Museums and Climate Change

Mark Jones, November 2008

In most respects the problems that museums face in reducing their carbon footprint and adapting to climate change are similar to those of other organisations. They can and should follow examples set elsewhere[1]. But they need to rethink policies and approaches that are specific to museums: in particular the environmental conditions required for their objects.

Environmental Conditions

Over the last 50 years there has been an increasing tendency to specify 'standard' environmental conditions both as a condition of loan and as part of the brief for designers and engineers responsible for building or refurbishing galleries or stores. Typically these specify temperature in the range 18-25°C and relative humidity in the range of 40-65% with fluctuations of no more than 5% within an hour. This is less demanding than BS5454:2000, the British standard for the preservation of archival documents. This specifies that temperature be between 16-19°C and relative humidity level between 45-60% and that, even within these ranges, conditions should not fluctuate by more than +/- 1°C in temperature and +/- 5% in relative humidity.

Since lenders require these conditions and since funding bodies, including the HLF normally require them, museums, galleries, archives and libraries which include loans in their exhibitions or which look to external funders for assistance with the capital cost of renewing their displays or stores are effectively required to install plant designed to control the environment within tight limits. The consequence is that such schemes have a high carbon footprint, resulting both from the embedded energy in elaborate and expensive plant which requires regular maintenance and replacement on a 15 year cycle, and high energy use to run the plant.

Understanding realities

If these conditions were genuinely required to preserve the collections there would be a genuine dilemma. Museums' urgent need to reduce their carbon footprint would need to be balanced against their strong duty to preserve their collections. But in fact such tightly controlled ambient conditions are rarely required to preserve the collections. Different objects have different requirements and it would be rational for other museums to follow the good example of the British Museum, which requires conditions appropriate for the loan in question rather than imposing blanket requirements. Most objects have quite simple requirements – metalwork needs to be kept reasonably dry,

[1] The V&A has reduced its energy carbon emissions by 20% over the last two years through installation of a new combined heat and power system with the Natural History Museum, use of low energy lighting etc.

woodwork needs relatively stable humidity etc – and some, for example ceramics, are tolerant of most conditions. Archives, libraries and prints and drawings have in fact survived very well in unconditioned environments with wide variations in temperature and humidity for centuries. And we know that most old oil paintings have survived widely varying environments as they travelled across Europe and to other parts of the world and furniture did well in the fluctuating environment of English country houses, until the introduction of central heating. Oddly the lower temperatures cited are not, as is implied, required for the survival of objects but for the comfort of human beings. Since rates of decay double for every 5º C rise in temperature objects kept at 14ºC will decay half as fast as those kept at 19ºC. From a preservation point of view turning down the thermostat would clearly be better.

Some objects really do need precisely specified and closely controlled conditions. But where there are no insuperable aesthetic objections such objects can be shown in conditioned cases or under glass or, when in store in a cupboard, without any requirement for the high energy consumption necessitated by close control of a whole gallery or building.

It is just as well that most objects are able to tolerate wider variations in environmental conditions than standards like BS5454 suggest because in fact the plant installed to control these conditions seldom functions as intended. Power failures or malfunctions in control systems can and not infrequently do produce conditions worse than those in unconditioned spaces. Even when plant appears to be working, proper monitoring of the environment shows that conditioned spaces not infrequently provide less good conditions than those in neighbouring unconditioned spaces. But most museums do not properly to understand the real environmental conditions in their buildings, either because their systems are insufficiently sophisticated or because it is assumed that technical staff will sort out problems as and when they arise and no one in a senior position really takes the trouble to understand and consider the significance of the data in question. And it is too seldom the case that the computer modelling which is used to predict the behaviour of new or refurbished spaces is reality checked against the known historic behaviour of similar spaces.

Understanding the alternatives

It is unrealistic to expect that those who derive their income from advising on or installing environmental control systems will spend their time researching and advising on alternatives which would put them out of a job. But there are good alternatives to high specification environmental control. BS5454 states that ventilation is needed for the preservation of archives [to avoid mould]. In fact there are other ways of avoiding mould and ventilation introduces the need to dry or moisten, cool or heat incoming air so that changes in the external environment [weather] do not alter the environment indoors. If air change is kept to a minimum, as it was and is in traditional stores, relative humidity and temperature remain naturally stable. Materials naturally capable of taking up and giving off moisture, like paper itself or lime plaster on walls,

will help to reduce the speed with which relative humidity changes. Reducing solar gain, using low energy light sources, insulating buildings, bringing in cool air in the early morning but not hot air in the middle of the day, can keep galleries relatively stable.

Conclusion

It is time for

- museums and funders to stop imposing standard environmental conditions;
- the museum professions to recognize that different objects have different requirements, that need to be understood individually not collectively;
- more effort to be put into understanding the real environmental performance of existing spaces so that a range of strategies for improving their environmental performance can be tried out;
- those commissioning new and refurbished spaces to specify the use of low tech and low energy methods to create reasonably stable environmental conditions.