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ICOMOS THEMATIC WORKSHOP ON CULTURAL HERITAGE AND CLIMATE CHANGE

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REPORT

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Introduction

Pamela Jerome, Scientific Council (SC) coordinator and moderator of the workshop, introduced the subject, recalling that Global Climate Change (GCC) had been suggested in 2004 as a topic for interdisciplinary research at the International Scientific Committees' retreat in Bergen. This was formalised in Resolution 35 at the 15th General Assembly of ICOMOS in Xi'an, China in October 2005, which expressed the strong concern of ICOMOS with regards to the impact of climate change on tangible and intangible cultural heritage in its full diversity of types, cultural and historical origins, and the intention of ICOMOS to fully cooperate through its National and International Committees (including ICORP) with UNESCO and other relevant organisations to document the impact of climate change on cultural heritage and develop preventive measures. Earlier that year, the World Heritage Committee at its 29th meeting had resolved to form a working group on Global Climate Change. This group held an Expert Meeting in 2006, the results of which are presented in a report[1] available on the UNESCO World Heritage Centre website (http://whc.unesco.org). In 2007, the UNESCO World Heritage Centre published a series of case studies,[2] also available on the UNESCO World Heritage Centre website.

[1] UNESCO World Heritage Centre. World Heritage Report No 22: Climate Change and World Heritage, 2006
[2] UNESCO World Heritage Centre: Case Studies on Climate Change and World Heritage. 2007

At the meeting of the Scientific Council in Edinburgh, Scotland in September 2006, the SC voted to adopt an interdisciplinary research program on the effects of Global Climate Change on cultural heritage. A brief was first debated in a working group, and then circulated in November 2006 to the members of the Scientific Council. Twelve papers were published in *Heritage at Risk* 2006/2007.[3] In 2007, three regional meetings on GCC and one ICORP (International Committee on Risk Preparedness) meeting[4] preceded the scientific symposium, which took place in Pretoria, South Africa in conjunction with the October 2007 Advisory Committee meeting. Breakout sessions during the afternoon explored the question of how GCC affects each International Scientific Committee's (ISC) area of expertise and what adaptation measures should be proposed. The resulting recommendations are contained in a report that is available on the ICOMOS website.[5] Some of the important points are summarised below.

The work done by each International Scientific Committee to identify the impact of Global Climate Change on its area of expertise identified several common issues, including:

- Materials or structures chosen through long experience to endure prevailing environmental conditions were often likely to fail when those conditions changed
- Severe weather and rising sea levels are more likely to cause catastrophic or progressive damage and destruction to cultural heritage
- As losses occur in the physical environment, intangible heritage values associated with the environment will also be lost, and hard choices will need to be made about what to try to preserve and what to let go
- Adapting to Global Climate Change will require firstly improved monitoring so that changes can be identified in time for responses to occur, and secondly improved maintenance to make cultural heritage more resilient to changing environments and disasters

One of the Pretoria symposium presentations described the problem for the York Factory site as "managing static remains in a dynamic landscape". While this describes most conservation work in cultural heritage, whether climate change related or not, the difference is that climate change accelerates and amplifies the dynamics of the landscape. Pamela Jerome's presentation summarised the Pretoria Recommendations including the proposed toolkit for site monitoring.

The need for maintenance

John Hurd from ISCEAH presented an outline for a proposed maintenance manual intended to encourage improved maintenance and other measures to enable cultural heritage items to resist the impacts of Global Climate Change. He proposed that the manual be arranged in a catalogue of types of item within the built and natural environment, and associated schedules of monitoring requirements and maintenance needs for each type.

John Hurd indicated that the background to the manual is the general lack of importance and funding given to maintenance as against conservation. Maintenance is less exciting than conservation but of great importance in giving cultural heritage items the resilience to withstand the impacts of GCC, which include severe weather events of increasing frequency and ferocity. The manual will differ from other maintenance guidelines in dealing specifically with threats arising from GCC.

The templates proposed for the manual (presented for comment) are as follows:

[3] Heritage at Risk. ICOMOS World Report 2006/2007 on Monuments and Sites in Danger. E Reinhold Verlag, 2008
[4] The meeting resulted in ICORP's New Delhi Resolution, 22 May 2007, available on the ICOMOS website
[5] Recommendations from the Scientific Council Symposium: Cultural Heritage and Global Climate Change (GCC), Pretoria, South Africa, 7 October 2007 – Final draft 21 March 2008

General context

	Urban	Semi-Urban	Rural	Isolated
Available drainage systems				
Central rainwater and foul drainage collection, and solid waste collection systems				
Gutters drainpipes, land drainage				
Available service systems (mechanical and electrical)				
Heating and cooling systems, electrical systems, water supply, air conditioning systems, fire fighting systems				
Adjoining structures and buildings				
Terraces and semi-detached housing				

Although the elements are similar for each context, the actual provision for each element will differ (for example, septic tanks in rural areas rather than centralized piped sewage in urban areas).

Types of structures (for example)
- Standing structures with roof
- Use: Residential, public service, monument
- Assemblies: Terraces, attached, semi-detached, symbiotic ensembles
- Troglodytic (in caves)
- Earth-sheltered/subterranean
- Above water (on stilts)
- Temporary structures
- Standing ruins
- Sheltered/partially sheltered ruins
- Ruins in archaeological trenches
- Reburied/backfilled archaeology
- Underwater archaeology (sea temperature rise)

Construction materials (for example)
- Earth
- Wood
- Tile
- Brick
- Stone
- Lime-based materials
- Organics (zero carbon footprint)

Building elements, systems, etc (for example)
- Foundations/footings
- Close wall land drainage
- Outer perimeter drainage
- Plinth
- Earth fast systems
- Roofing
- Flashings/runoffs
- Gutters and drips

- External/internal plaster and paint systems
- Maintenance cycles (may change)
- Fenestration
- Door systems
- Ventilation systems
- Wind loads
- Snow loads
- Desiccation
- Infestations

Documentation

Cliff Ogleby from CIPA (Documentation Committee) outlined the need for reliable documentation as a means of detecting change by comparing the state of objects or sites at different times. The first requirement is an accurate, quantifiable and accessible baseline record against which future records can be measured. Much useful documentation can be achieved with a simple toolbox, in which the most useful tool is likely to be a good digital camera, coupled with the skill and competence of the user. In some cases more advanced methods, such as high-precision surveying or thermal imaging, may be warranted, and expertise is needed to assess when the more advanced toolbox is needed for accurate documentation.

Digital photography

A suitable digital camera for optical recording will have the capability for:

- High resolution images (eg 10 Megapixel)
- Saving images with no compression (or lossless compression)
- Recording the date, time, title and location of the image

It is important to select locations for photography that can be identified, recorded and revisited in future for comparison. Sites can be marked physically or positioned accurately with GPS, depending on scale, which can range from sites in a landscape to mould on a structure. For consistency, images should be taken using a tripod and under similar lighting conditions, preferably even, indirect light (around lunchtime on a cloudy day), or using a flash which gives constant colour. A colour reference card, such as the IFRAO Standard Scale, should be included in the photograph for comparison. Images should be taken perpendicular to planar surfaces, or rectified.

Processing, storage and management

Images must be properly processed and stored. Proprietary file formats should be avoided – high-resolution images should be stored in native format, and working copies made for use. The best file format is probably TIFF. Write-on CDs have a working life of about 30 years, so regular backup copies are required. There are a number of reasonably good free systems available for image management, such as Google Picasa. It is necessary to ensure that the data about the image is attached to the image itself (metadata) by editing the EXIF information for each image. The date and time of the image are often automatically stored, but other information such as title and GPS location can be added. Image services such as Yahoo's Flickr can store images for exchange and access by others. It is important to organise the information so that it can readily be retrieved.

Other elementary documentation techniques include simple surveying, using plumb bobs, carpenters' tapes and builders' levels.

Advanced documentation tools (for example)

- High-precision orthogrammetry
- High-precision surveying
- Satellite imaging
- 3D-laser scanning
- Advanced photogrammetry
- Thermal imaging

Why document?
Monitoring allows intervention before failure. Management systems need to retain records of monitoring together with adequate documentation about those records. Documentation should include information on what the records are, where and when they are made and by whom, and what, if any, restrictions apply to the use of the records.

Risk preparedness
Robyn Riddett from ICORP discussed preparing for disasters arising from Global Climate Change. The first phase of disaster response can cause more unwitting damage to cultural heritage than the disaster itself, as the clean-up process may remove physical evidence and severely limit any ability for reconstruction. However, a tradition of vernacular construction will often enable accurate reconstruction, as well as lead to good maintenance based on knowledge of nature over a long period. Hence the maintenance of traditional skills is part of risk preparedness.

Any disaster relief efforts need to include heritage expertise as well as life-saving action. Training and response techniques can help deal with post-disaster recovery, although if the event is more severe than predicted, even adequate training may not result in an adequate response. It is thus always necessary to have a back-up plan.

A cultural heritage strategy is needed not only for training for natural disaster relief, but also for military training to deal with protection of cultural heritage in armed conflict, in accordance with the Hague Convention.

A number of countries have well-established programs for disaster response that include a cultural heritage component. For example, a museum in the Netherlands has a disaster plan that includes the safe removal of valuable items in the collection, and a training program to rehearse it. In Japan, there is regular training for response to earthquakes. Those who need training most are the people closest to the potential risk.

ICOMOS is a member of the International Committee of the Blue Shield organisation, the heritage equivalent of the Red Cross, which is devoted to risk preparedness and response. It is vital that all parties involved in disaster relief are trained in the requirements and methods of all other parties. Joint training exercises are the best way to develop a coordinated approach.

A good risk preparedness strategy includes documentation of the resource to be protected, for example, a layer on computerised bushfire maps showing heritage items. It also requires:

- Well-developed plans and training
- An integrated approach
- Periodical updating to reflect changed circumstances

Risk management is not only about sudden disasters. Global Climate Change also results in slow but equally damaging change. Abandonment of significant places is one example of a creeping disaster.

ICORP has a work plan to 2011 that is focussed on disaster planning. It will initially be sending questionnaires to other ISCs, and will then prepare a draft disaster-planning manual for dealing with cultural heritage.

Angela Rojas from Cuba illustrated the need for this work in a presentation on the two recent hurricanes that struck Cuba. Two hurricanes hit Cuba in close succession between 30 August and 9 September 2008: Hurricane Gustav (Category 4) and Hurricane Ike (Category 3). The result was that 444,000 homes were damaged and 63,249 homes destroyed, as well as approximately 1,000 tobacco sheds. There was a considerable loss of vernacular heritage. Most of the damage occurred in the Vinales Valley.

In the aftermath of a cyclone, there is a three-stage recovery process:

1. Providing water, food, hygiene, and immediate protection from the elements
2. Providing temporary accommodation (but for how long?)
3. Repairing and rebuilding or restoration of permanent accommodation

Conservation specialists in Cuba responded in a number of ways:

- Preparation of a new inventory
- Design of new interventions to improve safety in the future
- Development of new typologies for buildings that reflect new knowledge about previous mistakes in planning and building

After a disaster, the challenge for conservation practitioners is often how to preserve the spirit of a destroyed place.

Discussion

Neta Cebron Lipovec (Raymond Lemaire Centre, Leuven University) agreed that the objective of documentation was to record a baseline and identify necessary maintenance. They are already developing such a system at the Centre, under the direction of the UNESCO Chair on Preventive Conservation, Maintenance and Monitoring of Monuments and Sites. Their method uses a scoring system to assess vulnerability, which can readily be adapted to risks from Global Climate Change. The centre is holding a Monument Maintenance Fair in November 2008.

John Hurd (ISCEAH) commented that this work needs to be adapted to include risks arising from extreme weather.

Derek Hallam (ICORP) reported on an American initiative from the University of Washington: a web-based climate wizard using Google Earth, which produces rainfall data (not yet wind data) for the past 50 years. The website for the climate wizard is www.climatewizard.org. Once an area has been identified, the wizard produces 100 years of climate change data, plus scenarios for the future using three different models. The climate wizard enables identification of potential future risk – it is due to be released soon at a conference in Vancouver, and will then be available for testing. The important thing about the wizard is that it produces local data, so that the local environment around the site of concern can be predicted. On maintenance manuals, he commented that professionals write manuals, management allocates funding, and trades-people do the work – it is important that all three groups talk to one another.

Marc de Caraffe (CIAV) was of the view that a 'bottom-up' approach to the maintenance manual is needed, with the objective of helping people to help themselves.

John Hurd responded that while this was sound in principle, it was also true that people without knowledge or expertise may keep making the same mistakes; the manuals need to help them make things better. For example, after the Sechuan earthquake, the army was able to help those affected to avoid errors in rebuilding. After a disaster, it is also important to reinforce or, if necessary, reinvent the social structure, which can be done through co-operative rebuilding.

Axel Mykleby (CIAV) commented that ICOMOS needs to distribute its products more widely, through the internet and cheap print versions. He also agreed with Derek Hallam on the need to target publications to the people who will use them, and mentioned that collaboration of the Blue Shield Committee with the Red Cross, the military and disaster response organisations is already happening in Norway.

Philippe La Hausse de Lalouviere (ICOFORT) commented that there are opportunities that arise from climate change as well as threats. The opportunities include the need to collaborate with people from other disciplines such as IUCN, or the possibility of acquiring new knowledge through rescue archaeology.

Pamela Jerome (ISCEAH, ISC 20C) recalled that the recommendations from the Pretoria symposium document included measuring climate and other physical data (not just recording appearance through photographs). National Committees will be asked to propose sites for monitoring and adaptation.

Sue McIntyre-Tamwoy (Australia ICOMOS) stated that ICOMOS needs to develop a policy document to take advantage of opportunities for obtaining funding for projects related to Global Climate Change. Such projects need to prepare for gradual damage from climate change as well as sudden disasters.

Neta Cebron Lipovec advised that the Raymond Lemaire Centre is documenting current practices and will put the information on its website. Training is very important for people who do maintenance, and it is also important to give the owners copies of the maintenance manuals.

Mario Santena Quintero (CIPA) agreed that it was important to make sure that manuals are cost effective. He added that preventive maintenance needs to happen whether climate change is occurring or not. There are opportunities for ICOMOS to work cooperatively with both institutions and commercial firms.

John Hurd advised that his proposed maintenance manual is intended for dealing with severe weather or other events rather than normal weather; it is to extend existing manuals rather than compete with them. The proposed toolkit for monitoring physical data will help people realise that climate change is occurring. For this to be successful, it will be necessary to collect data from many sites over a wide area, which may require the involvement of volunteer groups such as the boy scouts.

Sue McIntyre-Tamwoy agreed that there was a need to concentrate on the difference between John Hurd's proposed manual and others that already exist. For example, what additional data needs to be collected, and what extra interventions might be needed?

Peter Phillips (ISCARSAH) suggested that in any manual, it is necessary to be careful what interventions are recommended, to avoid certain damage being done unnecessarily in the endeavour to prevent uncertain future damage.

Rand Eppich (CIPA) suggested as an aside that ICOMOS might look to offset the carbon cost of its meetings, for example, by planting trees or contributing to a reputable carbon-trading firm.

Summary

The following common issues from the discussion were identified:

- There is already a considerable amount of work being done to identify appropriate preventive maintenance; some new work may be needed to identify additional measures that improve protection against extreme weather events
- There are also new predictive tools that can identify potential future risk from climate change within a local region
- Maintenance and risk management manuals need to be prepared in consultation with site managers and trades-people, not just professionals, if they are going to be useful
- Monitoring needs to include measurement of physical aspects of both the site and the environment (such as air, soil and wall temperatures and moisture contents), as well as visual recording if it is to be a useful predictive tool
- Response to climate change needs to deal with gradual change as well as catastrophic events

- Training will be an essential part of monitoring, maintenance and disaster response
- ICOMOS needs to develop a sound policy statement and then identify simple and cost-effective ways to implement monitoring and maintenance across a wide range of heritage sites, which may include working with other professional bodies and institutions, obtaining corporate assistance and using trained volunteers
- Additional interventions to improve resistance to climate change need to be carefully considered to ensure that they do not do harm now in the effort to avoid damage later
- Climate change may present opportunities as well as threats, and we need to be prepared to respond to these as well

In closing, **Pamela Jerome** noted that the Scientific Council is planning to continue its work on Global Climate Change, and will hold future workshops on climate change that investigate its social and technological aspects. ISCs will again be asked to work together on these issues and contribute to the workshops. It is envisaged that part of this work would include an ICOMOS maintenance manual for climate change that identifies the monitoring data that need to be recorded and a simple toolkit for doing so, as well as recommendations for adaptations to improve resilience to change.

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Post-Workshop Reflections

Regular maintenance and existing maintenance manuals are well-established concepts that are key to heritage protection and critical components to preparation for changing environmental conditions. However, the SC will concentrate on the need for preparedness for extreme weather events and environmental changes such as desertification, increased moisture regimes, alterations in risks brought about by rising/lowering temperatures, sea levels, or other unusual conditions. Rather than a "maintenance manual for climate change," the SC proposes to focus on dealing with exceptional circumstances beyond ordinary maintenance in order to analyse and define additional action required to mitigate the impact of extreme environmental effects through adaptation and changes in risk preparedness strategies.

The SC intends to expand the participation of ISCs, and in particular to include ICORP and CIPA in research, in order to refine the GCC study to work specifically with heritage managers and maintenance personnel to enhance the ability to adapt, through preparedness, to unusual environmental events that may be attributable to GCC.

The initial output will be to prepare a challenging questionnaire to be circulated amongst National Committees and International Scientific Committees to provide a platform for discussion and planning towards evaluating and gathering data on environmental change, and to recommend responses based on the research and changes that have already occurred on a global level.

Jean-Marc Vallet (CIP) suggests that risk maps should be used as one of the first elements of documentation. (Related to this is Derek Hallam's recommendation to make use of the U.S. Geological Survey Earthquake
Hazards Program (http://earthquake.usgs.gov/eqcentre/eqarchives/) by going to Earthquake Information / World and clicking 'By country and Region'.) A site or monument currently under an efficient conservation policy could be considered in a relative equilibrium state in terms of degradation. This state makes up a predisposition level to the potential increase of its degradation rate under a situation of Global Climate Change. This level could be defined as a combination of intrinsic and extrinsic factors of risks:

- Intrinsic factors are the conservation state, the level of maintenance, the periodicity of restoration acts, the nature of materials and their resistance to alteration.

- Extrinsic factors are given in the map of the local risks (e.g. direct risks like a hurricane as well as indirect risks that result such as flooding, landslides), their frequency, their strength, and also the evaluation of the possibility of not preventing them or only partially.

This would be a basis for the definition of the increasing rate of needs of technical intervention and also a complication rate of this intervention, the level of restoration costs, the classification of urgencies, etc. A practical definition of four to five different levels (a "DCH" scale (scale of Deterioration of Cultural Heritage), like the Richter scale) would be of a great use to professionals who have to deal with the consequences of the events which are linked to Global Climate Change. The manual would also be able to propose an easy-to-use classification of risk for the management of cultural heritage under new environmental conditions, which would be seen as an expectation tool.

A "monitoring and intervention manual" could assist heritage managers by including a "how to" kit. This would indicate what is different about the challenges posed by climate change, and then define what data to collect and how to collect it in order to identify and better understand changes that may be already occurring. It would also propose types of interventions that can be implemented in order to adapt to changes. It would incorporate an inexpensive monitoring toolkit so that site managers could begin immediate data collection without committing major financial resources or hiring specialists.

A larger question is who will be responsible for the collation and evaluation of the monitoring information that emerges from sites around the world. Derek Hallam proposes that ICORP may be ideally suited for doing so, but CIPA is also a possibility. ICORP's proposed website with its relational database and ICORP Reporter Dashboard could be utilized to search the data inputted from various sites using custom forms.

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