In August 2002, central Europe saw some of the most devastating floods of the last 200 years. Newspapers, radio, and television heralded the extreme threats to the historic towns of the Czech Republic, Germany, and Hungary by the Jahrhundertflut. The heavy rains and high floodwaters forced the evacuation of thousands of people as cities and towns were submerged and lives were lost. Estimates by re-insurers for total flood damage in Germany, Austria, and the Czech Republic reached $14.7 billion.

These floods struck some of central Europe’s top cultural attractions and most valued historic urban environments. The World Heritage towns of Cesky Krumlov and Prague were damaged. Media coverage of the disaster left no doubt that the protection of cultural heritage is of concern to society at large. BBC News commented from Dresden, “The people here have been as concerned for their own properties as they are for the future of their historic buildings.” Numerous news reports highlighted the significant losses to the Czech and German economies from the closure of cultural sites and cancellation of tourist visits due to the floods.

Dresden, destroyed by Allied bombing in 1945, came under siege once again in August 2002 when floodwaters swelled the Elbe to five times its normal flow, poured into the city, and submerged seven districts. Despite the efforts of thousands of volunteers, army personnel, and relief workers to sandbag the river, flood waters advanced through the old town and other parts of the city. The city’s Royal Palace was hit by floodwater. Many of the city’s historic squares were under water. In one of the swiftest salvage operations ever mounted to save priceless works of art, museum staff, government officials, firemen, policemen, and volunteers moved about 20,000 works of art from Dresden’s galleries and museums to upper galleries and buildings hoped to be flood-proof. One of the most spectacular rescue efforts occurred the night of August 13, when more than 4,000 paintings from the Old Master’s gallery at the baroque Zwinger Palace were shifted in just seven hours. One of the rescue efforts involved attaching over-sized paintings to the ceiling with ropes.

It will take months, if not years, to repair the damage. The workshops and tools that would normally be used to restore Dresden’s art treasures were swept away by the floods. The greatest risk now is for buildings: “Nobody knows what the damage is exactly. It will be months and months to wait and millions and millions to pay.” These are the same historic buildings that were lovingly and faithfully restored after being firebombed during World War II. They have since become major tourist attractions and a source of reborn civic pride for the city.

In Prague, another cultural treasure house, officials at museums, palaces, and archives are coping with the worst flooding of the city since 1890. Some palaces close to the Vltava River were flooded. Storage facilities of the National Museum were heavily affected: books from the National Museum Library were soaked and the lower floors of historic buildings damaged. The architecture archive of the Prague University of Technology was under 10 feet of water, flooding 90 percent of this important archive of Czech architecture. In 1940 the archive had been relocated to the ground floor of this historic building. Thanks to the enormous effort of volunteers, most documents were removed from the building and frozen in order to allow for possible future restoration. An SOS Architecture Archive fund has been launched to restore the drawings and documents.

Less dramatic than the floods of August 2002 but cumulatively as damaging are the annual floods in Venice.
In the 20th century, the relative sea level increased by more than 23 centimeters, and the number of tides over 100 centimeters has surged. In contrast to the decade after 1923, when there were just 7 tides over 100 centimeters, in the decade after 1990, 114 floods measured over 100 centimeters, and in 2000 there were 19. Recent archaeological studies have shown that the city is sinking much faster than previously thought. Using new carbon dating techniques, a team of archaeologists calculated the rate of relative sea-level rise over 1600 years. They found layer upon layer of pavements and foundations laid over the centuries in a constant effort to keep the city above water. Such additional infrastructure increases costs to the city and property owners.

Much of Venice, especially St. Mark’s Square, has a severe dampness problem. This main square lies lower than other parts of the city and begins to flood when the tide is higher than 70 centimeters. Green algae grows on the porous brick and stone work of the palaces along the Grand Canal, causing further damage. After 50 years of neglect and indecision, Italian authorities have finally begun dredging canals, raising city pavements, and repairing damaged sea walls. The cost is estimated at more than $40 million per year, however. The deeper and more frequent the annual floods become, the fiercer the debate grows about how to stop them. Meanwhile, tour operators study the tides, as do shopkeepers and residents to calculate the opportunity and physical costs of flooding.

**Urban Heritage at Risk**

These recent examples present a vivid picture of what is at stake when natural disasters strike urban areas with significant cultural sites. They also highlight several key points:

- Do not underestimate the vulnerability of cultural heritage to natural disasters. Recent experience in central Europe starkly shows that environmental degradation, the inability to manage fluctuations in the volume of rivers, and other weather-related natural disasters are on the increase in many parts of the world and can destroy precious heritage sites.
- Ensure that individual site management plans are adequate for disaster scenarios by establishing priorities, improving the security of collections and buildings, and training staff. Although many cultural institutions in industrialized countries have their own emergency plans, they are often based on the case of fire, not floods or other types of disasters. All emergency plans need to be revised to address a range of disasters.
- Coordinate crisis management at both the institutional and urban/regional level. Experience indicates that institutional coordination has worked quite well, for example at national museums, but regional coordination within urban and other geographic areas has been less successful (as demonstrated by recent events in Prague).
- Inform the public about the risks to cultural heritage and the need for investment in protecting heritage from natural disasters. This will create an active constituency to support preventive measures. As was evident in central Europe, the public at large, through their work as emergency volunteers, was responsible for helping to save many treasures.

The subject of urban cultural heritage is important for several reasons. First, the severity and frequency of natural disasters is arguably on the increase. Whether weather-related disasters or geophysical processes, there are enormous costs associated with inadequate preparedness and post-disaster reconstruction. Recent episodes of extreme weather include the high winds that toppled trees in Versailles and the historic gardens of Paris, and the severe winter storms in 1999 that damaged buildings in Europe. Earthquakes regularly shatter urban areas of Iran and India, destroying temples, housing, and other elements of the historic environment.

Second, cultural heritage tends to be concentrated in urban areas where intense trading and business activities spawned displays of religious, civic, and private creativity and wealth. A vast majority of such cities are located in coastal areas or along rivers and are therefore vulnerable to flooding and landslides. A tally of the World Heritage list shows that, of the cities listed, most are situated in coastal or riverine areas. There are also cities in mountainous areas, such as Cuzco or Katmandu, that are in seismically active zones.

Third, both capital and secondary cities are at risk. Capital cities such as Prague and Dresden are often the focus of attention in times of disaster, and may be better
able to respond to emergencies. Provision of disaster information, organization of emergency services, and access to funds for reconstruction tend to be better in such cities. In smaller towns such as Cesky Krumlov, where half of the buildings in the town’s historic center were flooded in the August 2002 floods, the physical and economic consequences can be equally profound or even greater, though resources for reconstruction are often fewer.

But even in capital cities, current procedures for protecting cultural heritage have been shown to be inadequate. A cultural heritage expert from the Czech Republic filed this report:

We were not prepared sufficiently. Most of the state museums, galleries and castles opened to the public had evacuation plans for the case of fire… In most cases a detailed program for the evacuation of the collections was prepared (the priority, the succession of individual items).… Nevertheless nobody was prepared for a flood of such immense scale. What failed completely and tragically was the forecast and quick information on the real extent of the danger (personal e-mail communication, October 2, 2002, from Jana Polakova, ICOMOS Czech Republic, to June Taboroff).

With few exceptions, authorities responsible for safeguarding cultural heritage, most often governmental bodies but also private museums and cultural institutions, have yet to be sufficiently prepared to respond to natural disasters.

**Perceptions of Risk**

Natural disasters, such as flooding and hurricanes, are recurrent rather than single events. Nevertheless, perceptions of risk to cultural heritage are highly variable and provide a good indicator of readiness to tackle disaster prevention and mitigation. The following international sample of current work on risk and vulnerability gives an overview of thinking about heritage.

**The View from Southern Africa**

Contributors to the 2001 World Bank-sponsored consultative workshop on culture in Africa, held in Kimberley, South Africa, were asked to comment on risks to heritage. Representatives of 10 countries prepared national profiles and drew up preliminary lists of heritage at risk. Only in the case of South Africa was the issue of risk preparedness mentioned. “Disaster management plans for cultural property in case of fire, floods and even the occasional earthquake, etc. are imperative.” Natural disasters were cited in two reports. The Ghana report mentioned sea-level change in coastal areas as the cause of heritage loss. One example cited was encroachment of the sea at Katar in the Volta region, where Fort Peasantine has fallen victim to the waves. The Mali report cited drought and the southern spread of the Saharan region as risk factors for built heritage, as they provoke population flight and the abandonment of buildings. For Nigeria, Cameroon, Kenya, Zambia, Zimbabwe, Uganda, and Botswana, risks that were identified were attributable to human causes: environmental degradation (usually unspecified); uncontrolled development; and lack of awareness. Thus, for the majority of countries in southern and eastern Africa represented at the workshop, averting the risks of natural disasters was overlooked in a discussion of heritage at risk, despite the fact that these countries are prone to severe natural events.

**Europe and the G8**

In western and central Europe, the United Kingdom, North America, and Japan, disaster-prevention measures and plans are a relatively high priority for institutions charged with safeguarding cultural heritage. The rapid rescue of thousands of works of art by heritage and civil protection workers, assisted by large numbers of volunteers in Dresden, Prague, and elsewhere in Germany, the Czech Republic, and other affected Central European countries is an inspiring demonstration of disaster coordination. In California after the earthquake of 1989, many museums and libraries were closed and rebuilt to conform to earthquake safety standards or torn down and replaced with earthquake-resistant buildings. In the United States, institutions typically have individual emergency plans that are coordinated at a city- or state-wide level. In the United Kingdom, English Heritage has the remit to advise the public on ways to conserve and protect the historic built environment. It has produced, among other things, guidance on disaster preparedness and...
first aid measures to be taken in the aftermath of floods. The organization can also deliver assistance through its regional offices and London headquarters.

**Mediterranean Archaeological Sites**

A recent effort to address risk assessment for archaeological sites in the Mediterranean, financed by the European Commission’s Euromed Heritage I Programme, examined natural and human risk factors (EUROMED 2002). Natural factors included were earthquakes, volcanism, hydro-geological phenomena, coastal erosion, change in seacoasts, water erosion, climatic factors, and biological factors. For the nine sites examined, of which five were in urban areas, the natural risk factors of significant importance were identified as hydro-geological (Tharros, Italy; Lixus, Morocco; Jericho, West Bank); seismic (Jericho, West Bank); climatic (Tharros, Italy; Lixus, Morocco); and volcanic (Pompeii, Italy). The report was concerned with probability of risk, and gave only minimal attention to preparedness and mitigation, except in general terms such as the need for physical strengthening measures for standing structures and the need for orchestration of effort with government authorities. For these sites, representative of the archaeological richness of the Mediterranean, little in the way of protection measures for natural disasters is being put in place. As a result, they remain highly vulnerable.

**The International Council on Monuments and Sites Review of Risk**

The ICOMOS Heritage at Risk 2001–2002 report provides a view of the opinions of heritage professionals. It is based on 75 reports received from ICOMOS members, national committees, international scientific committees, and affiliated groups. The 2001 report elaborates categories of sites that are most threatened: rural and vernacular architecture; 20th century heritage sites; industrial heritage; religious heritage; archaeological sites; and cultural landscapes and gardens. Attention is concentrated on human risks, namely, new construction, change of ownership, and lack of maintenance. There is only occasional mention of natural disasters, however, one example being Turkey’s report on natural threats, and there is little attention paid to risk preparedness. The authors remark,

> Natural disasters are affecting the heritage in different ways. The flooding of Antakya, ancient Antioch, caused serious damage to the service facilities of the historic town. In 2001 there were several earthquakes in Turkey…. The damage inflicted on monuments and urban areas by the earthquakes of 1999 in Izmit and Duzce continue; some of the damaged buildings have not received any care for 2 years …. Unfortunately some monuments are being repaired without expert advice…. (ICOMOS 2002).

**ICOMOS Report on Risk-Preparedness for Cultural Heritage**

At the behest of UNESCO, ICOMOS prepared a report in 1997 to assess the degree of protection to which cultural heritage is integrated into disaster management (“Risk-Preparedness for Cultural Heritage,” ICOMOS 1997). Based on responses from 14 countries, the majority being industrialized countries with the exception of Jordan, Pakistan, Zambia, and South Africa, certain patterns were detected:

- Disaster management agencies do not generally distinguish cultural heritage from property.
- Disaster management for cultural heritage is handled differently in each country. In some cases the Ministry of Culture or its equivalent works closely with law enforcement or civil defense agencies. In countries such as New Zealand, each government institution is required to establish disaster management procedures and care for cultural heritage. In Sweden, the state administration is responsible for cultural heritage at the regional level; the disaster management agencies responsible for cultural heritage list cultural heritage to be protected under the Hague Convention.
- Interest by the disaster management community in integrating cultural heritage concerns into its activities varies. Some countries display high concern for the protection of cultural heritage in case of emergencies: Sweden has done so since the 1960s. Other countries may have general interest, but little in terms of follow-up procedures.
- Opportunities for improving protection include new legislation, coordination, and cooperation among...
agencies, and the creation of one national body to monitor emergencies.
• Obstacles that were cited include incomplete legal frameworks; lack of equipment; lack of trained staff; and fragmented responsibilities.
• There are few fora where disaster management and cultural heritage professionals collaborate.
• Guidelines and methodologies for protecting heritage to improve risk preparedness are not generally available. In Belgium a special methodology was developed for archives.
• The type of disaster determines which professionals carry out emergency response plans. This is at the discretion of the Ministry of Interior or agency charged with disaster response, advised by heritage professionals. In Sweden, the Swedish Agency for Civil Emergency Planning is the focal point for discussions among armed forces, planners, heritage specialists, and other concerned groups.
• There are few evaluations of emergency response for cultural heritage.
  The low response rate to the questionnaire (7 percent) suggests that many countries are not yet convinced that disaster preparedness is a priority. Although cultural institutions often have emergency response plans—usually for fire—few countries have developed comprehensive disaster management plans, institutional structures, and guidelines.
  This evidence from the field of cultural heritage shows that developing countries are even less ready to deal with natural disasters than wealthier countries. The Operations Evaluation Department of the World Bank said in a 1998 evaluation of disaster assistance:

> When the devastation caused by storms or other natural disasters in industrial and developing countries is compared, the injury and death rates can be up to 100 times higher in the poorer developing countries. Lack of mitigation is itself an indicator of underdevelopment, one that the Bank can help overcome (World Bank 1998).  

### Behavior of Denial

In many countries, behavior with respect to cultural heritage is not unlike that of property owners in the United Kingdom. In a 2002 survey conducted by the U.K. Environment Agency, many of those most at risk still deny that they could be flood victims, despite disturbing images of recent floods. In the autumn of 2000, 10,000 properties were flooded in storms, although flood defenses are believed to have protected 280,000 properties. The survey reports that, while 95 percent of people in an area at risk agreed that flooding was a serious issue, fewer than half accepted that it related to them. Only one person in 20 had taken any action to prepare for floods. A possible explanation for this behavior is that potential flood victims are reluctant to protect themselves against flood damage for fear it could reduce the value of their property.

Certainly there are exceptions of disaster planning in the field of heritage protection, but many governments and institutions begin to put in place preparedness measures only after being hit by a disaster. Otherwise, the possibility of a disaster striking is considered a remote phenomenon.

### After the Deluge?

When disaster strikes cultural heritage, there are special measures to take for historic buildings and sites. These measures are extremely important because they can reduce further damage. The general rule is that “remedial” work can be more damaging than the original disaster. While each type of disaster results in specific types of damage, there are certain principles that guide conservation interventions. They concern recording, analysis of damage, and impacts on living heritage.

A key preventive factor is to record incidents. Various cultural heritage authorities have their own forms. For example, with flood damage it is essential not to dry out old buildings too quickly with the application of heat. Timber paneling, boarded floors, and doors may warp and twist; salts will burst out of old stone, and plasterwork and painted surfaces will peel and flake. The best general advice is to dry the building slowly through ventilation and with the aid of dehumidifiers. This can take several months but it is better than destroying original historic fabric that may be even more expensive to replicate. Photographic recording and removal of important timber elements to a cold store for freeze drying is recommended for very important building elements.
In the case of earthquakes and other severe physical damage, documentation followed by analysis of building structure and engineering is necessary before solutions are proposed. The introduction of steel frames into masonry construction can cause additional and sometimes fatal damage. A case in point is the Feyzullah Efendi Madrasa in Istanbul, dating from the 18th century, which was inappropriately repaired after the 1999 earthquake.

It is also important to highlight the human consequences of disasters for both physical and nonmaterial culture. The living heritage of urban centers can be severely harmed by disasters, as they interrupt or erase traditional customs, such as festivals, markets, craft production, etc. The ICOMOS Heritage at Risk report (2002) remarked,

But the effects on heritage places, monuments and sites of the loss and on indigenous language and the traditional values, skills and knowledge that language embodies are more difficult to assess. The loss of understanding of the spiritual, intangible and cultural values of places is as difficult to document as it is irreplaceable.

Recent Activities

At the international level, there have been recent initiatives motivated by the need to address disaster prevention. They are aimed at informing and motivating national governments and heritage institutions that are the guardians of heritage. Of particular interest are the following reports, meetings, training sessions, and activities sponsored by international agencies, professional organizations, and training centers:

- ICOMOS Heritage at Risk annual reports. These reports include individual commentaries by 75 national committees. They are an important effort to assemble information and examine trends. ICOMOS also set up an International Committee on Risk Preparedness to develop professional guidance on risk management as an integral part of conservation practice.

- The International Committee of the Blue Shield (ICBS). Created in 1996 by the four nongovernmental organizations that represent professionals in the fields of archives, libraries, monuments and sites, and museums, the ICBS works to protect cultural heritage threatened by natural disasters and war. Though the ICBS has asked that national committees be formed, this initiative cannot go far beyond good intentions, since its lack of funding relegates it to a clearing house and forwarder of information.

- UNESCO has sponsored several meetings on the subject of disasters. Most recently, it convened the Conference on World Heritage Mountain Cities and Natural Hazards from September 25–27, 2002. UNESCO is discussing convening a roundtable on risk preparedness in 2003.

- The International Center for the Study of the Preservation and Conservation of Monuments (ICCROM) has supported several training courses on risk preparedness. Among these was a course in Central America after Hurricane Mitch.

- The World Bank has directly financed several projects with components targeting disaster preparedness and reconstruction. These include the China Yunnan Earthquake Reconstruction Project and the Honduras ProFuturo project, both of which intervened in historic urban areas. Under the Yunnan project, improved seismic resistance was incorporated into historic buildings in Lijiang, a World Heritage city. Despite the individual merits of these activities, however, many sites remain unprotected and systems are not yet in place to effectively reduce risk to heritage from natural disasters.

Trends in Natural Disaster Preparedness

As the number of devastating weather-related and geophysical disasters and processes increases—flooding in the United Kingdom, earthquakes in Turkey—the toll of urban heritage lost and damaged rises. Integrating cultural heritage concerns into national preparedness planning is the exception rather than the rule, especially in developing countries.

An example of good practice is the Swiss Federal Office for Civil Protection, which includes a heritage section. The Swiss Federal Office has been entrusted with two priority missions: providing aid in the event of disaster and other emergencies; and protecting the public in the event of armed conflict. Civil protection also protects cultural heritage and participates in a regional context and in cooperation with organizations specialized in disaster...
rescue and relief and transfrontier rescue operations. The Swiss Committee for the Protection of Cultural Property serves as an advisory body to the Confederation, to the Federal Department of Defense, Civil Protection and Sports, and to the Federal Office for Civil Protection. The committee has a maximum membership of 25 individuals, all with an interest in the protection of cultural property. In Switzerland implementation is the responsibility of the cantons in cases where responsibility does not lie directly with the confederation. They are expected to contribute financially to the protection of cultural property and take the following measures:

- Create the necessary legislative framework at the cantonal level
- Designate an office responsible for the protection of cultural property
- Draw up an inventory of cultural property
- Create documentation to safeguard cultural property
- Determine the form of organization required at the local level
- Train the staff responsible for the protection of cultural property.

The requirement of the Swiss authorities for localities to make financial contributions to heritage protection is especially forward looking. Sweden and the United Kingdom are other countries where advances have been made in planning for prevention.

Public commitment to protecting heritage during disasters is increasing in some parts of the world. In central Europe heritage professionals, bolstered by emergency services and the public at large, helped save important treasures. In the United States a major tourism magazine, Travel and Leisure, has initiated a new feature page on heritage at risk after the recent floods.

**Improving Prevention through Policies and Planning**

In an earlier paper, “Cultural Heritage and Natural Disasters: Incentives for Mitigation” (in Kreimer and Arnold 2000), I discussed measures and incentives that could be adopted to better protect heritage. It is worthwhile to re-examine and update these measures and incentives. Key strategic elements that are suggested by current experience are:

- Update and review inventories of historic places, paying particular attention to condition and change in vulnerability due to sea level rise, etc. Knowing the extent, location, and condition of heritage is the first step in its protection.
- Put in place risk-minimization procedures such as moving archives and collections from the basements of buildings in flood-prone areas, upgrading museum storage and display cases to meet seismic standards, and other measures to address known risks.
- Enforce building codes, especially in seismically active zones, to reduce the likelihood of collateral damage.
- Ensure that heritage professionals are included in national and local disaster and civil defense committees to ensure they are notified of impending disasters and are able to work in close collaboration with fire and safety authorities.
- When training civil defense and emergency workers, include modules on the special needs of heritage, including aftercare for important heritage objects and sites.
- Evaluate the current experience of disaster response for cultural heritage to draw lessons and avoid ad-hoc decisions.

Today the realization that natural disasters could affect cultural heritage is still not widespread. Governments are slow to mount preventive measures, and urban risk preparedness does not always take heritage needs into account. Many organizations are prepared for little more than fire emergencies. Experience in other areas of risk management suggests that “costs force customers to become aware of risks. They change behavior.” The cost of loss may prove to be a persuasive argument for national policymakers, especially when the cost of one lost masterpiece can climb to millions of dollars. Loss of income from tourism can also be crippling, and the loss of sense of place when historic areas are destroyed is beyond dollar calculation.

**The Way Forward**

Cultural heritage needs to be factored into overall disaster mitigation and management approaches. Cultural heritage professionals should make themselves known to disaster mitigation professionals and disaster mitigation professionals should invite the participation of heritage professionals in designing response systems. Effective preparedness and mitigation strategies will
depend upon government agencies, heritage professionals, and emergency services working together to:

• Ensure that legislation affords heritage the necessary protection in the event of disaster
• Coordinate with disaster relief planners at local and national levels
• Determine the necessary organization for delivery of heritage protection
• Prepare emergency plans at institutional, municipal, regional, and national levels
• Create emergency teams representing a mix of professionals
• Provide documentation and training materials for the protection of cultural heritage
• Design mitigation measures to ensure that heritage is properly conserved.

These are lessons that the World Bank and other international development institutions, bilateral donors, governments, the voluntary and private sector, and the ProVention Consortium can promote in their disaster preparedness and mitigation work. Let us not wait until the next disaster disrupts lives and livelihoods and destroys the cultural heritage of mankind before preparations begin.

Notes
6. For an example, see <http://www.civilprotection.ch/e/kulturgueterschutz/organisation.html>.

Bibliography