Preventive conservation consists of indirect action to retard deterioration and prevent damage by creating conditions optimal for the preservation of cultural heritage as far as is compatible with its social use. Preventive conservation also encompasses correct handling, transport, use, storage and display. It may also involve issue of the facsimiles for the purpose of preserving the original.

Preventive conservation supports a museum’s primary purpose to ensure that its collections are available for current and future generations. The benefits of preventive conservation will only be seen in the long term, however they need to be planned, financed and executed to provide the best possible care at the present time. It should involve everyone that works for the museum, as all have a role to play in preventing damage to the collection. Most preventive conservation involves common sense, good housekeeping and communication.

All the areas of preventive conservation are interlinked. So positive steps in one area have a positive effect in others. The interlinked areas that need to be addressed are:

- Buildings
- Storage
- Housekeeping
- Handling and Use of Collections
- Environmental Monitoring and Control
- Emergency Planning

There are a number of Standards that have been published which give more detailed advice than can be included within this factsheet about care of collections. See Bibliography of Standards.

**Buildings**

The buildings housing the collection are the first line of defence in the care of the collection. They should be secure, watertight and windproof. They should protect the collections from the most extreme of environmental conditions.

A schedule of routine inspections to check for the potential threats of damp, leaks, poor wiring, and pest ingress etc, should be in place. This should enable a planned routine maintenance programme to be undertaken. Any maintenance problems should be reported to the correct member of staff as soon as they are seen. This will prevent a small problem turning into an emergency.

**Storage**

Storage areas need to be kept well organised, pest free and clean. Artefacts should not be placed directly on the floor due to the risks of tripping and water damage from flooding or the aftermath of fire. Shelving should be stable, deep and strong enough to take the load. There should be an even airflow throughout the stores, as this will prevent the possibility of mould growth.

Using appropriate packing materials will protect the collections from a range of damaging situations. See the factsheet ‘Materials for Storage and Display’ for more details about the variety of suitable materials to use and those to avoid.

The layout of the stores needs to be planned so there is sufficient space for a person to move within the stores when they are carrying objects. There should also be enough space to clean easily behind shelving. All areas, shelving units etc., in the stores should be numbered and labelled to ensure items can be located easily. All artefacts within the store should be labelled following the instructions in the museum’s documentation procedures. You may consider putting a picture or photograph of the object on the box or packing. This will reduce the amount of handling required to find the object successfully.
**Housekeeping**

Good housekeeping is another bedrock of preventive conservation. All parts of the building including stores, displays and office space, should be cleaned and inspected regularly. This should include all those nooks and crannies that no one sees but which easily become a haven for pests e.g. internal corners of display cases, underneath shelving and behind desks.

Pest monitoring should be undertaken and any problems identified and treated quickly. Pests in this context can include insects, rodents, birds, moulds and fungi. This is where everyone in the museum can help by being trained to look out for any of these pests and then informing a nominated member of staff who can co-ordinate action to treat the problem.

No smoking, drinking or eating should be allowed anywhere except in designated staff areas. Visitor facilities such as a café are required to meet legal hygiene standards, but it is still advisable to inspect them regularly.

**Handling and use of collections**

Objects should only be handled when absolutely necessary, to prevent damage. Ideally most objects should be packed within storage boxes with padding to nest the object within the box. Wrapping the object in packing materials increases the handling of the object, increasing the risk of damage and decreasing access. Handling large, bulky and heavy objects should always be done with even more care and planning, whilst specialist lifting equipment should only be used by trained staff. Any damage to an artefact should be reported and noted on the object record.

Ensure everyone is trained in the handling procedures of the museum, including visiting researchers. Always wear gloves, either white cotton or nitrile (plastic) disposable gloves. When gloves get dirty ensure that they are changed for clean ones. For more information about handling objects see the factsheet ‘Handling and Packing’.

Loading and transporting objects should follow the museum’s documentation procedures. Objects should be carefully packed to ensure that the object is not loose within its box or crate for any journey, even from store to display. If the packing is complicated it is advisable to write a set of instructions, with diagrams, for the receiving institution detailing how to unpack and pack the box or crate. The instructions can be included with the object paperwork and a copy placed inside the box or crate.

A condition report should be made before the object is packed and the object should be checked against this report when it reaches its destination, especially if the object is being transported because of a loan. Photographing the object before the transportation is good practice, as it will enable museum staff to positively identify old and new damage. Museum staff should be comfortable that when an item is sent off site it is handled, transported and housed in conditions no worse than those of the home museum.

Security of the collection is vital both on and off the museum site and during transportation. The buildings should be secure and it is advisable to monitor display areas. All display cases should be secure, but also simple for staff to access. Visitors and researchers should be accompanied and monitored when working ‘behind the scenes’.

**Objects on display**

When planning exhibitions, the condition of the artefacts should be noted before they are displayed, followed up by a note of any changes after the exhibition. If an item is on permanent display, or is vulnerable, due to it being fragile or made from a sensitive material, a note of its condition should be made at regular intervals; this will enable the museum to identify any deterioration before it becomes serious. Any deterioration noted should be investigated to try to identify the cause and to see if there is a simple solution to prevent further damage. For example, a large vehicle is on open display, graffiti is noted on a routine inspection, consider placing a simple post and rope barrier around the vehicle and consult a conservator about removing the graffiti. Display cases and mounts should be made of ‘conservation grade’ materials. See ‘Materials for Storage and Display’ factsheet for more details.

Original photographs should not be used for display, as they are very vulnerable to damage and fading. Copies should be made that can be put on display.

If the museum operates any of its artefacts, e.g. clocks, large machinery, musical instruments, a log should be kept of its maintenance. The object should be inspected regularly for signs of wear and tear; these should be noted and included in the planned maintenance programme. Operating instructions should be available and updated as necessary. Only those museum staff who are authorised and trained should operate the object.
Environmental monitoring and control

Monitoring the environment will enable museum staff to identify locations with conditions that could be damaging to certain objects. However, it is the control of the environment based on that monitoring that will really improve collections care. This control does not have to be expensive; often the simple option can be cheaper and better in both terms of installation, maintenance and time costs.

The environmental elements that we monitor within museums are:

- Relative humidity (RH)
- Temperature
- Air pollution
- Light (including ultra-violet)
- Pests

RH and temperature

In order to monitor RH and temperature it is necessary to use equipment including whirling hygrometers, thermohygrographs or electronic recorders such as Humbugs and Tiny Tags. Much of this equipment also requires an annual calibration test to check that it is still providing accurate readings. The manufacturer's instruction manuals should provide instructions on how to calibrate the machines.

There are recommendations for the optimum environmental conditions listed in a number of publications (see Bibliography of Standards); a summary of these is at the end of this factsheet. One of the most important principles is that the RH and temperature levels should be kept as stable as possible. Even if you cannot maintain the optimum recommended levels, a stable environment that is not too dry or damp will protect the museums collections well.

Air pollution

The main aim regarding air pollution should be to prevent harmful substances from reaching the object. This can be achieved by placing the object in a display case or storage box. The Environment Agency should be able to provide the museum with a general report about pollution in the area. Monitoring of air pollution within the museum is more specialised and the museum may need to call in a conservator to help. Air pollution commonly includes dust, sulphur dioxide from burning fuels, nitrogen dioxide from exhaust fumes and ozone. Areas near the coast also have salt from the sea in the air and industries can produce specific pollutants.

Sulphur dioxide and nitrogen dioxide are acidic. Exposure to these gases can cause limestone, marble and other calcareous materials to dissolve, iron to corrode and organic items to deteriorate. Dust contains a great deal of organic material, e.g. skin and textile fragments, which are very attractive as a food source for a number of insects. Dust can act as poultice on objects, retaining moisture, and may even bond onto surfaces forming “concretions” which can be difficult to remove and can cause accelerated damage.

In an ideal situation pollutants would be prevented from coming into the museum; this could be done by using an air filtration system. However these are expensive to install, maintain and run. For the majority of museums this is not a practical option. Another solution is the creation of a lobby at the main entrance, by using a second set of doors to access the museum entrance. This reduces the large air exchange from the outside environment each time the front door is opened. This too can be expensive to install but is much cheaper to maintain and is less liable to system failure.

Some objects themselves give off harmful substances. For example, wool in objects gives off sulphur compounds that affect metals. Rubber, as found in gas masks, has a similar effect. For more information see Factsheet 3 ‘Handling and Packing’.
Light

Light needs to be measured in both its visible and ultraviolet ranges, so monitoring requires Lux and UV monitors. The simple way to reduce the amount of light is to install blinds that can be lowered and raised as the day progresses and to make sure that lights are turned off when objects are not being viewed. Measuring the overall exposure to light (lux x number of hours exposed) is more helpful than just the lux level alone. UV filter film can be applied to windows, but you will need to check with the local planning department if the building is listed before starting work. UV filters also need to be monitored to check that they are still working, as the performance of the material will reduce over time.

Pests

Insects can be monitored by setting traps. There are a number of insect trap types. Simple ‘sticky traps’ rely on an insect walking or flying into the trap whilst pheromone traps use hormones to attract a certain species of insect. Both these type of traps work best when placed in places where insects tend to be, e.g. corners of rooms and undisturbed places in display cases or near windows. Insect traps are manufactured by a number of firms, however if you are planning to use pheromone traps make sure your supplier understands which insect species you are trying to attract to the trap. All traps need to be regularly monitored and changed; otherwise they can become an insect food source themselves.

Evidence of rodent and bird ingress can be monitored during housekeeping routine checks. It is unlikely that the actual animal will be seen.

Everyone in the museum can help by being trained to look out for any evidence of these pests and then inform a nominated member of staff who can co-ordinate action to treat the problem. Good housekeeping and building maintenance should help to prevent the majority of pest infestations.

Emergency planning

Emergency planning will help the museum staff protect collections from the risks of theft, vandalism, fire, flood and bomb threats by having a series of procedures in place about how to deal with these situations. As part of that emergency plan there could be a supplies box for equipment that would be needed in case of emergency. For more information about emergency planning see the factsheet Emergency Planning.
Recommended Standards for light, temperature and RH levels (as taken from MGC Standards in Collections Care and BS 5454:2000 Recommendations for the storage and exhibition of archival documents)

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>MAXIMUM ILLUMINATION[^]{(1)}</th>
<th>MAXIMUM UV RADIATION[^]{(1)}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper, prints watercolours, drawings,</td>
<td>50 lux</td>
<td>75µ</td>
</tr>
<tr>
<td>manuscripts, photographs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textiles</td>
<td>50 lux</td>
<td>75µ</td>
</tr>
<tr>
<td>Undyed leather, horn, bone, ivory, wood</td>
<td>200 lux</td>
<td>75µ</td>
</tr>
<tr>
<td>Ceramics, metals, glass, stone</td>
<td>300 lux</td>
<td>75µ</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>TEMPERATURE[^]{(2)}</th>
<th>RELATIVE HUMIDITY[^]{(3)}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper, prints, watercolours, drawings,</td>
<td>16-19ºC[^]{(2)}</td>
<td>45-60%[^]{(3)}</td>
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<tr>
<td>manuscripts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photographs – black &amp; white</td>
<td>11ºC – 13ºC[^]{(3)}</td>
<td>30-40%[^]{(3)}</td>
</tr>
<tr>
<td>Photographs – colour</td>
<td>11ºC – 13ºC[^]{(3)}</td>
<td>30-50%[^]{(3)}</td>
</tr>
<tr>
<td>Textiles</td>
<td>18ºC[^]{(4)}</td>
<td>50-60%[^]{(3)}</td>
</tr>
<tr>
<td>Undyed leather, horn, bone, ivory, wood</td>
<td>18ºC[^]{(4)}</td>
<td>50-60%[^]{(3)}</td>
</tr>
<tr>
<td>Ferrous metals</td>
<td>10-25ºC[^]{(4)}</td>
<td>Less than 15%</td>
</tr>
<tr>
<td>Non-ferrous metals</td>
<td>10-25ºC[^]{(4)}</td>
<td>Less than 35%</td>
</tr>
<tr>
<td>Glass</td>
<td>18ºC[^]{(4)}</td>
<td>42%[^]{(3)}</td>
</tr>
<tr>
<td>Ceramics, stone</td>
<td>16-22ºC[^]{(4)}</td>
<td>45-55%[^]{(3)}</td>
</tr>
</tbody>
</table>

**NOTES**

(1) This criterion meets the requirements for people as much as objects.
(2) Fluctuations must not be more than 1ºC from level fixed within range.
(3) Fluctuations must not be more than 5% from level fixed within range.
(4) Fluctuations must not be more than 2ºC from level fixed within range.
(5) Fluctuations must not be more than 2% from level fixed within range.

**Bibliography of Standards:**


**Checklists and advice documents**