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The historic site of Mawson's Huts in the Australian Antarctic Territory is the location of one of only six surviving complexes from the era of Antarctic exploration. The site's rich cultural heritage and demanding environmental conditions have been taken into account in the Conservation Management Plan being developed to manage the many constraints, issues and opportunities the site offers. Supporting the effort to preserve this site, CSIRO has chosen Vaisala equipment to monitor and study the environmental conditions.

Preserving our Antarctic Heritage - Mawson's Huts



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Latitude 67 degrees south, longitude 142 degrees east, pinpoints the bleak and inhospitable Cape Denison situated on Commonwealth Bay in the Australian Antarctic Territory.



Latitude 67 degrees south, longitude 142 degrees east, pinpoints the bleak and inhospitable Cape Denison situated on Commonwealth Bay in the Australian Antarctic Territory. The windiest place on earth at sea level, Cape Denison is home to a site classified as rare in a global context and unique in Australian history. It is the location of one of only six surviving complexes from the Heroic Era of Antarctic exploration... the historic site of Mawson's Huts.

Hurriedly constructed by the Australasian Antarctic Expe-

dition led by Sir Douglas Mawson in 1912, the site consists of four buildings - the Main Hut, Magnetograph House, Transit Hut and Absolute Magnetic Hut - and numerous scattered artefacts. Mawson remained there for two years, directing several arduous journeys of exploration from the site and conducting scientific experiments.

Many constraints, issues and opportunities have been taken into account in the Conservation Management Plan that is being developed to manage the site's significant cultural heritage.

The Historic Site - the "Home of the Blizzard"

The Mawson's Huts Historic Site and associated elements is a complex cultural landscape that illustrates, in its surviving form and setting, the isolation and harsh conditions encountered by the original expedition members. Foremost is the preservation of Mawson's Main Hut, a formidable task due to the location, environment and lack of accessibility. Cape Denison can only be reached by sea in the Australian summer between December and March - a duration of one week's sailing from Hobart, Tasmania.

The historic site and its buildings face an extremely demanding climate, with temperatures ranging from -20°C to occasionally over 0°C . The constant onslaught of abrasive snow and ice coupled with severe winds that average a daily maximum of 71 kph (82 km/h) is proving to be the greatest single long-term threat to the buildings.

Since the 1970s various proposals have been made as to how best conserve Mawson's Hut. These include covering the building with a transparent dome, over-cladding the original exterior timbers, dismantling the Hut for relocation to Australia, and sundry other options for removing the ice which has invaded the building over its many years of solitude.

Action plans

In 1997-98, based on previous heritage and condition assessments, AAP Mawson's Huts Foundation sent a conservation team to generally stabilize the buildings. The team spent seven weeks at the site to assess the condition. The Main Hut and the Magnetograph House had weathered their 89 years reasonably well, maintaining intact structures and cladding, whereas the Transit Hut and the Absolute Magnetic Hut were subsequently stabilized for conservation as "standing ruins".

Remediating the ice abrasion and ingress in the Main Hut has been the most frequently proposed conservation option, and its removal appears to be a fait accompli. However, prior to a commitment to any preservation strategy, it is crucial to gain a full understanding of the likely impact of action plans. Is the snow/ice inside the Hut helping the building to be more wind-resistant? If the ice is removed, will the temperature increase around the foundations thereby jeopardizing the Hut's anchorage? Will ice removal expose metal surfaces to increased contact with salt? Will it increase the humidity thereby exacerbating corrosion in the original bolts and nails and/or increasing mould and staining on artifacts still not fully documented?

Monitoring

CSIRO has been providing expertise in monitoring corrosion rates at Mawson's Hut since 1983. Although Antarctic temperatures do curb the two most important factors in timber deterioration - fungus and insects - the common belief that a freezing climate will prevent bio-deterioration and corrosion, thus giving perfect preservation, has been exposed as a myth.

To further understand the deterioration processes affecting the building structure and artefacts, equipment for monitoring



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temperature and relative humidity, corrosion, salt deposition and erosion of timbers was installed in 1999. Data-loggers organized by the Consortium for Heritage Collections & Their Environment, which consists of CSIRO Department of Building, Construction and Engineering, the Australian Museum, the University of Canberra and the University of NSW, were positioned in the Main Hut and downloaded by a much-publicized couple, Jim and Yvonne Claypole.

A Campbell Scientific CR10X monitoring system was used, with eight combined Vaisala HM35A Relative Humidity Temperature Transmitters and 10 surface temperature thermocouple sensors variously placed from floor to ceiling height and from the outer walls to the center of the Hut to record differing conditions within the building.

The Claypoles also exposed low-alloy copper steel coupons on top of a research team building near the Main Hut for atmospheric corrosion study and analysis.

Revealing statistics

CSIRO's Wayne Ganther said that the immense volume of data collected over the 1999-2000 period revealed some incongru-

ous statistics. The steel corrosivity samples indicated an atmospheric corrosion rate similar to that of suburban Melbourne and Sydney - 12.2 microns per year. The data collected from inside the Main Hut demonstrated that daily internal temperature and humidity peaks only occur when solar radiation is significant during the Antarctic summer. The temperature in the Main Hut did not rise above 0°C , except at the highest ceiling point, at any time during the year. Interestingly though, the relative humidity did not fall below 80% in the majority of locations throughout the Hut. Time of wetness (TOW), a major factor in corrosion study, was extrapolated against the International Standard 9223 and the newly christened "King" TOW criteria developed by King and Ganther from CSIRO-based work at Terra Nova Bay, Antarctica, 2000.

Research published in "Studies in Antarctica Help to Better Define the Temperature Criterion for Atmospheric Corrosion" by CSIRO scientists George King and Wayne Ganther, Janet Hughes from the National Gallery of Australia, and Paolo Grigioni and Andrea Pellegrini from ENEA Italian National Antarctic Research Program, revealed that the standard ►



To further understand the deterioration processes affecting the building structure and artifacts, equipment for monitoring temperature and relative humidity, corrosion, salt deposition and erosion of timbers was installed in 1999.

benchmark ISO 9223 criterion for estimating time of wetness is incorrect and needs to be revised.

Utilizing King's alternative criteria, the recently calculated TOW data together with the deterioration of the metal artefacts observed on previous expeditions shows there is significant risk to the building. Previous studies have indicated that bio-deterioration of timber is said to

be possible above 20% equilibrium moisture content. The surface equilibrium moisture content in Mawson's Hut was measured as continually above 16% and above 20% more than 80% of the time. If decay is indeed possible at these temperatures then there is more than enough water available for it to proceed.

Despite the severe-site limitations, the collected data has demonstrated that the current

state of the building offers some insulating effect. While it is initially surprising that these processes are occurring, it is worthy to note that it is incremental over a long period of time with significant intermissions during winter conditions. That being said, even sluggish processes become a major factor when considering the need to preserve historically significant buildings for future generations.

Ultimate responsibility for the conservation and management of Mawson's Huts Historic Site rests with the Australian Antarctic Division as custodian for the Australian Antarctic Territory on behalf of the Australian Government. The statutory context for this responsibility for both cultural and natural heritage conservation is provided by the Antarctic Treaty. ●

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