Factsheet:
Caring for paper collections in museums

SCOTTISH MUSEUMS COUNCIL

Introduction

This factsheet aims to give a basic introduction to the care and preservation of paper collections held in museums. Since museums aim to preserve their collections for both present and future generations, practices must be established that give maximum opportunity for preservation, but that also allow the works to be handled by staff, volunteers, and researchers. It is important for curators and assistants, or volunteers who help them, to have an understanding of factors that affect the collections they look after in order to prevent the works being damaged. In many respects paper is a resilient material but, in certain conditions, paper objects can be seriously damaged, sometimes irreparably so.

Most museums have a wide range of paper items in their collections. These might include **fine art on paper** (such as watercolours, prints, drawings, and pastels), **archive papers** (such as documents, records, and letters), and **maps and plans**. Paper might also be found in association with other objects - such as a label on a tin, or on the frame of a painting.

The care of photographs is in some ways similar to the care of other works on paper, but as there are some differences guidelines for their preservation are addressed in a separate factsheet.

Threats to paper collections

There are a range of factors within the museum environment that are potentially damaging to paper collections. These include

- environmental factors, including some levels of relative humidity, temperature, light, and air pollution
- pests
- people
- materials that come into direct contact with the objects, in either storage or display
- materials that the objects are made of

The consequences of the objects being exposed to harmful conditions can be seen in many different types of damage. It is quite common to see paper that has become discoloured. It can turn from white or cream, to yellow or even an orange-brown colour. As well as paper being discoloured, it is common for it to become less flexible. This

embrittlement and discolouration of paper are signs of degradation and could be the 'symptoms' caused by many of the threats to the collections listed above. Other types of damage caused could include dirt and stains, tears and creases, abrasion, and fading of inks and pigments.

Trying to avoid such a catalogue of damage may seem an enormous task but it is often not too difficult to make improvements that help to preserve the collections significantly better. Improvements don't have to involve employing a conservator, they don't have to cost the earth, and they actually save money in the long run.

Guidelines

Ensuring the museum environment meets basic standards, and controlling the way objects are used in the museum will go a long way to protect the collection. The following guidelines outline the conditions that are needed to preserve paper collections. They are elaborated on in the next sections of this factsheet.

Conditions needed to preserve paper collections:

Threats	Conditions needed to preserve paper
relative humidity	• 45 - 65 % • minimal fluctuations
temperature	• 10 - 20^{o} C • minimal fluctuations
light	• storage: no light • display: maximum of 50 lux visible light, and10 microwatts per lumen ultraviolet • limited display periods
air quality	• reduced particulate pollution • reduced gaseous pollution
pests	• pest control established in the museum building
people	• systems that help people handle paper objects safely
contacting materials	• must be chemically inert
unstable objects	• all the above conditions maintained to slow down deterioration.

Relative humidity and temperature

Paper objects survive best in a cool, dry environment. If paper is subjected to high temperatures and high levels of relative humidity, it will degrade faster than if kept cool and dry. It will become discoloured and lose its flexibility, making it hard to handle safely. The higher the levels, the faster the degradation will take place.

Solutions

Areas of the museum that are naturally warm or damp, or have variable conditions - such as attics or basements - should not be used to store the collections. Storerooms should be monitored to check that the right levels of temperature and relative humidity are being maintained continuously. If the right levels are not being maintained, steps should be taken to improve the conditions – for example installing insulation to reduce fluctuations or introducing low level heating or a dehumidifier to lower the relative humidity.

Light

Light degrades paper just as high temperatures and high relative humidity do but, in addition, light can damage certain types of media such as watercolours or inks that might be found on the objects.

Solutions

In storage, the solution to the problem is easy - all paper objects should be stored in the dark. This is usually achieved by placing the collections in lidded boxes, drawers or cupboards.

On display, the solution is not so straightforward. There are three factors that have to be considered. These are

- how bright the light is
- the ultraviolet content of the light
- the length of time the object is exposed to light.

Ultraviolet is the most damaging part of the spectrum of light. Bright light, with a high level of ultraviolet in it, falling on an object for a long period will cause the most amount of damage. It is important to address all three factors if damage is to be minimised. The ultraviolet content and intensity of light are measured with hand-held lux and U.V. meters.

Light levels need to be brought down to as close to 50 lux as possible. This can be done through positioning lights and objects carefully, removing lights, using blinds, and so on. The ultraviolet component of the light should be removed by covering windows and

fluorescent tubes with a filtering material that lets visible light through but blocks U.V. radiation. Reducing the length of time objects are exposed to light is very important. It can be achieved by covering objects outside visitor hours, and reducing display periods.

If it is not possible to reduce light levels to 50 lux, it is even more important to reduce exposure time. If light levels are really low, display periods may be extended.

If the level of 50 lux is achieved, a sensible display period might be between six and twelve months every four to five years.

Air quality

The air within the museum can carry both particles and gases that might affect the collections. Particulate pollution is essentially dust. Dust consists of tiny particles of materials such as soil, sand, soot, skin flakes, and fibres. Accumulations of dust can be very disfiguring - and not always easy to remove.

Polluting gases include nitrogen dioxide, sulphur dioxide, ozone, formaldehyde, and acetic acid. They can degrade paper, and cause it to become yellowed and brittle. They can be given off by a frighteningly large number of materials that might be found in or near the museum, including

- vehicle emissions
- wood and wood finishes
- newly applied oil based paints
- poor quality paper products
- some types of plastics, especially cellulose nitrate, and poor quality foams
- poorly processed photographic materials
- some textiles and rubber
- some cleaning materials
- photocopy machines.

Solutions

Levels of dust within the museum building can be reduced by having well-sealed doors, windows, and showcases and by keeping stores and galleries clean. Keeping objects covered in storage is essential to avoid dust falling on them.

It is important to identify any materials that might be producing gases that are harmful to the collection. Once identified, the materials can be removed, or isolated from the collections.

Polluting gases can also be reduced by storing the collection in card and paper products that have molecular sieves contained in them. Molecular sieves are particles that are designed to trap specific molecules, (such as sulphur dioxide and the other pollutants listed above) by forming chemical bonds with them. Examples of these products are MicroChamber® papers and cards. These materials are no more expensive than other good quality storage materials, and are very effective in absorbing many harmful vapours.

Pests

Happily for paper collections, they are less vulnerable to attack from pests than some other types of museum collections, such as textiles or wood. However, damage from pests is not unknown and may be seen in the form of material having been eaten away. Book lice and silverfish may destroy particular parts of a work - for example, the surface of a coated paper or the glue in a binding. Mice are less specific in their tastes, and can destroy entire objects. Flies can leave dirty marks that are impossible to remove.

Solutions

Most pests do not like cool dry conditions. Those are the conditions that are best for preserving paper. If these conditions are maintained, the threat of pest damage will be very much reduced. It would still be a good precaution to inspect the collection from time to time for evidence of pests. 'Sticky traps' are an inexpensive, simple tool that can help to monitor the presence of pests in the building. Wooden frames and frame backs can harbour woodworm, and should not be overlooked. If an infestation is discovered, it is important to contact a conservator without delay to seek help.

People

Although we rely on people to carry out lots of essential tasks in caring for the collections, they themselves are probably the source of most of the damage in a collection. Degraded paper, damaged or large works, works with fragile media, (such as charcoal or pastel drawings), and many other types of paper object can all be hard to handle safely.

Solutions

Providing everyone who works directly with the collection with the knowledge of how to handle the collections safely is essential. They also need to be given the facilities to work safely - somewhere to wash their hands frequently, clear clean surfaces, and small

weights to secure rolling sheets. Storerooms and the cabinets within them should be well organised and clearly labelled so that objects are handled as little as possible.

People also need to be advised on how to label objects correctly. They should use an HB or 2B pencil or waterproof ink in a pen with a very fine nib rather than biros or felt pens. Self-adhesive tapes such as Sellotape should never be used directly on the objects. Acid-free gummed paper or linen tapes are the only tapes that can safely be recommended for direct use on the objects - for example to hinge a work to a mount or to do a first-aid repair on a large tear.

Further information is available from SMC in other advice sheets that explain how people can handle paper objects safely. People who work regularly with the collection may benefit from attending a training day or having a coaching session with a paper conservator.

Contacting materials

Contacting materials - that is any materials that are in direct contact with the object, either on display or in storage - need to be of a good quality. If they are not, damaging substances can transfer from the poor quality material to the object, and cause discolouration, staining and embrittlement. Materials that should not come into direct contact with objects include

- wood pulp papers and cards
- wood, and MDF, and painted surfaces
- polyvinyl chloride (PVC) plastic sleeves
- paperclips, elastic bands, staples
- 'Post-its'
- self adhesive tapes and labels
- dry mount adhesive.

Solutions

There is a wide range of good quality materials available from conservation suppliers that are very stable and perfectly safe to use in direct contact with the objects. Although these materials usually cost a little more than their poor quality equivalents, it is very well worth investing in them as using them will go a long way to ensuring the safe preservation of the collections.

Good quality storage enclosures are either made of paper or card, or plastic. Paper and card have the advantage of being easy to label and enclosures can be a bit cheaper than plastic ones. Plastic enclosures are transparent and so the object can be examined

with the minimum amount of direct handling.

Good quality paper and card are

- free from wood pulp fibres, acids, and lignin
- made of 100% cotton fibres, or has a high percentage of alpha cellulose fibre content
- may be 'buffered' or 'unbuffered'
- may contain molecular sieves to trap airborne pollutants

Good quality plastics are

- free from plasticisers and coatings
- inert

Examples of good plastics are polyester film ('Melinex'), polythene, and polypropylene. Plastic enclosures should not be used on objects that have loose media - such as charcoal or chalk drawings, or pictures with flaking paint. This is because the static present between the two layers of plastic can pull off loose media.

Suppliers of conservation materials provide a lot of detail about their products and so it is not difficult to choose supplies that meet the right specifications.

Unstable objects

Some objects in the collection are made of poor quality materials, and will degrade much faster than other objects. Examples of this are modern newspapers, cheaply produced paperback books, and faxes printed on thermally treated paper.

Solutions

It is possible to slow down the rate at which these objects degrade. This is done by maintaining a cool, dry environment, storing them in good quality enclosures, out of the light, and handling and displaying them as infrequently as possible. It might be advisable to copy the originals before they become too degraded and fragile. It is advisable to be on the look-out for unstable objects, and to avoid accessioning them if at all possible.

Storage formats

There are no firm rules about storage formats: every object and every museum is different, and to some degree the objects and the conditions and facilities available dictate what is most appropriate.

Many paper objects are best stored individually, or in small bundles, in good quality sleeves, inside a labelled acid-free lidded box. Larger flat works might be best stored in acid-free card folders, in large boxes or drawers. Some objects, such as paper models or packaging boxes, may be three dimensional, and need plenty of acid-free tissue within a lidded box to prevent them from becoming crushed.

Information is available from SMC in other advice sheets about

- sleeves and folders for storing paper objects
- handling paper and photographic collections
- how to mount and frame works on paper
- storage of framed pictures
- how to roll larger works and store them well

Further information and advice

This is one of a series of factsheets, advice sheets and guidance notes produced by SMC on common collections care and preventive conservation issues. For more details, signposting to further sources of advice or information on how to contact a conservator, see our website at: www.scottishmuseums.org.uk

SMC also runs training days on the basic care of paper and photographic collections.

Selected Reading

BS 5454 Recommendations for the storage and exhibition of archival documents.
British Standards Institution, 1989

Ellis, M.H.
The Care of Prints and Drawings
American Association of State and Local History, 1987
ISBN 0910050791

Greenfield, J.
The Care of Fine Books
Nick Lyon Books, 1988
ISBN 1558210040

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