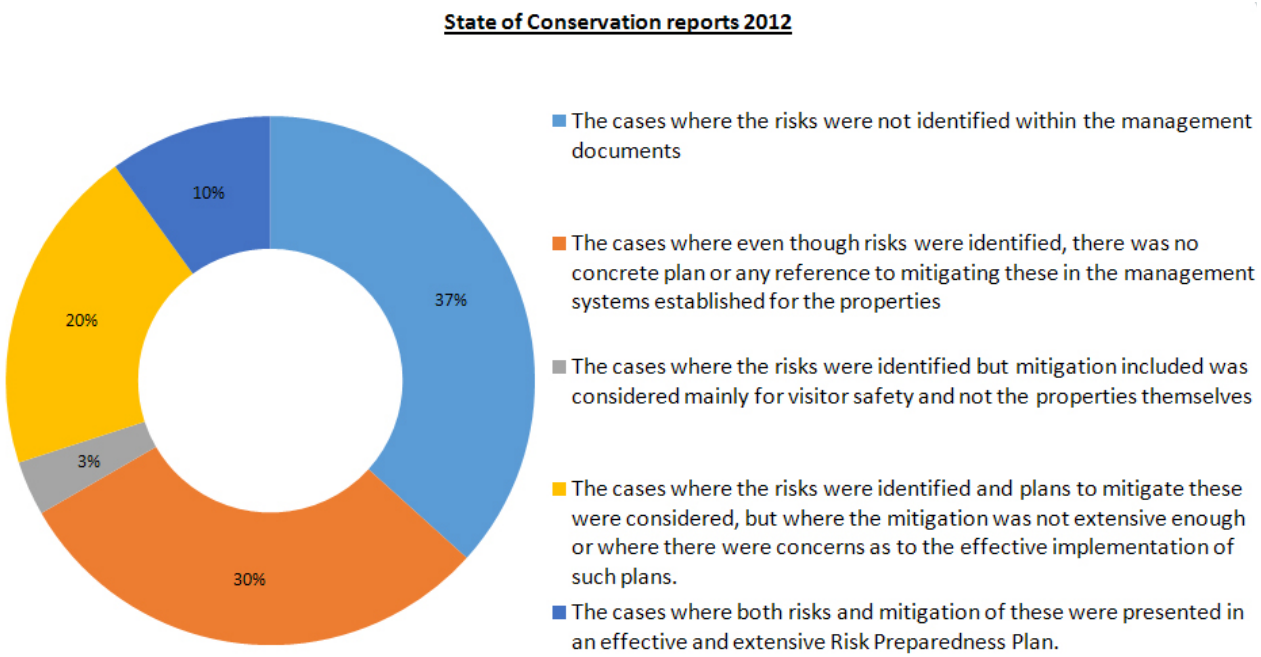


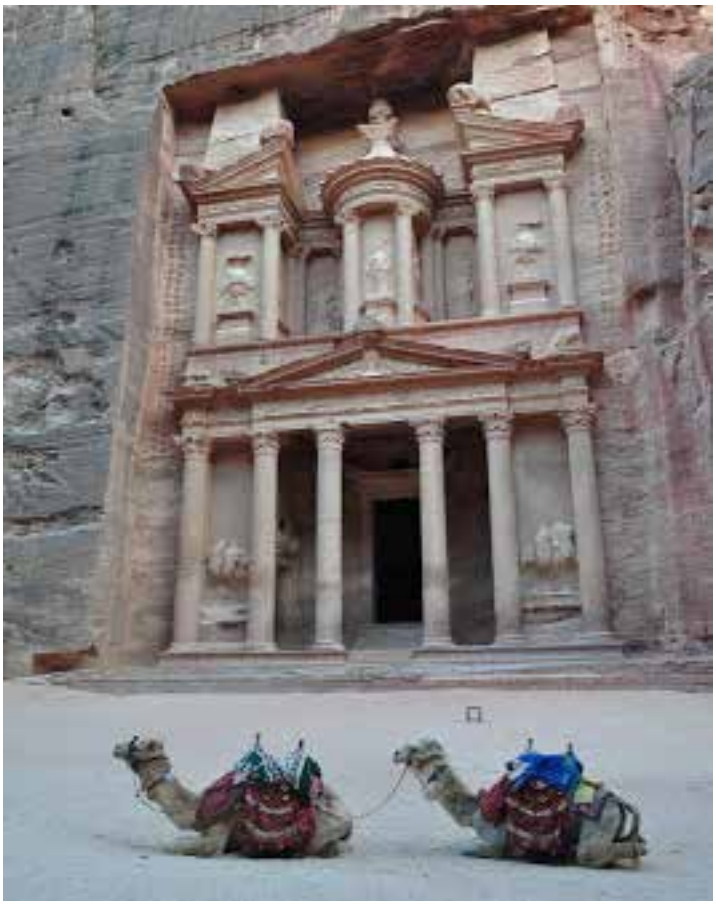
Fig.10 Analysis of responses as per the State of Conservation Reports 2012.
SOURCE: Based on the study by Pinelopi Antoniou for UNESCO World Heritage Centre

Despite the increasing vulnerability of cultural heritage to hazards, disaster risk reduction does not register as a priority area for management of World Heritage properties. Only six out of the 60 properties researched appear to have complied, at least on paper, with the request by the World Heritage Committee that 'risk management components' be incorporated within their management systems. Although the study was inherently limited by the fact that only materials available within the archives of the World Heritage Centre were taken into account (disaster risk reduction initiatives may indeed have been implemented which are not known to UNESCO), this small number is still significant considering that the World Heritage properties studied were located in areas at particular risk from disasters.

This conclusion seems to be corroborated by the extremely low number of requests submitted in the framework of the World Heritage International Assistance Programme[21] that concern disaster risks (only eight out of the total of 2,517 submitted, representing just 0.3 per cent). This is an important indicator of how little consideration the topic has received from States Parties to the World Heritage Convention over the past 35 years. The States Parties which submitted the above requests, moreover, do not appear to be within the high end of the hazard risk table (i.e. not even in the first 20, according to the World Risk Index), which suggests that awareness on the issue needs to be raised.

In light of the increasing vulnerability of cultural heritage to disaster risks and climate change and the near absence of disaster risk reduction plans, coupled with extremely low levels of awareness amongst stakeholders and the public and limited capacity building in the area, it is critical to undertake efforts to advance heritage concerns in the wider agenda for disaster risk reduction and to raise awareness of disaster risk reduction among heritage managers and professionals. To do this it is useful to build upon past achievements and lessons.

3. How is Heritage Being Protected from Disaster Risk?



This chapter outlines the essential considerations to be taken into account when building the resilience of heritage, and illustrates them with concrete examples. These provide a broad overview of issues derived from case material drawn from the literature, various members of the Scientific International Committee on Risk Preparedness of the International Council on Monuments and Sites (ICOMOS-ICORP), the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), UNESCO, Council of Europe, MARSH International (a global insurance broking and risk management firm) and a group of mayors from European Cities who have committed to advancing this agenda.

Fig.11 Ancient landscape of the Petra Archaeological Park in Jordan
SOURCE: Silvan Rehfeld, UNESCO.
http://whc.unesco.org/en/list/326/gallery/

3.1 Assessing risk to cultural heritage

Risk information is fundamental to efforts to reduce the vulnerability of heritage to disasters. The use of multi-hazard risk assessments, forward-looking climate change projections and estimations of potential economic losses are all used to help disaster managers and heritage professionals design mitigation measures, set priorities and make the economic case for investing in resilient heritage.

The Petra Archaeological Park in Jordan (Fig.11), for example, is one of the most iconic World Heritage sites worldwide. Inhabited since prehistoric times, this Nabataean caravan-city, was an important crossroads between Arabia, Egypt and Syria-Phoenicia. Petra is half built, half carved into the rock and is surrounded by mountains riddled

with passages and gorges. It is one of the world's most famous archaeological sites, where ancient Eastern traditions blend with Hellenistic architecture.

This unique and extremely fragile landscape, however, has been affected over the years by a number of natural and human-induced factors. Landslides, rock falls, earthquakes and flash flooding have impacted the site significantly and have already resulted in loss of lives and reduced tourist security. Recent initiatives in preventive risk identification, assessment and monitoring at Petra have proved critical to providing data for the long-term management and conservation of the site. In 2011/2012, the Petra risk mapping project, prepared and implemented by UNESCO in cooperation with a multidisciplinary team of experts, targeted the establishment of site boundaries and buffer zones, defined risk criteria and categories, and developed a risk management methodology to be integrated in the overall risk management plan for the site. The project, piloted in selected areas, will continue to provide capacity building to the staff of the local authority in charge of the management and conservation of the site to assure long-term sustainability.

The Municipality of Ancona in Italy has conducted a study identifying and assessing risks associated with climate events for 27 of its cultural heritage properties, including 25 architectural monuments and two archaeological sites. The study will help prioritizing action and planning maintenance activities so as to reduce the need for restoration work. The method for evaluating potential climate hazards is based on *The Risk Map of Cultural Heritage*, produced by the Higher Institute for Conservation and Restoration (ISCR) in 1995. Vulnerability data shows that the 25 architectural cultural assets studied in this project had values of medium to high vulnerability. For archaeological sites overall vulnerability is high.

A wide range of risk assessment instruments targeted at heritage sites and properties is available, including guidance provided in the resource manual *Managing Disaster Risks for World Heritage*[22] , and quantitative methods for risk assessment tailored to heritage collections[23].

Impact assessments that examine the broader economic costs associated with disaster-related damage to heritage are also important instruments for guiding and prioritizing efforts to reduce risk to heritage[24]. For instance, during restoration work aboard one of Britain's most cherished maritime treasures, the Cutty Sark, a fire started that caused extensive damage and delayed its opening by nearly five years. The financial costs related to the fire damage alone were estimated in the order of US$ 7-15 million. In addition, there was considerable loss of revenue not only to those directly involved in the tourism industry but also to the many local businesses and livelihoods in the area that rely on tourists and visitors coming to Greenwich to see the ship. As a first order of approximation of losses, this potentially represented US$ 25 million per year of direct revenue from entry fees to the Cutty Sark. But it does not account for all other local spin-off expenditures

for food, souvenirs, transportation, etc. spent by visitors and tourists that may be of the same order of magnitude.

A growing number of specialist institutions and businesses are devising more sophisticated instruments to model potential damage, as in the case of Ancona. The newest models of risk assessments can be complemented by local knowledge of hazards (as will be discussed later).

3.2 Undertaking risk reduction measures for heritage site and assets

Among the World Heritage properties that integrate disaster risk considerations within their management plans, four are located within a single country: Japan. These include the Hiraizumi temples, gardens and archaeological sites representing the Buddhist Pure Land, where specific mitigation measures have been implemented against various hazards, notably fire, and are monitored regularly. Underlying risk factors are also being reduced through the control of the surrounding forests, the regular maintenance of the water infrastructure and the structural retrofitting of historic buildings. Another interesting case is that of the Historic Monuments of Ancient Kyoto, where innovative technological solutions have been devised to prevent the worst consequences of possible fires, combined with initiatives for the engagement of civil society that build on traditional practices.

Heritage sites are, in some cases, protected by broad risk reduction and urban planning initiatives undertaken by national and local governments. They include the comprehensive General Plan of intervention to protect the city of Venice from floods (which includes the "MOSE" sea barriers); the Thames Barrier, which has been built to protect the City of London from storm surges; the comprehensive flood plan of Bonn, which provides protection for important cultural heritage sites such as the Jewish cemetery at Bonn-Beuel and architectural monuments from the 18th and 19th century; and Mexico City, where Plan Verde undertook to address major risks to the historic centre, such as seismic instability and continued sinking of the city caused by depletion of the aquifers[25].

Other heritage assets are protected by risk reduction measures that have been tailored to their special characteristics and values. Following a fire which completely destroyed the Venice Opera House in 1996, the city authorities re-assessed the firefighting system, taking into account different risk factors, including urban features, materials

and the historical and cultural importance of the buildings. A new fire hydrant system was designed. Hydrants fed with fresh water, independent of the municipal water system, were put in place to avoid the extensive damage to cultural heritage caused by salt-water systems.

Following the catastrophic earthquake of 1979, the city of Dubrovnik in Croatia launched a programme to earthquake-proof the historic city centre using an innovative approach to financing using revenues generated from visitors. Stone walls were consolidated by grouting, cleaning and pointing. The roofs were also repaired. From 2000 to 2009, over 31 blocks of flats had been improved, which led to a reversal in the negative population trends in the city centre, stronger social cohesion and confidence in the future of the city[26].

Investments may also be made in developing new technology for protecting cultural heritage from disasters or mitigating their impacts. Turkey has high seismicity, which poses risks to museum collections as well as cultural buildings. In the case of museums, in particular, free-standing and hanging objects or display cases are at risk of overturning, sliding and collision. To mitigate the above-mentioned risks and protect visitors and staff, the city of Istanbul, the Kandilli Observatory and the Earthquake Research Institute (KOERI) of the Bogazici University joined forces with other partners to devise a solution; in addition to conducting research and organizing events to raise awareness and build capacity in collaboration with Yildiz Technical University's Museum Studies Graduate Program, J. Paul Getty Museum. KOERI carried out a project on developing and testing of an inexpensive ball-in-cone type isolation unit to protect museum objects. Several museums have since initiated or accelerated various risk reduction measures.

In the Kobe earthquake of 1995, fires erupted when the gas mains fractured and the automatic cut-off systems failed. Fire-fighting operations were hampered by a lack of readily available water. Following the earthquake, the Japanese authorities proposed the development of a new approach for the heritage properties in Kyoto that would not rely solely on the availability of the mains water supply, as it was recognized that such systems could fail. It was proposed instead to build a natural water (rain and river) network system utilizing the existing topography for use by both the public and firefighters. Instead of relying solely on a government response, such a system would be reliable and rooted in the area and the fire-fighting power of the local community[27].

As recognized in cities such as Newcastle upon Tyne in the United Kingdom, climate change is posing new kinds of threats to cultural heritage. Old buildings such as the Castle Keep, constructed by the Normans in the twelfth century, were built with respect to the prevailing climate conditions. Drainage systems, for example, were designed

to cope with existing rainfall patterns. However, a changing climate has created new vulnerabilities and the Castle Keep has suffered internal flooding following episodes of heavy rainfall that the existing drainage system cannot cope with. Discussions are ongoing between the city and English Heritage to find a minimal but robust solution that will not have any adverse impacts on this important building. As in the other examples in this section, solutions sought to build on the creativity of heritage managers and their partners and reflect the importance of understanding the unique physical features of heritage sites and assets as well as understanding local socio-economic

3.3 Using insurance and risk transfer mechanisms effectively

In some respects the use of insurance for cultural heritage may seem problematic, for example in terms of estimating the appropriate insurance value of something that is unique, priceless and often intangible. However, the insurance industry plays an important role in promoting investments in risk reduction, specifically as a means to reduce the cost of losses. The reality is that cultural heritage and those responsible for cultural heritage can benefit from appropriate insurance measures. One of the primary functions of insurance is to spread losses and to reduce financial exposure; this is often the only means that owners and managers of heritage assets have to invest in recovery or restoration after damage.

Business interruption and denial of access, for instance, are important considerations for many heritage managers. In the central business district (CBD) of Christchurch in New Zealand a sizeable cordon remained in place more than a year after the magnitude 6.3 earthquake in 2011 (Fig.12). Around 1,000 buildings in the CBD were demolished because they were perceived as unsafe. Moreover, due to the threat of aftershocks the public was not permitted entry to the CBD, where several culturally significant buildings, including museums and churches, were located. In terms of coverage, it was necessary for the heritage managers and their insurance companies to clarify whether business interruption could be claimed. Important lessons were learned about testing the insurance policy to see if coverage was 'for the damage' or 'for the event'.

A similar situation occurred in New Orleans in 2005, where a culturally significant property was damaged by hurricanes Rita and Katrina. This was subsequently the subject of litigation and it was decided in the US case that even if the building had not been damaged, it would have suffered the same business interruption loss because of the devastation to the surrounding area and therefore the claim was allowed.

Another important issue is the appropriateness of the insurance policy to the heritage site. A cultural heritage site contains an inherent and unique series of values which deserve a higher degree of care and consideration than modern property counterparts. This heightened sensitivity needs to be applied when assessing requirements for property insurance for cultural heritage sites to ensure that the appropriate levels of cover is achieved. For these reasons, the choice and level of coverage is extremely important, with significant differences between 'Total reinstatement' and 'No rebuilding insurance', for instance.

Insurers will often conduct surveys as part of their consideration as to whether to accept a risk, and even if they do not ultimately accept that risk the prospective insured will still have the benefit of the recommendations. With regards to specifics of heritage sites and assets, MARSH Insurance has compiled valuable background on insurance and cultural heritage which presents important lessons that help heritage managers to understand what can be insured and how.

Fig.12 Earthquake damage to the Catholic Basilica in Christchurch, New Zealand.
SOURCE: Bryan Lintott , 2011

4. How is Heritage Being Used to Promote Resilience to Disasters?

As mentioned earlier, heritage is not limited to physical aspects; it includes as well the knowledge, beliefs, values and behaviours that give communities and nations their unique identities. It is not unusual to find references to the importance of culture in international agreements, but few have unpacked the concept to better understand what it implies in practice. This section examines a few illustrative aspects of culture as it applies to building resilience to disasters. It points to some principles and specific measures that may be used to harness the strength of culture as a tool in reducing disaster risk. Two aspects, in particular, are considered: the role of traditional knowledge in building resilience and the role of culture in mobilizing actions that reduce disaster risk and support post-disaster recovery.

4.1 Draw on traditional knowledge

Both modern science and indigenous knowledge play vitals roles in reducing communities' risks. Taking advantage of scientific and technological advances does not imply disregarding the capacities and resources already available locally. Indigenous knowledge for disaster reduction lies in the accumulated experience that comes with the close relationship of communities to their environment. Communities have learned to read the signs in the sea, the skies and wildlife to predict hazards. Direct experience with disasters has taught many communities the duration, location, time, frequency, intensity, predictability, onset and possible behavior of the hazards linked to these events. Likewise, local technologies and construction practices often reflect adaptations to the environmental conditions.

Local, experiential, 'early warning' systems are frequently credited with saving lives and property. The Moken, for instance, are a tribe of nomads living in the southern seas of Thailand and Myanmar who spend at least eight months a year at sea, bartering fish and shells for rice and fuel. They tell the 'legend of the seven waves', which serves to perpetuate traditional knowledge of tsunamis and led them to raise the alarm to tourists and others as to the proximity of the tsunami that struck the coast of Thailand on 26 December 2004. The Moken community has recently been recognized for the lives they saved during this devastating tsunami.

In another example, an earthquake that struck the Japanese village of Hiromura in 1854 provided valuable lessons that continue to instruct new generations of Japanese. A villager noticed that the well had run dry and alerted the village leader. A short time later, a devastating earthquake struck. The leader realised that a tsunami would strike the coast and guided the villagers to higher ground. Following this event the villagers built an embankment that has protected the village ever since, including when the Showa Nankai earthquake triggered a four-metre tsunami; the area protected by the embankment was undamaged. This story continues to be used by the Japanese government to spread awareness of the need for preparedness against tsunamis.

Traditional construction technologies that have evolved through trial and error are often very resilient because of indigenous knowledge that has enabled these technologies to manage local hazards and use local materials. Typical *bhunga* dwellings (Fig.13) of the Kutch region in India survived remarkably well when many new constructions collapsed due to the 2001 earthquake. They are constructed in a circular form, which helps to resist the lateral forces that occur during earthquakes. Resilience is further reinforced with a strong supporting beam that holds up a conical-shaped roof. The walls are constructed with wattle and daub, which is also effective in absorbing earthquake energy.

Fig.13 Traditional 'Bhunga' dwellings in Gujarat, India survived 2001 earthquake
SOURCE: Rohit Jigyasu, 2012

In another example, the 'armature crosswall' is a concept for new constructions based on traditional Turkish and Kashmiri construction techniques that provides flexible design that helps to dissipate earthquake energy[28].

The performance of traditional structures in urban settings (Fig.14) also illustrates the ingenuity of local communities and their capacity to adapt to their environment. Tightly packed buildings work as an integrated structural system that are better able to maintain their integrity when subjected to lateral loads. This is especially true with the use of timber as a resilient building material, as is the case in many cities of the Middle East and Asia.

Fig.14 The dense urban fabric of the Old Town of Lijiang, China. A significant part of this fabric was gutted during recent fire incident on 11 March 2013
SOURCE: Fiona Starr, UNESCO, 2010

The historic walled city of Ahmedabad in India, for instance, uses a series of interlocking building techniques that helped buildings to withstand shocks during the 2001 earthquake because they behaved as a single structure. This gave the buildings an advantage in resisting earthquake forces[29].

Traditional building techniques can also help to inform modern-day practice. Over the centuries, portions of the ancient earthen architectural site of Chan Chan in Peru have been damaged or destroyed by a combination of erosion from rain, surface flooding and rising groundwater. Since 1970, El Niño events that bring heavy rains have become more intensive in this region. In 1996, following the major El Niño event of 1982-83 and many subsequent events, a team of experts from the Government of Peru, ICCROM, the International Centre for Earthen Construction and the Getty Conservation Institute developed a preservation and management plan for Chan Chan. The plan combines modern engineering techniques with traditional architectural stabilization methods, employs local craftsmen and uses traditional materials to stabilize the perimeter walls of palaces and funerary platforms and battle the effects of climate change.

Both traditional knowledge and modern science offer valuable techniques for reducing disaster risk. Blending the traditional and the modern creates a fertile ground for innovation and enhances local ownership and acceptance of new risk reduction initiatives. Partnerships between disaster managers, local communities and heritage or other technical specialists in institutions such as universities and NGOs can play an instrumental role in drawing out the knowledge for reducing risk.

4.2 Consider cultural dimensions in risk-communication and post-disaster recovery

Cultural values and beliefs underlie the decisions people make when facing risk and coping with disasters. Moreover, cultural values provide a source of pride and identity that can inspire communities to undertake bold actions. An understanding of these values can greatly enhance the effectiveness of risk communication and can speed economic as well as psycho-social recovery after disaster strikes.

During the Egyptian Revolution, in the 'Arab Spring' of 2011, amid the protests and the attempted looting, several hundred young Egyptians spontaneously formed human chains around the Cairo Museum and the Library of Alexandria to deter those who would take advantage of the unrest to loot the invaluable collections. On 28th January a mob of around 1,000 people entered the museum looking for valuables. Because

of the efforts of the local people most of the looting was confined to the gift shop. A small number of looters managed to enter the museum, where they decapitated two 3,300-year-old mummies and damaged about 100 other artifacts. The civic sense of a population determined to protect its heritage testifies to the immense value of culture for the identity, dignity and self-image of people.

Throughout the implementation of the Hyogo Framework for Action (HFA) 2005-2015, many have referred to the urgency of creating a 'culture of prevention'. While recognizing that prevention calls for a cultural shift, less attention has been given to understanding the cultural factors that influence people to act on the risk information. This is beginning to change as new evidence and models for risk communication are emerging. For instance, researchers have studied the factors that influence individual- and household-level preparedness for earthquakes in New Zealand[30]. In seeking to understand how families interpret and make sense of earthquake safety information, the perceptions and beliefs about self-efficacy, personal responsibility and a variety of biases play a pivotal role. Societal factors such as the sense of community, trust and prevailing social norms, among others, are identified as significant factors as well. "Understanding how people interpret risks and choose actions based on their interpretations are vital to any strategy for disaster reduction."[31] These issues have significant implications for efforts to cultivate a 'culture of prevention', particularly as they relate to risk communication and motivation to act on that information.

Cultural heritage can play an important role in the recovery of the victims of disasters. Often, cultural insensitivity or ignorance in post-disaster recovery programmes can have adverse effects on people. Take the case of the Marathwada region in the Indian state of Maharashtra, which was struck by a devastating earthquake in 1993. As part of the rehabilitation programme, nearly 52 villages were relocated and reconstructed based on the predetermined criteria of earthquake safety for their layout, architectural design and construction technology. It was found that those villages which were reconstructed on the basis of traditional architecture, with courtyards and surrounding verandahs using locally available materials and skills and cluster planning of neighbourhoods, were adapted by the villagers much more successfully than those that had 'city-like' layouts, with wide streets forming grid patterns and row housing built using imported building materials and construction technology.[32]

Similarly, initiatives such as the Haiti Cultural Recovery Project[33] works to rescue, recover, safeguard and help restore Haitian artwork, artifacts, documents, media and architectural features damaged or endangered by the 2010 earthquake and its aftermath. The initiative has not only provided skills to a new generation of artisans, it has also hastened the psycho-social recovery of the community.

An understanding of culture is an important instrument for the many organizations working to build resilient communities and nations. The tools for cultivating culturally informed approaches to risk reduction can be quite basic, including an openness and sensitivity to cultural differences. Spending time with communities and asking about their views and experience is essential. Investments in understanding culture yields dividends in fostering a genuine culture of prevention and promoting resilience in disaster-affected communities.

5. Who is Protecting Heritage from Disasters?

Several initiatives at international and regional levels have been undertaken in the fields of both heritage and disaster risk reduction aimed at setting policy frameworks for disaster risk reduction of cultural heritage. While on the one hand these aim to introduce disaster risk reduction into heritage protection and management, on the other hand efforts have recently intensified in mainstreaming heritage concerns in larger disaster risk reduction initiatives.

5.1 Risk reduction and heritage in the international agenda

At the international level, a number of conventions have been established by UNESCO over the past 60 years for the safeguarding of cultural heritage, including from the effects of disasters caused by natural and human-induced hazards. The Convention for the Protection of Cultural Property in the Event of Armed Conflict, also known as the Hague Convention, was adopted by UNESCO in 1954 and is the first international legal instrument that deals with threats to cultural heritage. The 1972 Convention Concerning the Protection of the World Natural and Cultural Heritage (World Heritage Convention), with its nearly 1,000 sites recognized and 190 States Parties, has become over the years the most popular treaty aimed at preserving heritage from all sorts of dangers, while giving it 'a role within the life of communities' [34]. More recently, in 2003, a new convention has been adopted which concentrates on the safeguarding of intangible cultural heritage, including traditional knowledge, practices and skills which have been used by communities to reduce risks from disasters [35]. These tools have been compounded by a large number of policies, recommendations, declarations and resource materials specifically focusing on the issue of disasters and threats to heritage from natural and human-induced hazards such as wars.

It was indeed in the wake of the civil wars that tore apart former Yugoslavia in the early 1990s, which also had a devastating impact on cultural heritage, that a more general reflection took place within the cultural heritage sector on how to more effectively protect cultural heritage from this kind of event. In October 1992, ICOMOS convened a meeting in Paris to discuss future strategies for action, which was followed by the establishment of an Inter Agency Task Force (IATF) for Cultural-Heritage-at-Risk, including ICCROM, UNESCO, ICOMOS and International Council of Museums (ICOM). The

IATF's action agenda focused on preparedness, the recognition of cultural heritage as a priority in disaster response, coordinated international response to disasters, training of professionals and searching for new tools through testing of experiences. The most important contribution made by the IATF was the establishment of the International Committee of the Blue Shield (ICBS) by ICOMOS, ICOM, ICA (International Council on Archives) and IFLA (International Federation of Library Associations and Institutions) in 1996 for coordinating preparations to meet and respond to emergency situations as well as post-crisis support for cultural heritage.

After the great Kobe earthquake in Japan in 1995, the efforts aimed at exploring the possibilities of establishing systems to protect cultural heritage from disasters beyond armed conflict further intensified.

The efforts of the IATF and the larger reflection associated with its work have resulted in a great 'attitudinal shift' in the conservation community. Disaster management has come a long way from a reactive culture which views disasters as rare events to a 'conservation paradigm focused on prevention' and risk preparedness[36], and on a stronger integration between heritage protection and disaster management in general.

At the same time, the confluence between the agenda of disaster risk reduction and those of human development, poverty eradication and environmental protection was particularly highlighted after the World Conference on Disaster Reduction in Kobe in 2005, which resulted in the formulation of the Hyogo Framework for Action, which was adopted by 168 Member States of the United Nations.

The HFA states that in furthering disaster reduction efforts it is important that countries address the safety of their people by taking into account their "cultural diversity, age and vulnerable groups". This includes "the protection of ... other national assets from the impact of disasters". The role of heritage has been specifically emphasized under the following 'Priorities for Action' of the HFA:

- 3.(i).(a): ... The information should incorporate relevant traditional and indigenous knowledge and culture heritage and be tailored to different target audiences, taking into account cultural and social factors.

- 4.(i).(b): Implement integrated environmental and natural resource management approaches that incorporate disaster risk reduction, including structural and non-structural measures, such as integrated flood management and appropriate management of fragile ecosystems.

This new approach was integrated in a number of policy statements, including the Declaration of Quebec (1996), the Kobe-Tokyo Declaration on Risk Preparedness for Cultural Heritage (1997), and the Kyoto Declaration on Protection of Cultural Properties, Historic Areas and their Settings from Loss in Disasters (2005), among others. Broad dialogues have been consistently organized at a global level, such as a Thematic Meeting on Cultural Heritage Risk Management, on the side of the 2005 United Nations World Conference on Disaster Reduction in Kobe. This landmark event was followed by a workshop on 'Integrating traditional knowledge systems and concern for cultural and natural heritage into risk management strategies', which was jointly organized in September 2006 by the UNESCO World Heritage Centre and ICCROM at Davos in Switzerland – within the framework of the International Disaster Reduction Conference; the International Conference on Disaster Management and Cultural Heritage, at Thimphu in Bhutan in December 2010; and more recently the 'Istanbul Statement', issued during the International Symposium on Cultural Heritage in Times of Risk: Challenges and Opportunities, in Istanbul, organized by ICOMOS-ICORP and Yildiz Technical University in November 2012, which recommended that risk preparedness, disaster response and recovery strategies should address cultural heritage in parallel with practical humanitarian needs, as disaster recovery is also a wider and longer-term social process.

Within the World Heritage Convention, a policy on Climate Change and World Heritage was adopted in 2007[37] , together with a Strategy for Risk Reduction at World Heritage Properties[38] . The purpose of the Strategy is to strengthen the protection of World Heritage and contribute to sustainable development by assisting States Parties to integrate concern for heritage into national disaster reduction policies while incorporating concern for disaster risk reduction within management plans and systems for World Heritage properties in their territories[39]. The Strategy is structured around the five main objectives defined within the Hyogo Framework for Action, but adapted to reflect the specific concerns and characteristics of World Heritage.

The five key objectives of the Strategy for Risk Reduction at World Heritage Properties are:

1. Strengthen support within relevant global, regional, national and local institutions for reducing risks at World Heritage properties.
2. Use knowledge, innovation and education to build a culture of disaster prevention World Heritage properties.
3. Identify, assess and monitor disaster risks at World Heritage properties.
4. Reduce underlying risk factors at World Heritage properties.
5. Strengthen disaster preparedness at World Heritage properties for effective response at all levels.

International political and strategic advances have been achieved at the regional level as well. The European Commission included protection of cultural heritage in "Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risk. The Directive aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity[40]. In 2012, the Congress of Local and Regional Authorities in the Council of Europe adopted Resolution 399 on Making Cities Resilient. The resolution acknowledges the need for Council of Europe Mayors and local authorities to address urban resilience by embracing the Resilient Cities Campaign "Ten Essentials"[41]. The challenge ahead is to understand what measures are undertaken to implement these important global and regional agreements.

5.2 Implementation of disaster risk reduction for resilient heritage

Heritage is managed through a remarkably diverse set of ownership or management arrangements, which involve private foundations and national or local governments, among others. To reduce risk to heritage and leverage heritage as an instrument of resilience, heritage managers must partner with disaster management authorities, universities and technical institutions, NGOs, political leaders at national – and particularly at local – level, as well as the private sector and the public.

Since 2007, efforts have been made to implement the Strategy for Risk Reduction at World Heritage Properties. UNESCO and its partners have developed a number of resource materials[42] and conducted numerous capacity-building initiatives. Organizations such as ICOMOS-ICORP (the International Scientific Committee on Risk Preparedness of ICOMOS; an international NGO dedicated to protection and management of cultural heritage have been working towards promoting the global agenda on risk reduction and heritage through symposiums and workshops, guidelines and training programmes.

The International Centre for the Study of Preservation and Restoration of Cultural Property, based in Rome, has in cooperation with other organizations undertaken several initiatives in this area, especially with regard to training and capacity building on disaster risk management of cultural heritage. The Institute for Disaster Mitigation of Urban Cultural Heritage, at Ritsumeikan University (Rits-DMUCH) in Kyoto, has organized an International Training Course on Disaster Risk Management of Cultural Heritage every year since 2006. This course is the first attempt at the international level to provide high-level educational opportunities on the topic of natural disasters for people in the

field of cultural heritage, and on the topic of cultural heritage for people in the field of disaster management.

Through its European and Mediterranean Major Hazards Agreement (EUR-OPA), the Council of Europe has been promoting the reduction of the vulnerability of ancient buildings and historical settings from earthquakes and other risks by developing projects and activities such as the identification of possible efficient techniques used in the past that can be reused or updated, the simulation approaches for individual monuments and aggregates of historical buildings or the study of ageing of structures and their wearing due to the impact of climate change.

While national governments do not report specifically on their progress in reducing risk to heritage sites, it is clear that many are interested[43]. Protecting cultural heritage is beginning, in a few instances, to be an integral part of national disaster management platforms. In Bhutan, for example, the government has incorporated cultural heritage protection by producing a set of guiding principles and recommendations for integrating cultural heritage and disaster management[44].

In Europe, national governments and national platforms for disaster risk reduction in in Italy, Serbia, Portugal and Sweden and the former Yugoslav Republic of Macedonia are in different ways supporting in heritage and building resilience to disasters in their respective countries. The Swedish National Heritage Board's informs municipalities and other actors about climate change adaptation measures for protecting buildings, archaeological sites and collections of artifacts that could be threatened by the risk of flooding or storms. As a member of the Swedish National Platform, this agency in cooperation with others in the platform, suggests appropriate activities that will increase awareness of future climate- related threats such as from sea level rise[45].

In heritage protection, as in many other aspects of disaster risk reduction, local governments find themselves on the frontline. Mayors around the world have been partnering with NGOs, the private sector, universities and the public to protect heritage in their cities and towns. Most recently, mayors have come together to share their experience and commitment to resilient heritage and to continue efforts to learn from each other in this important area.

In 2012, the 'Venice Declaration on building resilience at the local level towards protected cultural heritage and climate change adaptation strategies' (APPENDIX II) was adopted by mayors from cities throughout Europe as an outcome of an international conference organized UNISDR and the city of Venice 'Building cities' resilience to disasters: protecting cultural heritage and adapting to climate change'.

The Declaration represents a significant development in that it was driven by local governments and disaster managers rather than by heritage specialists. The active engagement of a global reinsurance firm, MARSH International, which shared its tools and experiences in protecting heritage from disaster risk also represents a significant step towards engaging the private sector in this work. The Venice Declaration focuses on raising awareness and taking action on resilience vis-à-vis cultural heritage in a changing climate.

The commitment of local governments is vital to protecting heritage and reducing disaster risk. In 2012, the Mayor of Venice, Mr. Giorgio Orsoni, was appointed as European Champion for Cultural Heritage Protection in the UNISDR campaign 'Making Cities Resilient – My City is Getting Ready!' Among other initiatives undertaken already cited, the city of Venice, worked other authorities and partners in cultural heritage conservation, to involve civil society in efforts to build resilience and protection of cultural heritage. This included coordinating a group of civil protection volunteers which is specifically committed to the protection of cultural assets, meaning that they are trained on prevention and emergency activities by the competent authorities.

Local governments are also finding support through partnerships with other local governments. The cities of Venice and Byblos, both of which include UNESCO World Heritage Sites and both signatories to UNISDR's "Making Cities Resilient Campaign – My City is Getting Ready!" have joined forces through a city-to-city exchange initiative. Both were concerned about the threat of inundation from storm surges and other risks driven by climate change or human activities. They agreed to initiate a twinning project in June 2011 which began by bringing together experts and practitioners from Venice and representatives of the Lebanese government and the Municipality of Byblos. Together they have been exploring issues related to implementing an integrated approach for the protection of the ancient harbour of Byblos, and important marine and adjoining archeological sites with Phoenician, Roman and Medieval remains.

Initiatives such as these reflect not only the commitment to heritage and disaster risk reduction, but also to innovative approaches to building partnerships that can advance implementation.

6. Way Forward for Promoting Heritage and Resilience

As mentioned earlier, the Strategy for risk reduction at World Heritage Properties, adopted by UNESCO in 2007, clearly specifies various priority actions for achieving the objectives that are structured around the five main priority areas defined by the Hyogo Framework for Action, but adapted to reflect the specific concerns and characteristics of World Heritage (APPENDIX I). Although meant specifically for World Heritage properties, these actions are of equal relevance for all types of heritage.

As this overview paper suggests, there are many initiatives under way; yet these efforts remain largely ad hoc. With a more concerted effort, the growing commitment for protecting heritage and leveraging the power of heritage for building resilience displayed by mayors and local governments, national governments and local communities can be harnessed. A few productive starting points are outlined below.

6.1 Foster the partnerships that protect and draw on heritage for disaster risk reduction at the local level

Given that heritage assets are closely associated with communities to whom they truly belong, the increasingly active engagement of local governments in disaster risk reduction provides an excellent opportunity to link heritage to disaster risk reduction. There is no 'one-size-fits-all' guidance available; rather, experience has shown that partnerships between heritage managers, local governments, specialist institutions, the private sector and local communities are called for. Capacities to build these partnerships can provide valuable impetus.

6.2 Consolidate available guidance and data on heritage and promote new research and tools

While some general tools have been tested and are readily available, there is an urgent need to develop manuals and guidelines for heritage professionals and city managers aimed at reducing risks to cultural heritage from various kinds of hazards. These learning materials should be easily available as online resources. Knowledge institutions such as universities and research institutes should undertake applied research on the role

of heritage in building the disaster resilience of communities and its relevance in a contemporary context. The research findings should not just remain in reports but should be actively utilized for developing sustainable techniques for mitigating risks to cultural heritage from various kinds of hazards.

6.3 Assess risks to heritage

Drawing on existing hazard, vulnerability and risk information and linking this to documentation on the attributes and values of heritage properties is an important step in reducing risks to cultural heritage. This can be developed with varying levels of detail, ranging from broad structural damage to the finer details of erosive and corrosive processes that can damage heritage. When assessing risks, it can be useful to include social impacts and economic estimates that look beyond the immediate damage to consider the potential impacts that disruption to access to heritage sites can have on communities. In some cases, insurers may be in a position to assist with risk modeling.

6.4 Design culturally informed campaigns for risk communication and post-disaster recovery

Risk communication, including public awareness and efforts to influence investment decisions in the public and private sectors – including at the household level – are fundamental to any risk reduction strategy. Efforts to bring more concerted attention to risk communication are under way; these efforts may be more likely to affect a change in attitude and behaviour if cultural values and beliefs are considered explicitly in the design of such programmes. Preparedness for post-disaster recovery presents another productive entry point for including cultural perspectives that can hasten recovery.

6.5 Build Capacities for reducing disaster risks to heritage

Capacity-building programmes aimed at reducing disaster risks to heritage should be organized for various stakeholders. These would include hands-on training courses for the managers of heritage properties and museums for developing, implementing and monitoring appropriate mitigation, preparedness, response and recovery plans for heritage, as well as those aimed at introducing policies and programmes for decision-makers such as city mayors and museum directors.

6.6 Engage heritage managers and related institutions in national platforms

At present there is no real alignment of heritage needs in disaster risk reduction polices and plans at national and local levels, and vice versa. Political awareness and motivation remains limited as well. National Platforms can be an important vehicle for promoting disaster risk reduction and climate change adaptation for cultural heritage. These platforms would benefit from the active engagement of relevant government departments, technical institutions and heritage managers in the public and private sectors.

Fig.11 Ancient landscape of the Petra Archaeological Park in Jordan
SOURCE: UNESCO, Amman.
http://whc.unesco.org/en/list/326/gallery/

6.7 Advocate cultural heritage in global agendas

As stakeholders around the world are considering elements for a post-2015 framework for disaster risk reduction, the opportunity to bring more depth and scope to promoting resilience through heritage should not be missed – the views of heritage managers should be sought out in the ongoing consultative process. Building resilience calls for commitment to addressing underlying risk factors, most of which are inextricably linked with socio-economic development. Heritage is a cross-sectoral area that has strong links with various development sectors such as shelter, livelihoods, health, education, infrastructure and environment. These links should be reinforced in the global post-2015 agenda for sustainable development.

APPENDICES

APPENDIX I: Objectives and priority actions recommended in the strategy for risk reduction of world heritage properties adopted by unesco in 2007

Available at http://whc.unesco.org/archive/2007/whc07-31com-72e.pdf , P.4-7:

TABLE 1. Objectives and Priority Actions

OBJECTIVES	PRIORITY ACTIONS
1. Strengthen support within relevant global, regional, national and local institutions for reducing risks at World Heritage properties Global actors for disaster reduction should give more consideration to cultural and natural heritage among the issues to be considered when defining their strategic goals and planning their development cooperation activities. At the same time, general disaster reduction strategies at regional, country and local levels must take into account and integrate concern for world cultural and natural heritage in their policies and implementation mechanisms	*Action 1.1* Promote cultural and natural heritage, and its potential positive role for disaster reduction as part of sustainable development, within relevant international development institutions, conventions and global forums and with other potential financial partners, as a means of raising support for the protection of heritage from disasters.
	Action 1.2 Strengthen policies and funding provisions for disaster reduction within the World Heritage system, for instance by including disaster and risk management strategies in the preparation of Tentative Lists, nominations, monitoring, periodic reporting and International Assistance processes.
2. Use knowledge, innovation and education to build a culture of disaster prevention at WH properties The building of a culture of prevention, at all levels, is one of the key elements for a successful disaster reduction strategy. Experience shows that reacting a posteriori, especially as far as heritage is concerned, is an increasingly ineffective way of responding to the needs of people affected by disasters. Training, education and research, including on relevant traditional knowledge, are the most effective ways of developing a culture of preparedness. This particular area of actions fits entirely within the broader mandate of UNESCO as the UN intellectual arm, in particular for establishing global knowledge networks	*Action 2.1* Develop up-dated teaching/learning and awareness- raising resource materials (guidelines, training kits, case studies and technical studies, glossaries) on disaster reduction for World Heritage, and disseminate them widely among site managers, local government officials and the public at large.
	Action 2.2 Strengthen the capacity of World Heritage property managers and community members, through field - based training programmes, to develop and implement risk management plans at their sites and contribute to regional and national disaster reduction strategies and processes.
3. Identify, assess and monitor disaster risks at WH properties The first step to reduce disasters and mitigating their impact is the identification of possible risk factors, including from global agents such as climate change. The vulnerabilities from disasters to World Heritage properties must be therefore identified, assessed in their level of priority and closely monitored, so as to inform the appropriate risk management strategies	*Action 3.1* Support risk identification and assessment activities at World Heritage properties, including consideration of climate change impacts on heritage, consideration of underlying risk factors, all necessary expertise and the involvement of relevant stakeholders as appropriate.
	Action 3.2 Develop a World Heritage Risk Map at the global level or at regional levels to assist States Parties and the Committee to develop better responses.

OBJECTIVES	PRIORITY ACTIONS
4. Reduce underlying risk factors at WH properties When a disaster occurs, there are a number of underlying factors that can significantly aggravate its impact. These include land/water and other natural resources management, industrial and urban development, and socio-economic practices. Removing the root causes of vulnerability implies often the identification and reduction of underlying risk factors associated to human activities	*Action 4.1* Give priority within international assistance to helping States Parties in implementing emergency measures to mitigate significant risks from disasters that are likely to affect the Outstanding Universal Value, including the authenticity and/or integrity of World Heritage properties.
	Action 4.2 Develop social training programmes for communities living within or around World Heritage properties, including consideration of heritage as a resource to mitigate physical and psychological damage of vulnerable populations, particularly children, during and in the aftermath of disasters.
5. Strengthen disaster preparedness at World Heritage properties for effective response at all levels The worst consequences of natural or human-made disasters can often be avoided or mitigated if all those concerned are prepared to act according to well conceived risk reduction plans, and the necessary human and financial resources, and equipment, are available	*Action 5.1* Ensure that risk management components, with identified priorities, are integrated within management plans for World Heritage properties, as a matter of urgency. For World Heritage cultural properties, the scope of these plans should address ways of protecting the key assets that contribute towards the Outstanding Universal Value and should also include the protection of any significant original archival records that contribute to their heritage value, whether or not they are located within the boundaries of the World Heritage property. For natural properties, such plans should be oriented to protect the key values for which the properties were inscribed as well as their integrity.
	Action 5.2 Ensure that all those concerned with the implementation of disaster reduction plans at World Heritage properties, including community members and volunteers, are aware of their respective roles and are well and systematically trained in the application of their tasks.

RELATED ACTIVITIES

From 28 August to 1 September, in Davos (Switzerland), the World Heritage Centre and ICCROM organized a one-day workshop on *"Integrating traditional knowledge systems and concern for cultural and natural heritage into risk management strategies",* with resources from the World Heritage Fund. This event, in which ICOMOS and ICOM representatives also participated, took place within the framework of the International Conference on Disaster Reduction (ICDR), a major event following the World Conference of Disaster Reduction (WCDR) held at Kobe (Japan), in 2005.

In line with Decision 30 COM 7.2 (Vilnius, 2006), the session helped disseminate the *"Strategy for Risk Reduction at World Heritage Properties"* within this important international forum while promoting the integration of concern for heritage within broader disaster reduction strategies and plans at global, regional and national levels. As proposed within the "Strategy", the primary purpose of this session was to strengthen ties and exchange experiences between the heritage community and the wider Disaster Reduction sector. The various papers presented and the outcome of the discussions will result in an e-publication edited by ICCROM, which will be made available on the web- site of the World Heritage Centre, together with the "Strategy" itself and the prioritized list of actions, upon validation by the World Heritage Committee.

One of the important results achieved by the session is reflected in the final Declaration (i.e. the "Davos Declaration") adopted by the ICDR, which includes the following paragraph: *"Concern for heritage, both tangible and intangible, should be incorporated*

into disaster risk reduction strategies and plans, which are strengthened through attention to cultural attributes and traditional knowledge"[16]. This constitutes the first reference, within a global policy document on disaster reduction, to the importance of the heritage in the context of disaster risk reduction.

Moreover, with respect to the provisions contained in paragraphs 7 and 8 of Decision 30 COM 7.2 (Vilnius, 2006), the World Heritage Centre and ICCROM are preparing a user- friendly resource material to build capacity on disaster reduction at World Heritage properties. This should be finalized within 2007. A revised format for Emergency Assistance requests has been prepared, and is presented for the consideration of the Committee in Document WHC-07/31.COM/18.

Finally, in the context of the meeting held at UNESCO Headquarters on 5 and 6 February 2007 to develop a Policy Document on World Heritage and Climate Change, a number of references have been made to the linkages between Climate Change and risk management or reduction. Climate Change, in this context, should be considered as one of the factors that, combined with specific vulnerabilities, can result in significant risks to the conservation of World Heritage properties. The policies and strategies of the World Heritage Committee on the issues of Climate Change and Risk Reduction, therefore, should be consistent and complementary.

DRAFT DECISION

Draft Decision: 31 COM 7.2

The World Heritage Committee,

Having examined Document WHC-07/31.COM/7.2,

Recalling Decision 30 COM 7.2, adopted at its 30th session (Vilnius, 2006),

Takes note of the important outcome of the Davos International Conference on Disaster Reduction as reflected in its final Declaration, on the role of heritage within disaster risk reduction;

Approves the revised Strategy for Risk Reduction at World Heritage Properties with its prioritized list of actions;

Requests the World Heritage Centre and the Advisory Bodies to ensure that activities in the framework of the Strategy for Risk Reduction at World Heritage Properties are consistent and, when appropriate, complementary to the policies and strategies established by the World Heritage Committee on the issue of Climate Change.

APPENDIX II: Venice declaration on building resilience at the local level towards protected cultural heritage and climate change adaptation strategies

We, Mayors and Local Government representatives together with National Government Officials, representatives of the Council of Europe, the European Commission, the Private Sector, UNESCO, UNHABITAT and UNISDR,

1. Having participated in the event "Building Cities Resilience to Disasters: Protecting Cultural Heritage and Adapting to Climate Change" organized by the City of Venice and UNISDR,

2. Recognizing that:

a) More than half of the world's population now lives in cities or urban centres, which serve as the economic engines of nations, and where around 100 cities are in control of 30 per cent of the world economy;

b) Cities, including over 200 World Heritage urban properties, are living evidence, a physical store of cultural heritage that represent a source of cultural identity and a non-renewable human asset, and that urban vulnerability to risks are one of the most significant threats to the preservation of such assets;

c) A well-conserved historic environment, supported by living traditional knowledge and skills, considerably reduces underlying disaster risks' factors, strengthens the resilience of urban communities and saves lives.

d) Sustainable development must integrate disaster risk reduction and resilience building at all levels through planning across sectors to increase urban resilience to disaster;

e) Disaster risk is driven higher by climate change particularly in urban areas due to the increased incidence of extreme weather events, such as flooding, flash floods, tropical cyclones, drought, wildfires and heat waves, which affects the growing populations of cities;

3. Recalling:

a) The World Disaster Reduction Campaign 2010-2015 Making Cities Resilient: "My city is getting ready!" which is aimed at achieving resilient sustainable urban communities based on the principles of the Hyogo Framework for Action;

b) The Mayor's Statement on Resilient Cities at the Third Session of the Global Platform for Disaster Risk Reduction, which calls on UNISDR to work with city networks, UN entities and civil society organizations to sustain local preparations for disaster risk reduction and local resilience-building;

c) The Strategy for Disaster Risks Reduction at World Heritage Properties, which was adopted by the World Heritage Committee at its 31st Session in 2007.

Resolve to:

a. Ensure the continuation of exchanges of experiences and good practices within communities, cities and local governments on achievements related to disaster risk reduction at the local level;

b. Actively encourage exchanges between cities facing challenges posed by the protection of cultural heritage in a changing climate;

c. Further the engagement of European local level city networks in embracing resilience to disasters with a particular focus on cultural heritage protection and climate change adaptation by promoting and embracing the objectives of Making Cities Resilient Campaign;

d. Support the integration of heritage concerns into national and local disaster risk reduction policies and plans and, at the same time, ensure that disaster risks are taken into consideration within management plans and systems for heritage properties in their territories, notably for World Heritage Cities;

e. Ensure that sustainable development strategies reflect disaster risk reduction measures at the local level for urban sustainability and resilient growth;

f. Encourage communities, cities and local governments to take advantage of existing sources of information such as the Making Cities Resilient website, national databases and other available information related to the activities of participating cities to ensure that achievements and obstacles in addressing vulnerabilities to disasters are shared and built upon;

g. Integrate the Ten Essentials of the Making Cities Resilient Campaign into local risk reduction plans as a way to accelerate efforts to make cities safer and to prevent the loss of lives and assets;

h. Foster partnerships for disaster risk reduction with the private sector to analyze the root causes of continued non-resilient activity in the urban built environment, related infrastructure and cultural heritage, and to enhance collaborative exchanges regarding dissemination of risk data;

i. Encourage the use of the Local Government Self-Assessment Tool as a channel for sharing advances and challenges in reducing risks at the local level towards building cities resilience.

Adopted on 20 March 2012.

APPENDIX III: Key international conferences, workshops, training courses and publications on disaster risk reduction of cultural heritage

The following is a brief overview of various initiatives carried out by international and regional organizations as well as national governments on disaster risk reduction of cultural heritage.

- International Symposium, 'Cultural Heritage Disaster Preparedness and Response', Hyderabad, India, 23-27 November 2003, organized by ICOM.
- Thematic Meeting on Cultural Heritage Risk Management, United Nations World Conference on Disaster Reduction, Kobe, Japan, January 2005.
- International Workshop on 'Protecting Cultural Heritage and Settings from Disasters', organized by the Research Center for Disaster Mitigation of Urban Cultural Heritage, Ritsumeikan University, Kyoto, and ICOMOS, Japan, January 2005.
- Teamwork for Integrated Emergency Management in Asia, a Museum Emergency Programme Education Initiative of UNESCO, ICOM, ICCROM, Getty Conservation Institute, August 2005.
- Special Session on 'Traditional Knowledge for Disaster Risk Reduction', at the International Disaster Risk Reduction Conference held in Davos, Switzerland, 2006.
- Training Course on 'Reducing Risks to Collections', organized by ICCROM in cooperation with the Canadian Conservation Institute, 16-27 October 2006.
- Teamwork for Integrated Emergency Management in South East Europe, a Museum Emergency Programme Education Initiative of UNESCO, ICOM, ICCROM, Getty Conservation Institute and National Archives of Netherlands, November 2007 to September 2008.
- International Workshop on Disaster Risk Management at World Heritage Properties, Olympia, Greece, 2008.
- Capacity-Building Workshop on Assessment of Vulnerability of Cultural and Natural World Heritage Properties to Disasters and Climate Change, Beijing, 6-12 December 2009.
- Second International Workshop on Disaster Risk Reduction to Cultural Heritage, Acre (Israel), 14-17 November 2009.
- International Conference on 'Earth Wind Water Fire – Environmental Challenges to Urban World Heritage', Regensburg, Germany, 2008.
- Workshop on Risk Reduction for Caribbean Heritage, Havana, Cuba, 2008.
- UNESCO Chair International Training Course on Disaster Risk Management of Cultural Heritage, organized by the Research Centre for Disaster Mitigation of Urban Cultural Heritage, Ritsumeikan University, Kyoto, in cooperation with the World Heritage Centre and the Division of Cultural Heritage at UNESCO, ICCROM, ICOMOS, and Agency for Cultural Affairs as well as other relevant institutions of the government of Japan, 2006 onwards.
- Training Course on Reducing Risks to Collections, organized by ICCROM in cooperation with CCI and ICN, in Beijing from 7-25 September 2009.
- International Conference on Disaster Management and Cultural Heritage, Thimphu, Bhutan, December 2010.
- International Symposium on Cultural Heritage in Times of Risk: Challenges and Opportunities, in Istanbul, November 2012.

- First Aid to Cultural Heritage in Times of Conflict, organized by ICCROM with the support of UNESCO, Blue Shield and specialized National and International Agencies, 2010-2012.
- Reducing Risks to Cultural Heritage Course, organized by ICCROM, the Canadian Conservation Institute (CCI) and Netherlands Institute of Cultural Heritage (ICN), May to November 2011.
- Workshop on Disaster Risk Management of Cultural Heritage in Albania, organized by ICCROM and UNESCO Venice Office, 2011-12.
- 'Managing World Heritage Sites: Integrating Disaster Risk Reduction Strategies', CONACULTA, INAH, Coordinación Nacional de Conservación de Patrimonio Cultural, UNESCO, World Heritage Centre, LATAM, ICCROM and the Regional World Heritage Institute in Zacatecas.
- Venice Declaration, adopted in 2012 at the international conference on 'Building Cities' Resilience to Disasters in Europe: Protecting Cultural Heritage and Adapting to Climate Change'.
- Consultative Meeting on Cultural Heritage and Resilience organized by UNISDR Incheon Office at Incheon, 29-30 August 2012.

Three significant publications on the subject focused on disaster risk reduction of cultural heritage have been published. These include:

- Stovel, Herb, 1998 "Risk Preparedness: A Management Manual for World Cultural Heritage", ICCROM in cooperation with ICOMOS. Available at: *http://www.iccrom.org/pdf/ICCROM_17_RiskPreparedness_en.pdf*
- Resource Manual, 2010, Managing Disaster Risks for World Heritage, published by UNESCO in cooperation with ICCROM, ICOMOS and IUCN. Available at: *http://whc.unesco.org/en/news/630/*
- Jigyasu, R. and Arora, V. 2013, Disaster Risk Management of Cultural Heritage in Urban Areas: A Training Guide, published by Rits-DMUCH in cooperation with UNESCO World Heritage Centre and ICCROM
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APPENDIX IV: International organizations and research institutions working on 'heritage and resilience'

The following is a brief overview of various initiatives carried out by international and regional organizations as well as national governments on disaster risk reduction of cultural heritage.

UNESCO World Heritage Centre:

Ensuring the day-to-day management of the Convention, the Centre organizes the annual sessions of the World Heritage Committee and its Bureau, provides advice and assistance to States Parties, and coordinates both the reporting on the condition of sites and the emergency action undertaken when a site is threatened. The Centre also organizes technical seminars and workshops, develops teaching and awareness raising materials and keeps the public informed of World Heritage issues. In relation to disaster risks, the World Heritage Centre coordinates the implementation of the Strategy on Disaster Risk Reduction at World Heritage Properties. Weblinks: *http://whc.unesco.org and http://whc.unesco.org/en/disaster-risk-reduction/*

International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM):

An intergovernmental organization dedicated to the conservation of cultural heritage. ICCROM aims at improving the quality of conservation practice as well as raising awareness about the importance of preserving cultural heritage. It contributes to preserving cultural heritage through five main areas of activity: training, information, research, cooperation and advocacy. ICCROM has been actively engaged in various capacity-building initiatives on risk management of cultural heritage. For details visit *http://www.iccrom.org*

International Committee of the Blue Shield (ICBS):

The Blue Shield is the cultural equivalent of the Red Cross. It is the symbol specified in the 1954 Hague Convention for marking cultural sites to give them protection from attack in the event of armed conflict. The ICBS covers museums and archives, historic sites and libraries, bringing together the knowledge, experience and international networks of five expert organizations dealing with cultural heritage. For details visit *http://www.ifla.org/blueshield.htm*

International Council on Monuments and Sites (ICOMOS):

An association of professionals throughout the world that works for the conservation and protection of cultural heritage places. It the only global NGO of its kind, and is dedicated to promoting the application of theory, methodology and scientific techniques to the conservation of architectural and archaeological heritage. For details visit *http://www.icomos.org*

International Scientific Committee on Risk Preparedness of ICOMOS (ICORP):

Aiming to enhance the state of preparedness within heritage institutions and professions in relation to disasters of natural or human origin, and to promote better integration of the protection of heritage structures, sites or areas into national, local as well as international disaster management, including mitigation, preparedness, response and recovery activities. For details visit *http://icorp.icomos.org*

International Council on Museums (ICOM):

An NGO devoted to the promotion and development of museums and the museum profession at an international level. For details visit *http://www.icom.org*

International Union for Conservation of Nature (IUCN):

Helping the world to find pragmatic solutions to the most pressing environment and development challenges. It supports scientific research, manages field projects all over the world and brings governments, non-governmental organizations, United Nations agencies, companies and local communities together to develop and implement policy, laws and best practice. For details visit *http://www.iucn.org*

Cultural Heritage without Borders (CHwB):

A Swedish NGO that lends international support to cultural heritage at risk of being destroyed whether as a result of disasters caused by natural hazards, war or neglect or political or social conditions. It has been very active in emergency rescue and recovery of cultural heritage damaged due to war in South-East Europe.

Institute for Disaster Mitigation of Urban Cultural Heritage, Ritsumeikan University, Kyoto (Rits-DMUCH):

An educational and research centre that aims to protect urban cultural assets from disasters, and establish the necessary knowledge and technology to protect cultural heritage for future generations. The institute has a UNESCO Chair and conducts an International Training Course on Cultural Heritage Disaster Risk Management every year. For details visit *http://www.rits-dmuch.jp/en/*

International Council of Museums (ICOM) Disaster Relief Task Force:

First created by ICOM President to provide assistance to museums damaged by the 2004 tsunami, ICOM has since extended the task force missions to worldwide activities, including manmade disasters such as war. DRTF assists ICOM in reacting more swiftly to crisis, once recovery needs of cultural and natural heritage institutions have been addressed. For details visit *http://icom.museum/the-committees/technical-committees/standing-committee/disaster-relief-task-force/*

Getty Conservation Institute (and Getty publications):

The Getty Conservation Institute works to advance conservation practice in the visual arts, broadly interpreted to include objects, collections, architecture, and sites. It serves the conservation community through scientific research, education and training, model field projects, and the broad dissemination of the results of both its own work and the work of others in the field. In all its endeavors, the Conservation Institute focuses on the creation and dissemination of knowledge that will benefit the professionals and organizations responsible for the conservation of the world's cultural heritage. For details visit *http://www.getty.edu/conservation/publications_resources/pdf_publications/*

International Institute for Conservation of Historic and Artistic Works (and publications):

An independent international organisation supported by individual and institutional members, it serves as a forum for communication among professionals with responsibility for the preservation of cultural heritage. It advances knowledge, practice and standards for the conservation of historic and artistic works through its publications and conferences. It promotes professional excellence and public awareness through its awards and scholarships. For details visit *https://www.iiconservation.org/*

European University Centre for Cultural Heritage - CUEBC :

The European University Center for Cultural Heritage contributes, in connection with national and international institutions concerned, to carry out a cultural heritage policy from the point of view of expert training and specialization, scientific advice, as well as protection and promotion of cultural and historical assets.

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37. See the World Heritage Report N.22: "World Heritage and Climate Change", 2007, accessible online from: *http://whc.unesco.org/en/series/22/*

38. Accessibile online from: *http://whc.unesco.org/archive/2007/whc07-31com-72e.pdf*

39. UNESCO, (2007).

40. Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risk, on the assessment and management of flood risks. http://ec.europa.eu/environment/water/flood_risk/

41. Accessible from: http://preventionweb.net/go/26362

42. Accessibile from: http://whc.unesco.org/en/activities/630/

43. National platforms are nationally owned and led multi-stakeholder forums or committees working on disaster risk reduction. National platforms coordinate the implementation of the HFA and serve as the coordinating mechanism for mainstreaming disaster risk reduction into development policies, planning and programmes.

44. Statement by Hon'ble Lyonpo Minjur Dorji (2011) Statement by Hon'ble Lyonpo Minjur Dorji, Minister for Home and Cultural Affairs, Royal Government of Bhutan on the 3rd Session of the Global Platform for Disaster Risk Reduction in Geneva, 8-13 May 2011.

45. UNISDR Europe Office, 2012, Overview of National Platforms for Disaster Risk Reduction in Europe, Brussels. Online at: http://www.preventionweb.net/files/19617_overviewnpeuropeefdrr20120924.pdf

46. Excerpt from the "Davos Declaration", International Conference on Disaster Reduction, ICDR, Davos, Friday 8 September 2006. Accessible in full online at: http://www.idrc.info/userfiles/image/PDF_2006/IDRC_Flyer_Declaration_2006.pdf

Front Cover: Damage to one of the turrets at the Castle of Ferrara during an earthquake in 2012, Italy.
SOURCE: Claudio Margottini, 2012.

Back Cover: Ongoing conservation work at the museum gallery inside the Castle of Ferrara, Italy. The ceiling has been propped and the artworks on the walls have been protected by plastic sheets to prevent possible damage from aftershocks.
SOURCE: Claudio Margottini, 2012.

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