

## Climate Change, Fire and Cultural Heritage in Australia

Climate change will have, and is already having, a very wide range of impacts on cultural heritage sites around the world, ranging from permafrost melting causing building instability in polar and circumpolar regions, to increased desertification causing burial of sites beneath moving sand in Saharan Africa and other arid regions (see examples in World Heritage Centre 2007). Many regions around the world will experience coastal inundation caused by sea-level rise combined with an increased severity of adverse weather events, and polar regions will see the withdrawal of protective sea-ice, putting at risk cultural heritage places in low-lying cities and rural areas and along undeveloped coastlines.

In Australia there is similarly a range of observed and potential climate change impact. A series of regional models have been developed that allow some degree of refinement in looking at possible impacts across the continent. These draw on and expand the IPCC TAR 2001 reports, and are informed by local data collection and modelling (Intergovernmental Panel on Climate Change 2001; Pittock 2003; Allen Consulting Group 2005; Hennessy, Holper & Pittock 1995.). This modelling suggests the following possible outcomes for Australia, allowing for a range of global emissions scenarios:

- an increase in annual national average temperatures of between 0.4° and 2.0°C by 2030 and of between 1.0° and 6.0°C by 2070 — with significantly larger changes in some regions by each date;
- more heat waves and fewer frosts;
- possibly more frequent El Niño Southern Oscillation (ENSO) events — resulting in a more pronounced cycle of prolonged drought and heavy rains;
- possible reductions in average rainfall and run-off in Southern and much of Eastern Australia with rainfall increases across much of the Tropical North — as much as a further 20 per cent reduction in rainfall in Southwest Australia, and up to a 20 per cent reduction in run-off in the Murray Darling Basin by 2030;
- more severe wind speeds in cyclones, associated with storm surges being progressively amplified by rising sea levels;
- an increase in severe weather events — including storms and high bushfire propensity days; and
- a change in ocean currents, possibly affecting our coastal waters, towards the end of this period.

This paper will concentrate on just one example: the impacts of fire already observed and likely to increase as a result of climate change, in Kosciuszko National Park. Kosciuszko National Park, together with other parks in adjacent states, is a part of the Australian Alps, a mountainous region, low by global standards (Mt Kosciuszko, the highest on mainland Australia, is just 2,229 m), but containing Australia's major examples of alpine environments. The Alps have been used for extensive seasonal grazing and mining prior to their reservation for environmental conservation and recreation, and are the site of Australia's largest hydro-electricity development, the Snowy Mountains Hydro-Electric Scheme. These land uses have left many small huts in the landscape, where people lived for the summer season or shorter periods while working or moving through the mountains. Many of these huts are now used for recreational accommodation by walkers and skiers, and as a group they form a greatly valued part of the cultural heritage of Australia.

In 2003 wildfires (called bush fires in Australia) destroyed 19 out of the 83 surviving huts and hut ruins in the Kosciuszko



Burrungabugge Hut, which was destroyed by the 2003 bush fires and not reconstructed. This hut itself replaced another hut burnt down in 1983.



Franklin Chalet, built in 1938 as an early ski lodge near Canberra, the national capital, and destroyed by the 2003 bush fires. The decision has been made, because of declining snow cover in this area limiting future use of a building this size, and the extent of total reconstruction necessary to recreate a building of this size, not to reconstruct the Chalet, but to preserve elements as a memorial and build a new multi-purpose shelter on an adjacent site.

Geehi Hut, burnt out in the 2003 bush fires and in part restored and in part reconstructed in 2004



National Park (see Kosciusko Huts Association website lists). The 2003 fires were among the most disastrous in Australia's history, being spread over a large area of the southeast of the continent, and impacting on natural bushland, agricultural land and urban areas alike — in Canberra, the nation's capital, some 500 homes were destroyed.

In their 4<sup>th</sup> Assessment Reports, 2007, the Intergovernmental Panel on Climate Change (IPCC) draws attention to the evidence for climate change already taking place. In relation to fire frequency and intensity, it notes the observation of more intensive and longer droughts since the 1970s, with increased drying linked to higher temperatures, decreased precipitation, changed sea-surface temperatures, and wind patterns all being associated with the drying events. The report on the physical science basis for climate change predicts as 'likely' to 'very likely' more warmer and fewer cold days, warmer and more frequent hot days, and an increase in the frequency of warmer spells and heat waves as being 'very likely' to 'likely' (IPCC 2007a: 8, 9). These are the conditions that lead to increased fire danger.

The IPCC working group II (IPCC 2007b: 11) identified that "Production from agriculture and forestry by 2030 is projected to decline over much of southern and eastern Australia, and over parts of eastern New Zealand, due to increased drought and fire." This clearly has implications for the many timber huts and other historic sites located in these forest and agricultural lands as well as in native forests in national parks. The fires that so severely impacted on Kosciusko National Park huts in 2003 (and in 2006 in the neighbouring Alpine National Park, Victoria) are likely to become an increasing occurrence in Australia. The IPCC report indicates that other regions will experience similar increased risk, the frequency of wildfires in Southern Europe, peatland fires in Central and Eastern Europe, and forest fires in North America are all predicted to increase in coming decades.

Several challenges face the managers of cultural heritage sites in the light of global climate change projections such as these. One challenge is to raise awareness that the impacts are not limited to broad-acre forestry, agricultural and reserved conservation lands, but will (and are) impacting on cultural heritage as well. Another challenge is to develop adaptation responses that will reduce or remove the threats posed by climate change to cultural heritage places. A range of adaptive responses could be envisaged. A precursor to developing and implementing adaptive responses might be to carry out a systematic recording and assessment of the range of cultural places in localities or environments projected as being particularly at risk. This would have a two-fold outcome — it would help identify the elements or attributes of places and classes of places that might be threatened by particular climate change outcomes (eg likely to be impacted by wind, heavy rain, soil cracking, sea or flood inundation, changed soil chemistry/salt incursion, soil erosion, changing land use etc), and allow targeted adaptive responses to be designed: and it would also properly record those places where adaptive responses are not feasible, and where the place might be damaged or lost under changed climatic conditions.

In the Kosciusko case, the losses to fire have heightened the awareness of the vulnerability of the huts, and set in train a number of actions to increase their protection from fire (such as creation of fire breaks or fuel reduction programs, and provision of fire-fight-

ing equipment at relevant locations) as well as to ensure they are fully recorded to allow restoration/reconstruction if that should become necessary in the future.

The IPCC report II (2007b) states that "The resilience of many ecosystems is likely to be exceeded this century by an unprecedented combination of climate change, associated disturbances (e.g. flooding, drought, wildfire, insects, ocean acidification), and other global change drivers (e.g. land use change, pollution, over-exploitation of resources)." This is a risk not only to the natural heritage of the world, but also to the cultural heritage that is an integral part of an environment in the grips of dramatic global climate change.

### Bibliography

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