

# The impact of global climate change and cultural heritage: grasping the issues and defining the problem.

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## Abstract

Australia along with the rest of the world is experiencing rapid climate change. Increasingly, we are bombarded with images, data statistics and predictions that highlight a changing climate and a changing world. It is becoming difficult for most Australians to picture the physical environment that their children and grandchildren will inherit. Water restrictions in many of the eastern areas have heralded an end to the summer weekend tradition of washing the family car in the driveway while children cool down using the hose for water fights. The face of city suburbs is changing as people re-design their gardens to include more drought tolerant plants. We are warned that even our World Heritage sites now part of the Australian cultural iconography, are under threat with climate change likely to affect both our Great Barrier Reef and reduce the distribution of our Wet Tropical Rainforests. That symbol of sun, surf and the Australian way of life – Bondi Beach (Figure 1), we are told, will in the not too distant future exist only in our memories, although immortalised in paintings, postcards and photos.

Whatever one believes about the causes of the change there is no escaping the evidence that:

Since the middle of the 20th century, average Australian temperatures have risen by about 1°C with an increase in the frequency of heatwaves and a decrease in the numbers of frosts and cold days. Rainfall patterns have also changed – the northwest has seen an increase in rainfall over the last 50 years while much of eastern Australia and the far southwest have experienced a decline (<http://www.bom.gov.au/climate/change/>).

Australia has one of the most variable rainfall climates in the world. The Bureau of Meteorology tells us that 'Over the long term we have about three good years and three bad years out of ten'. Given the diversity of our climate and the changes we have been experiencing one would think that climate change and its impacts on heritage places would be at the forefront of current debates amongst academics, regulators and practitioners concerned with cultural heritage related disciplines. However, surprisingly little debate or research has occurred to date. This volume then is a timely reminder that global climate change is likely to be one of the major contributors to cultural heritage loss over the next few decades both through direct impacts such as rising sea levels and the erosion of coastal sites and through secondary impacts as a result of changing tourism patterns and government settlement policies.

## Introduction

The papers in this volume were delivered in either the symposium or the Public Forum on Climate Change and Cultural Heritage held in conjunction with the 2007 Australia

ICOMOS conference in Cairns in partnership with James Cook University. Australia ICOMOS has been concerned about the issue of climate change and its potential impact on cultural heritage for some time and has urged the government to engage with the issue whenever opportunities have arisen. For example, Australia ICOMOS produced a submission to a Commonwealth parliamentary standing committee in relation to the development of a Sustainability Charter for Australia and our President Peter Phillips participated in a subsequent committee workshop on this matter in 2006. Individual members (e.g Pearson & Williams 1996; Rowland 1992, 1996, 1999) have repeatedly raised the issue of the likely impact on Australia's cultural heritage sites, particularly our World Heritage Sites via conference papers in national and international forums. However, despite these attempts little concerted attention has been focused by any of the levels of government in Australia on this issue. Partly for this reason Australia ICOMOS has decided to elevate and foster discussion about climate change and heritage impacts within Australia. This is being achieved through:

- Hosting the national symposium and a Public Forum on Heritage and Climate Change in Cairns in July 2007;
- Preparation of a submission in 2007 to the Commonwealth Government calling for an explicit allocation in the federal budget as a component of a Cultural Heritage Fund to address this issue;
- Devoting this issue of our journal *Historic Environment* to the subject;
- Surveying heritage practitioners, research institutions, government agencies and others to identify research, assessment or investigation projects that are either underway or recently completed, relevant to cultural heritage and climate change;
- Adopting a strong advocacy role on this issue within our country and the region.



**Figure 1:** Bondi Beach, Sydney Australia symbolic of Australia's beach culture. Photo: Enoch Lau November 2004 available through GNU Free Documentation license.

## The symposium and public forum on climate change and cultural heritage

The Australia ICOMOS annual conference held in 2007, in partnership with James Cook University, *eXtreme heritage: managing heritage in the face of climatic extremes, natural disasters and military conflicts in tropical, desert, polar and off-world landscapes*, provided the ideal opportunity to further the discussion on climate change and cultural heritage. The conference and the symposium were sponsored by a range of Australian government and private sponsors including both state and federal government agencies. These were the Department of Environment and Water Resources (now Department of Environment, Water, Heritage and the Arts), The Queensland Environmental Protection Agency (including the Queensland Heritage Council), the Queensland Department of Natural Resources and Water, The Australian Research Council Centre of Excellence for Coral Reef Studies, the Wet Tropics Management Authority, Godden Mackay Logan Heritage Consultants and Rio Tinto Aluminium Weipa.

### The Symposium

The purpose of the symposium was to engage with heritage practitioners, researchers and relevant specialists in discussing the potential impacts and work towards an understanding of both these and the likely strategies for further action to address them. Attendance was not limited to ICOMOS members and the ratio of members to non members attending was around 50% indicating that interest in this issue is not limited to ICOMOS members.

The day long event consisted of discussions structured around several presentations. The discussion proved to be as important as the presentations drawing on a broad range of expertise to address the issues. The morning was spent considering the heritage risks and likely impacts of climate change whether gradual or due to extreme climatic events. What might we lose as climate change occurs? What are we doing to identify the potential losses and issues? What will be the impacts on natural/intangible and physical heritage values? (see for example papers in this volume by Pearson and Rowland).

The discussion then moved on to issues around human receptiveness and responses to climate change and how these currently helped or compounded the potential impacts. We also looked at related policy and governance issues (see for example Christoff this volume). Finally, we turned our attention to look at what research is currently underway with several case study presentations (see for example Foale; Henry & Jeffery this volume). Discussion centred on identifying some of the priority areas for immediate and future investigations required in Australia (and its region) to prepare for and respond to climate change. John Hurd presented on the role of ICOMOS International Scientific Committees. His paper this volume however focuses not on ICOMOS but rather draws together the threads of the days discussion in addition to the major points of his presentation in the public forum including the key message that it is through 'maintenance that we can best enhance the resilience of our cultural heritage places.

Strategies for increasing the dialogue between heritage professionals, government agencies and academic researchers were discussed with a view to injecting momentum into research on this issue in order to build resilience through knowledge, and an ability to anticipate and respond to heritage issues as they emerge.

### The Public Forum

The public forum was designed as an opportunity to engage the general public on this issue and raise awareness of the need for action. The *Public Forum on Climate Change and Cultural Heritage* was promoted locally via radio stations and through invitations to selected community groups.

The public forum was hosted by Australia ICOMOS and James Cook University and was sponsored by the Queensland Department of Natural Resources and Water. The Department had recently taken on new responsibilities in relation to Climate Change and is also the agency responsible for the management of Indigenous heritage in Queensland. The Forum was opened by the Minister for Natural Resources and Water, the Honourable Craig Wallace. National ABC radio personality, Michelle Rayner, was the Master of Ceremonies for the event.

At this forum delegates and the public engaged in one of the most important discussions facing the future of heritage conservation this millennium. Brief presentations on issues relating to heritage and climate change by a series of specialists included:

- John Hurd – *The Walls Come Tumbling Down: Changing rainfall patterns in Himalayan deserts.*
- Professor Malcolm McCulloch – *Coral Reefs: Will they survive rapid environmental climate change?*
- Dr Michael Pearson – *Climate Change and its impact on Australia's cultural heritage.*
- Mr Andrew Skeat – *Managing the Great Barrier Reef: The climate challenge.*

Unfortunately, for all of those present, Dr Rasool Vatandoust who was scheduled to present *The ancient city of Bam, Iran, before and after the Earthquake of December 2003*, was unable to attend due delays in processing his visa.

About 220 people attended the event which was held in the evening within the tropical rainforest gardens of the Tanks Art Centre in Cairns. The event received local radio, press and television coverage and it was clear from the media response that the public is interested to hear more on this subject.

### The Extreme Heritage Conference

While a range of other significant themes shaped the ensuing conference the discussions from the symposium and public forum continued as a thread and were picked up again in the plenary discussion at conference close. The delegates at the conference determined that momentum should be maintained on this issue and passed the following motion:

The Australia ICOMOS Conference on *eXtreme heritage: managing heritage in the face of climatic extremes, natural disasters and military conflicts in tropical, desert, polar and off-world landscapes* in Cairns, 19-21 July 2007, notes with concern the risks to cultural heritage posed by climate change. We ask Australia ICOMOS to recognise:

- the impacts of global climate change on cultural heritage and the potential for mitigation and adaptation strategies to alleviate detrimental impacts on cultural heritage
- that maintenance has a critical role in building a resilience in cultural heritage against the impacts of such change

We urge Australia ICOMOS to encourage action to:

- identify the cultural heritage places and landscapes at greatest risk

- monitor and collect data about changes to cultural heritage places and landscapes due to climate change and associated effects
- establish standards of conservation planning and practice in the face of climate change
- improve risk preparedness and disaster planning, including through the continued work of Australia National Committee for the Blue Shield
- underscore the indivisible relationships between tangible and intangible cultural heritage and between communities and their heritage places in planning processes
- engage communities in these processes to be prepared and able to respond to the impacts of climate change on our cultural heritage.

These events set the basis for future work by Australia ICOMOS on heritage and climate change. There is no doubt that the task is a huge one. During the preparation for the events it became increasingly clear that very little work had been done by academics, practitioners and governments on climate change and heritage in Australia. While many people were interested in it few had actually engaged with the topic in any detailed way. However, interest in the topic, is clearly widespread as the President of Australia ICOMOS and other key speakers were interviewed by radio stations in Australia and New Zealand following the conference. It is hoped that future proposals for research and applied projects will find support within agencies and amongst funding bodies.

## **Publications and research: generating and disseminating information**

Selected papers from the forum and symposium presented here in this volume of *Historic Environment* will it is hoped, stimulate academic interest in the topic. A further multi-authored paper is in preparation for publication in a scientific journal.

In this volume a range of issues related to climate change and heritage are covered. This is by no means an exhaustive overview of either the complexity or the geographic coverage of the issues but it does provide an insight into the enormity of the task ahead for researchers, heritage managers and policy makers if we are to face the challenge that global climate change poses for our cultural heritage.

'Waterworld: the heritage dimensions of Climate Change in the Pacific' by Rosita Henry and William Jeffery explores the notion that the heritage of climate change is a heritage of loss. They consider the case study of small island states in Micronesia which are already experiencing climate change impacts and facing imminent loss of land, livelihood and cultural landscapes. Their paper calls for an expansion of the focus of climate change research from its almost exclusive consideration of socio-economic impacts to include research that embraces ethnographic studies at local and regional levels. Using the example of Chuuk, they illustrate how such vulnerable communities are already engaging with the discourse of Global Warming and point out that despite the inarguable negative impacts of 'loss' that it is also a productive notion, creative of heritage values.

Peter Christoff's paper, 'Places worth keeping' also points to the likelihood of 'loss' and the harsh reality that climate change may in extreme cases lead to choices between survival and, as he puts it 'the grand artefacts of civilization'. He poses the

question (which remains unanswered): 'If circumstances overwhelm us what will we define as most worth saving?' Christoff examines issues of governance which complicate the challenges that climate change poses for heritage. He points to the need for urgent and sustained public debate about heritage values under threat from climate change impacts, emphasising that current patterns of behaviour, sites, structures and artefacts which comprise the fabric of everyday life may well become 'lost' heritage.

Mike Rowland in 'Saving the past from the future' provides an overview of the struggle to get a consideration cultural heritage onto the climate change agenda. The lack of progress and the inertia of government agencies and surprisingly, the heritage profession itself, are discussed. In the case of the latter this is set within the context of archaeological evidence of the impact of humans on the environment throughout the long period of their existence. Rowland advocates that cultural heritage managers and archaeologists adopt an approach that balances the likelihood of what one might call 'natural' long and short term environmental changes with the consideration of potential human induced changes. His case study from the Keppel Islands off the East coast of Australia demonstrates that not all changes are human induced and yet such changes can also have serious effects on the survival and integrity of archaeological sites. He presents a convincing case for more long term research to understand and monitor such changes and advocates the use of geo-indicators in this process.

In his paper 'Conserving Melanesia's Coral Reef Heritage in the face of Climate Change', Simon Foale continues the focus on island and coastal communities. He emphasizes the value of the currently healthy coral reefs of the region to local communities who rely heavily on subsistence fisheries. He points out while there are some escalating pressures; the generally good health of the reef is probably largely predicated on relatively low human population densities in the region. He flags the need for culturally and ecologically appropriate action however; to meet the challenges presented by an inevitable increase in population, increasing subsistence and artisanal fishing within a context of increasingly frequent climate change incidents such as coral bleaching. For indigenous communities dependent on their environment for subsistence, changes to the natural environment can clearly have disastrous effects on intangible heritage such as community practices and cultural identity and even threaten the long and short term viability of communities.

Michael Pearson steps back from a coastal focus to consider generally the potential impacts of climate change on cultural heritage across Australia in his paper 'Climate Change and its Impacts on Australian Cultural Heritage'. Once again our attention is drawn to the fact that the Australian environment and its inhabitants are no strangers to changing climatic conditions with major environmental consequences. Pearson points out that projected changes to our environment will negatively affect a range of heritage sites throughout all regions not just the coastal areas and that furthermore many of our iconic World Heritage sites will be dramatically impacted. Therefore he calls for detailed regional analysis of projected climate change impacts on Australia's cultural heritage. This is urgently required if we are to respond and implement appropriate mitigation strategies. He outlines some practical steps for heritage agencies and managers to adopt if they are serious about conserving the nation's cultural heritage.

John Hurd continues this practical approach while stepping

back from the Australia – Pacific context and its focus on decreasing rainfall and rising sea levels to illustrate his case with examples from central Asia where increasing frequency of severe rainstorms in desert environments is having disastrous impacts on cultural heritage structures and archaeological sites largely comprised of earthen structures. The risks to structures are physical and largely predictable and he points out that the most cost effective management strategy is as simple as regular maintenance. Extreme climatic events will generally have a more severe impact on places that have become weakened through a lack of maintenance and whose integrity is compromised, than they would on places that are well maintained and physically resilient. Yes, he acknowledges that maintenance is not ‘sexy’ but nevertheless if we want conserve significant cultural heritage places in a context of climate change then the two most important activities are: maintenance and monitoring.

### **Boosting research on this issue.**

Several things need to happen in Australia before serious attention is paid to researching the cultural heritage impacts of climate change and the development of mitigation methods and strategies. Amongst these are:

- Elevation of the issue of climate change in relation to cultural heritage within the National Research Priorities. These priorities are set by the Commonwealth government and have a direct influence on the nature of academic research that is proposed and funded.
- Allocation of a specific budget within state and federal governments to fund high quality projects of specific interest to the government heritage agencies and their responsibilities. To this end Australia ICOMOS presented a submission to the Commonwealth government in 2007 for a funding allocation to ensure that the matter is addressed within the heritage conservation portfolio.
- Establishment of standard monitoring protocols and the collection of data on changing conditions across a range of heritage places.

To date visible, practical government response to climate change (at each level of government) has largely been limited to changing departmental titles to include the words ‘climate change’ or ‘water’, the introduction of water restrictions, the reconsideration of long shelved plans for nuclear power facilities and larger dams, and discussions around limitations to coastal zone planning and development. In fact, it has become clear that government responses to climate change threats may themselves have considerable negative implications for cultural heritage as large water control and storage projects are proposed and discussions are held about the viability of entire communities in regional Australia. Through activities such as the public forum held in Cairns Australia, ICOMOS hopes to stimulate interest in these issues amongst the general public and to encourage them to engage in discussions not only regarding climate change itself but also government **responses** to climate change.

### **Survey of research and investigation underway now or undertaken in the past 5 years in Australia**

Scientists point out quite rightly that the big difference about climate change in the past and our current situation is that we know it is happening and therefore have the ability to adapt and plan our responses to it. However, even setting aside the

climate change skeptics in the community and in governments, the implications for the projected changes in terms of the impact on tangible and intangible heritage values are not understood. A range of studies are required to tease out and identify the likely impacts on cultural heritage before we can even begin to ‘prepare’ or ‘adapt’. In the course of organizing the Symposium it became clear that little strategic research in this area was being undertaken in Australia.

Following the symposium Australia ICOMOS decided to try and get a more detailed view of the nature of research being undertaken which was either directly related to this issue or which could be useful to progressing understanding on this issue. To this end we initiated a survey of research and investigation through a short questionnaire. This document has been circulated to all our members Australia wide; and through other related e-lists to all archaeologists in Australia, heritage professionals in NSW and various academics and private organizations.

It was anticipated that at least some applied research into site ‘sensitivity’ to climate change impacts would have commenced within those agencies with heritage conservation responsibilities. ‘Sensitivity refers to the degree to which an area or activity of interest will be affected, either adversely or beneficially, by a particular change in climate or a climate-related variable’ (Australian Greenhouse Office 2006:57). In this context of course, the ‘area or activity of interest’ could be individual sites or structures or categories of heritage places or site types. It seems however that there continues to be little government investment in this type of strategic research. This raises serious concerns about our nation’s adaptive capacity in relation to the management of heritage in the face of global climate change.

It is heartening to note however several recent projects that may be heralding a change in focus. At least one small focussed project is being undertaken in this area, by undergraduate students at Macquarie University looking at Aboriginal heritage sites along Middle Harbour (Currie et al 2007). On a larger scale some academic research has begun to focus on the potential of archaeological sites to provide predictive insights into future climate change (e.g work by Barham, O’Connor and Fallon in Western Australia) although results have yet to emerge. Generally however, research funding for large scale projects in the area is scarce. The Commonwealth Departments of Climate Change and of Environment, Water, Heritage and the Arts have jointly commissioned a study entitled *The Implications of Climate Change on Australia’s World Heritage Properties: a preliminary assessment* which when completed will provide an important starting point in understanding the likely impacts of climate change and in developing appropriate strategies to enhance the resilience of these places.

Completed questionnaires have begun to trickle in and while there are a few projects of interest in the responses so far, what is most remarkable is the paucity of research and investigation underway and the lack of financial investment in researching this issue. What is also of concern is that Australia ICOMOS members are generally not involved in the limited work that is occurring. If one considers (as we do) that our members are the core of best practice heritage practitioners in the country then it is disturbing that work in this important area is occurring without input from members. This then, highlights an area where we need to invest concerted effort to build links with

researchers and other stakeholders. The results of the survey will be published and brought to the attention of relevant government departments and it will be used to encourage networking amongst researchers and heritage professionals currently working in isolation on this issue.

### **Advocacy within Australia and our region.**

Following on from the Symposium and Public Forum in Cairns our International Vice President Kristal Buckley gave a presentation in Tahiti in August on *Climate Change and Cultural Heritage in the Pacific*. This presentation was also delivered at a meeting of the ICOMOS Scientific Council in Pretoria, South Africa in October 2007, at which venue the author also presented on Climate Change and Cultural Heritage in Australia (McIntyre-Tamwoy 2007).

Australia ICOMOS also held meetings with the relevant Minister and Shadow Minister of both political parties in Australia which raised the need for urgent work on this issue and flowing from that Australia ICOMOS prepared a submission outlining a specific budget proposal for consideration in the pre-election budget discussions.

### **Developing a plan of action**

Elsewhere in this volume Rowland points out that Australian archaeologists, heritage specialists and government agencies have been slow to respond to the threat of climate change and indeed seemingly reluctant to engage with debates around climate change and its implications for cultural heritage. Perhaps this lack of engagement is in part because, like people in the rest of the world, Australians take comfort in the mantras that climate change has always occurred and that in the long-term past the planet has been both warmer and cooler than today. Even taxi drivers can point out that climate fluctuations arise because of changes to the Earth's orbit, to solar radiation, to the positions of continents, and to concentrations of atmospheric greenhouse gases. Perhaps as a nation we are more complacent about climate change because of our variable climate a trait that is celebrated in the formal recognition of some of our World Heritage sites which are significant because they demonstrate climate change in the deep past. Australia is a nation steeped in a long history of interactions between changing climatic conditions and the corresponding adaptations of humans, plants and animals.

In relation to sea level rise there is some degree of complacency as some scientists assure us that the rate is so slow that we will be able to 'adapt'. By adapt of course they mean move inland and change some practices! But how will our cultural heritage 'adapt' and in what way will our cultural practices change? As Henry and Jeffery point out in their paper in this volume the cultural heritage of climate change is a heritage of 'loss' although of course the archaeological record provides evidence that it can also be a heritage of 'adaptation and innovation'.

The relative inaction of heritage regulators, planners and practitioners to take early action is further explained by the lack of scientific consensus on the subject until quite recently. The first half of the 1990's was marked by conflicting reports and complex data generated by a series of natural phenomenon. The extent to which these 'natural' phenomena interacted with each other to produced climatic changes is still debated. For example when Mount Pinatubo, a volcano in the Philippines which had been dormant for 600 years, erupted in 1991, the emissions formed an aerosol of super - cooled droplets of

sulphuric acid in the stratosphere which effectively reflected solar radiation back into space and resulted in a significant cooling of the planet for about three years masking global warming trends in the early 1990's (see Robinson 2002:29-262). Add to this the complex meteorological events associated with the El Nino and even the argument that the El Nino and the Pinatubo eruption may somehow have been related (Robinson 2002:262) and it is perhaps no wonder that the easy option of 'let's wait and see...' seems to have prevailed.

Even those that accepted that climate change was occurring were able to postpone serious consideration of the issue by citing the debate about whether or not that change was natural or the result of anthropogenic actions. The scientific community themselves have been slow to reach consensus on this issue. The Intergovernmental Panel on Climate Change (IPCC) has taken seventeen years to reach the stage where enough information has been gathered to enable it to produce strong consensus statements that human activity has contributed significantly to the global warming trends (see Table 1). Why this debate on drivers of climate change has so effectively quashed a consideration of the implications of climate change for cultural heritage is not immediately clear but is perhaps partly due to a basic premise of cultural heritage management which is an acceptance that cultural heritage evolves through the interaction between people, their communities and their environment and that even cultural heritage 'significance' is not static but changes with the values of people and societies. In other words if change is natural then cultural heritage will adapt along with societies' response to change. This implies the underlying assumption that such change will be gradual and incremental allowing time for societies to adapt and respond to their environment. However, if as is now becoming apparent global climate change is human induced (or at least significantly exacerbated by anthropogenic factors), the issue of an un-natural rapidity of change requires us to think along the lines of salvage, mitigation and investment in cultural heritage conservation.

It is essential that the cultural heritage industry develop a plan of action to address this issue as a matter of urgency. Hurd (see paper this volume) has recounted how extreme climatic events such as heavy rains and flash floods can entirely destroy archaeological heritage sites within a matter of hours; Rowland (this volume) also reports that extreme storm surges and cyclones will have impacts that are difficult to prevent or predict. Even so many other impacts of climate change are more gradual and actions as simple as regular maintenance can build resilience that will help heritage structures withstand changing climatic conditions. There is no doubt that current and future climate change is and will result in the loss of sites. What is most disturbing is that we have done little to determine which sites are at risk, how significant they are and whether or not mitigation works or salvage programs are warranted.

### **Why act?**

The IPCC's Fourth Assessment Report (2007) provides a clear warning that the issue of global climate change and its impacts on our natural and cultural environments will be serious issue for world societies for the rest of this century.

There is *high agreement* and *much evidence* that with current climate change mitigation policies and related sustainable development practices, global GHG [Green house gas] emissions will continue to grow over the next few decades...

YEAR	IPCC REPORT	CONSENSUS
1990	1	<ul style="list-style-type: none"> <li>• There is a natural greenhouse effect which already keeps the Earth warmer than it otherwise would be.</li> <li>• Emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases.</li> <li>• The increase will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface.</li> </ul>
1995	2	<ul style="list-style-type: none"> <li>• The balance of evidence suggests a discernible human influence on global climate</li> <li>• Unambiguous detection of climate-induced changes in most ecological and social systems will prove extremely difficult in the coming decades.</li> <li>• As future climate extends beyond the boundaries of empirical knowledge (i.e., the documented impacts of climate variation in the past), it becomes more likely that actual outcomes will include surprises and unanticipated rapid changes.</li> </ul>
2001	3	<ul style="list-style-type: none"> <li>• The Earth's climate system has demonstrably changed on both global and regional scales since the pre-industrial era, with some of these changes attributable to human activities.</li> <li>• There is now strong evidence that most of the warming observed over the past 50 years is attributable to human activities.</li> </ul>
2007	4	<ul style="list-style-type: none"> <li>• Warming of the climate system is <b>unequivocal</b>, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level</li> <li>• Observational evidence from <b>all</b> continents and <b>most</b> oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases.</li> <li>• Other effects of regional climate changes on natural and human environments are emerging, although many are difficult to discern due to adaptation and non-climatic drivers.</li> <li>• Global GHG emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004. There is <i>very high confidence</i> that the global average net effect of human activities since 1750 has been one of warming.</li> <li>• Anthropogenic warming over the last three decades has <i>likely</i> had a discernible influence at the global scale on observed changes in many physical and biological systems.</li> </ul>

**Table 1:** Findings from the IPCC reports on global climate change illustrate the increasing certainty and consensus amongst the world's scientists that global climate change is occurring, that it is occurring at increased rates due to anthropogenic activities, and that the upper limits of the projected change is not yet ascertainable but likely to exceed current projections.

For the next two decades a warming of about 0.2°C per decade is projected... Even if the concentrations of all GHGs and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected. Afterwards, temperature projections increasingly depend on specific emissions scenarios.

Continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would *very likely* be larger than those observed during the 20th century...

Anthropogenic warming and sea level rise would continue for centuries due to the time scales associated with climate processes and feedbacks, even if GHG concentrations were to be stabilised (IPCC 2007:44-46)

In Australia even under the most modest scenarios if we consider Aboriginal heritage sites alone, we are facing a loss of thousands of Aboriginal heritage sites along our coastline. A small study undertaken by students at Macquarie University highlights the potential for heritage loss. The study sought to model the impacts of one feature of global climate change i.e. rising sea levels on Aboriginal heritage sites along the foreshores of Middle Harbour in the heart of Sydney. The study area was restricted to the Willoughby City Council area. The

researchers found that of the 148 mapped Aboriginal sites in this area, 8% are already inundated wholly or partly during high tides at least twice a day (2007:30). They predict that this will rise to 20% within the next 100 years on the conservative IPCC estimate of a 0.59 m sea level rise and another 18% of the sites will then be within a one metre buffer of the predicted sea level rise and therefore potentially affected by high spring tides and storm surges (2007:31). In other words potentially over a quarter of all sites will be damaged or destroyed by rising sea levels and associated wave wash alone. If one generalizes this result to apply to the remainder of coastal foreshore areas, even allowing for differing terrains then the size of the problem is overwhelming and while this may be one of the reasons why there has been little action on the part of those agencies that are charged with the responsibility to protect Aboriginal sites, it nevertheless borders on cultural negligence.

### **An Australian framework for responding to the issue**

The IPCC tells us that,

Societies across the world have a long record of adapting and reducing their vulnerability to the impacts of weather and climate related events such as floods, droughts and storms. Nevertheless, additional adaptation measures will be required at regional and local levels to reduce the

adverse impacts of projected climate change and variability, regardless of the scale of mitigation undertaken over the next two to three decades. However, adaptation alone is not expected to cope with all the projected effects of climate change, especially not over the long term as most impacts increase in magnitude. (IPCC2007: 56).

Applying this advice to a consideration of tangible cultural heritage the message is clear: we need to take action and even when we do we will still experience negative impacts and loss! Therefore it is important that we take steps to understand how our cultural heritage will be affected, what places are at risk and determine if steps can be taken to mitigate that risk or whether as communities we should be reconciling ourselves to losing particular places.

A number of frameworks already exist that provide guidance on applying the principles of risk assessment and management in decision-making. In Australia, the principal framework is the Australian and New Zealand Standard for Risk Management, AS/NZS 4360:2004 (Australian Standards 2004), which has recently been adapted to provide guidance specific to managing climate risk (Australian Greenhouse Office 2006). The Risk Management Standard divides the process of risk management into five steps:

1. Establish the context
  - identification of the decision making event and the associated challenges,
  - establishment of the approach to risk management that is to be used as well as the information and data requirements (including climate projections);
2. Risk identification
  - identification of the potential climate hazards and downstream consequences of concern to stakeholders;
3. Risk analysis
  - Qualitative or quantitative analysis of the likelihood of different outcomes, including the probability of exceeding stakeholder identified thresholds;
4. Risk evaluation
  - Assessment of whether risks are tolerable,
  - prioritisation of multiple risks (if present), and judgment regarding whether risks require treatment;
5. Risk treatment
  - Selection and implementation of risk management actions (e.g. through methods such as stakeholder forums, multi-criteria analysis, cost-effectiveness).
  - Communication and consultation with stakeholders throughout the entire process.
  - Clarity and transparency surrounding underlying concepts and assumptions is required. All participants need to understand the different ways in which the system is conceptualised and used by various stakeholders.
  - Monitoring and review which ensures that a learning-by-doing ethos is developed and communicated among all parties. Not just a one-off event, but a process that is engaged over time and updated with changing information and stakeholder preferences.

This process needs to be adapted and applied to our cultural heritage places by ALL levels of government with responsibility for cultural heritage as a matter of course. Australia ICOMOS concern is that there is currently little evidence that the government standard procedure is being applied to the issue of climate change threats to cultural heritage by either government or private sector.

## Conclusion

The Australia ICOMOS Public Forum and Symposium on Climate Change and Cultural Heritage provided a useful catalyst for increasing the discussion around this topic both amongst interested cultural heritage specialists and managers and amongst specialists and the public. However it highlighted a disturbing lack of engagement with the issue by all levels of government, academia and practitioners in Australia and overseas.

It is clear to those of us involved in heritage conservation, that climate change will affect the full range of cultural heritage places and values including:

- Individual structures, building, monuments;
- Memorials, places of cultural meaning, names;
- Natural resources of cultural importance;
- Areas, landscapes, ecosystems, groups;
- Archaeological sites, material traces, signs.

However in nearly all cases the extent to which individual places will be affected is not known because little or no work has been done to ascertain this (although we note that the Commonwealth Government has almost completed a report on the potential impacts to Australia's World Heritage sites). Similarly almost no effort has been directed to estimating what proportion of sites will be destroyed or severely affected although useful data on this issue could be economically gained through scenario mapping, for example, mapping coastal Aboriginal sites that will be inundated by predicted sea level rises. The ability to conduct such studies relatively cheaply is demonstrated by the student project cited previously which focussed on Aboriginal sites along the foreshore of Middle Harbour (Currie et al 2007).

Similarly, little consideration has been given to ascertaining how the loss of tangible heritage places, sites and structures will affect communities and the intangible aspects of culture, or on finding locally appropriate response to this potential loss (but see Henry & Jeffery; and Foale this volume).

Climate change policy-making has not yet taken account of heritage and generally cultural heritage agencies and experts are poorly informed about climate change. This despite the fact that climate change is already experienced in many places. It is clear that natural and cultural landscapes are especially at risk, that there will be losses and that these losses will be magnified if appropriate mitigation and strategic projects are not put in places in the immediate future.

Integrated consideration of physical, cultural and social aspects is needed which considers climate change as one of many factors that affect the conservation of cultural heritage. However, the risk of irreversible loss applies to cultural heritage and misplaced complacency about the extent of that risk will maximise the loss. It is possible that as Australian's we have drawn undue comfort from the mantra of 'we have enough time to adapt' combined as this is with a long history of human adaptation to changing environments on our continent.

Australia ICOMOS understands the keys to successful adaptation and cultural heritage conservation to lie in:

- Increasing our knowledge;
- Developing and implementing mitigation and salvage programs;
- Engaging with relevant communities in discussions and programs and working with them to develop shared

understanding of cultural heritage impacts at local and national levels;

- Building resilience;
- Strengthening heritage management capacity;
- Better disaster planning & responses, and
- Advocacy and governance.

Our efforts to date represent the commencement of a long process of employing these tools to achieve positive heritage outcomes in the face of the inevitable impacts of climate change. Our challenge is to maintain this issue at the forefront of heritage regulators and the general public until such time as concerted strategic and applied action is implemented; to generate and support strategic and applied research which addresses climate change issues as they relate to cultural heritage; and to build a consideration of the likely impacts of climate change into routine cultural heritage conservation activities.

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