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Success Guides

Successful Collection Care

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Ariennir gan Lywodraeth Cymru
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Front cover picture: Monitoring equipment is key to successful collection care – in this image course students learn how to use it. The course, *Controlling the Museum Environment*, run by RAW (Resilience at Work) was held at Leamington Spa Museum & Art Gallery.

Successful Collection Care

We tend to assume that once an object enters a museum it will last forever but sadly this is not the case.

This guide is a companion to the Success Guide, Successful Basic Conservation. Together they provide a practical foundation to understanding 'preventive' and 'interventive' conservation of our collections.

How long do you expect the collections in your museum to last? Ten years? A hundred? A thousand? How can you be certain that they will? We tend to assume that once an object enters a museum it will last forever but sadly this is not the case. Our objects can begin to decay from the moment they are made. If we get the conditions right in our museums we can try to make sure that this is a slow process. If we get them wrong, then the objects may decay before our eyes. The process of making the decay mechanism as slow as possible is called 'collection care' or 'preventive conservation' (both terms are used interchangeably by the conservation profession). The museum Accreditation Standard[1] defines caring for the collections in our museums as "a fundamental duty for all museums".

This can make the process seem very daunting but it needn't be complicated.

In this guide I will highlight the decay mechanisms, explain how to monitor for them and what to do to make sure that your objects have as long a life as possible.

What causes objects to decay?

Objects can be affected by many decay mechanisms – a collapsing shelf can result in the total destruction of a glass vessel, whereas munching by an insect may result in holes or partial loss of a textile. A few years ago the Canadian Conservation Institute (CCI) looked at all the mechanisms that can cause objects to decay and gathered them together into a 'Framework for Preservation of Museum Collections'. The Framework identified nine **Agents of Decay**, where the decay mechanisms are grouped under simple headings and the list is presented in the order of the level of risk each agent represents. This convenient list applies to all, and any, collections. It's an ideal summary which can be understood by all staff and volunteers and enables everyone in the museum to play their part in caring for our collections.

Objects can be assessed against the list to determine the likelihood of the agents affecting it and the damage that could result. The agents are:

1. Direct physical forces These can be sudden and dramatic, like dropping a glass vase. They can also be gradual, such as pilgrims touching the same area on a statue, silver being removed by many years of polishing or the wearing away of a bearing in an engine. The end result is the same – physical loss or damage.

2. Thieves, vandals and displacers Thieves generally take high value items that are easily transportable.

Vandals are less predictable. They often attack high profile or controversial items but this is not always the case. Damage can range from chips or scratches to destruction.

Displacers are the most insidious and difficult to define. These are objects that are lost from a collection due to

[1] Accreditation is open to all museums that meet the 1998 Museum Association definition of a museum: "Museums enable people to explore collections for inspiration, learning and enjoyment. They are institutions that collect, safeguard and make accessible artefacts and specimens, which they hold in trust for society." The Accreditation scheme is administered by Arts Council England, in partnership with Museums Galleries Scotland, Northern Ireland Museums Council and CyMAL.

Poor storage – how long will these objects last?

inadequate collections management. They may be in the museum, but if they cannot be found or identified they are lost to the collection.

3. Fire This can cause complete destruction of objects and also of the buildings that house them. Damage can be caused to other objects by smoke and heat and by the water used to control the fire.

4. Water This may arise from flooding, leaking roofs and fire suppression and can cause serious loss or damage. Objects may be destroyed or become waterlogged – further damage can result during the drying process. Corrosion and mould growth may occur and the object may also warp or fall apart.

5. Pests These can be divided into three classes; insects, vermin and microbiologicals.

Insects There are thousands of insects in the world, but a relatively small number that attack collection items. Museums provide ideal living conditions and a ready food source. Holes and frass (insect poo the colour of the object eaten) in/on objects, dead insects and cast skins of pest species are all signs that there is a problem with insects.

Damage from contaminants is usually seen as a change in colour on some or all of the object.

Vermin These animals often pose a health risk to humans as well as causing damage to collections. Rats and mice will gnaw objects and storage furniture/cases. Pigeons, starlings and sparrows can foul buildings and their nests can block gutters, down pipes and air-conditioning systems. Insect pests can hitch a ride on these animals and may live in their nests and detritus.

Microbiologicals include moulds and fungi. These are disfiguring and can destroy objects if they are not removed and may cause health problems. They can also encourage metal corrosion. They need high humidities to thrive, so their presence indicates a damp problem.

6. Contaminants These are chemicals in the form of gases, liquids and solids.

Gases can enter the museum from several sources. The most well known is atmospheric pollution with sulphur dioxide being the most problematic component (this is the gas which causes silver to tarnish). Gases given off by materials used in the museum can also cause problems. Wood, wood composites, adhesives, sealants and paints can all be harmful to objects. Objects themselves can also give off gases; plastics in particular can give off gases as they degrade.

Liquids only need to be present as a thin film. The most damaging and common liquid is human sweat, deposited onto objects through handling. Sweat contains lactic acid, sodium chloride and fatty and amino acids. The sweat on a metal surface will react with the metal and the atmosphere and corrosion can begin. It can also stain paper and textiles. Objects displayed or stored outside can be vulnerable to attack from acid rain (rain mixed with atmospheric pollution).

Solids are usually in the form of fine particles (salts and dust). Salts are chemical compounds deposited from the atmosphere or by handling. Dust is, principally, particles of skin, but also contains clothing fibres, tiny particles of building materials and sand or soil. It attracts moisture, which in turn encourages corrosion and other decay mechanisms. Dust can also be a food source for pests. This can encourage pests into areas containing objects; the objects may prove to be a preferred food source or they may be damaged as the pests feed on dirt lying on the object.

Damage from contaminants is usually seen as a change in colour on some or all of the object but there may also be physical changes, such as paper becoming brittle.

7. Light is formed of two components, visible light and ultra violet (UV).

Organic materials, dyes and pigments can fade and discolour as a result of exposure to light. UV also causes fading and discolouration but it can also cause materials to deteriorate and disintegrate by causing materials to breakdown at a molecular level.

8. Incorrect temperature Temperatures that are too high (30°C and above) or low (5°C or less) or fluctuate (more than a 4°C change in 24 hours) are damaging to objects. High temperatures can increase the rate of chemical reactions and cause an object to decay more rapidly. They will also encourage pests to breed. Low temperatures can cause some materials to become brittle e.g. surface finishes and paints. Fluctuations can stress objects resulting in glues failing (e.g. a piece of veneer lifting from a piece of furniture).

9. Incorrect relative humidity (RH) The RH affects objects in several ways. High RH levels (damp air, 65% and up) can cause organic materials to expand and metals to corrode. Mould growth is encouraged if high levels are maintained for some time (70% and up). Low RH levels (dry air, 30% or less) can cause organic materials to dry out, resulting in splitting or cracking.

There is much more detailed information showing how each agent causes harm on the **Canadian Conservation Institute** website http://www.cci-icc.gc.ca/index-eng.aspx and **Collections Trust website** http://www.collectionstrust.org.uk

Although the list is ordered to show the factors that cause the most sudden and catastrophic damage at the top with damage that occurs at a slower rate at the bottom, not all objects will experience the same level of damage from each agent. The list is trying to show the *potential* for damage. Understanding what an object is made from will help to show which agent will be most damaging **for that object.**

For example, if a woollen textile was dropped it would suffer little damage, but a ceramic vase might be broken into pieces. If there was an infestation of clothes moths, they could wreak havoc on the textile but would cause no damage to the vase.

If you know your collections, you will know what agents are likely to cause problems.

How can we prevent damage?

Having contemplated the list above it may seem that the easiest way to prevent damage is to put your collections in a dark, climate controlled, non-dust generating building and lock the door, but this method of prevention makes it impossible for staff and visitors to view the collections. We therefore need to instigate preventive or collection care actions to manage the agents. Unless the museum is large, it is unlikely that there will be one person dedicated to these agents and managing them can seem overwhelming. A little diary planning and careful deployment of equipment will make the management achievable.

It may be helpful to think about dividing the work into seven areas. These may not at first sight seem to be connected to collections care, but caring for the collections needs to be embedded in all areas of activity, not just those that can be badged as conservation.

1. Policies and procedures

The production of policies can sometimes feel like a box-ticking exercise, but done well they are useful documents. A dictionary definition of policy is “a course or principle of action adopted or proposed by an organisation or individual”, so this is how you will do things in your organisation. You may need an action plan or set of procedures to help you implement the policy – this will set out the steps that you need to take to achieve the policy. The Museums Accreditation standard gives guidance on the policies that you should have for your museum. There are also other plans, such as your emergency plan, that should go into specific detail of action that you might need to take in specific circumstances. If you don’t know if you have policies to help you manage the nine agents, talk to your Museum Mentor colleagues or MDO (Museum Development Officer). You may also find it helpful to carry out a review of the work areas to see if there are gaps. An assessment tool such as the Risk Awareness Profiling tool (www.raptonline.org.uk) will help you to take a snapshot of your museum and identify areas that need further thought.

2. Handling and moving objects

Try to keep this to a minimum as handling exposes objects to damage from mishandling and from contaminants from the skin – even clean hands will leave deposits on objects. Make sure that all museum colleagues who handle objects have had training in how to carry it out

If you know your collections, you will know what agents are likely to cause problems.

Metal coupons showing tarnishing.

safely and that you have sufficient quantities of packing materials, boxes, trolleys, gloves and other personal protective equipment necessary. Carry out risk assessments to ensure the safety of the people undertaking the move and make sure that there is a space for the object to move to before you start.

Handling guidelines are useful as you can use them to set out how things should be done. Include glove usage in the guidelines. There is no definitive standard to follow, but I would recommend that you should wear gloves as the default position – rigger types for machinery or large lumps of stone (and similar objects) and nitrile gloves for everything else – these have good sensitivity and come in a range of sizes.

3. Risk assessment

This is usually considered in the context of events or moving objects but can be applied to many areas. In relation to caring for the collection, this is particularly relevant for:

- Security – are the procedures adequate to protect the collection from theft and vandalism? Do they cover key control and restrict who can access behind the scenes areas?
- Fire prevention, detection and evacuation of people. Do you review these regularly? It's easy to create little dumping areas that rapidly become full of rubbish and become a fire hazard. Does your detection system alert a monitoring company? Domestic smoke alarms are of little use unless you live in the museum!

4. Environmental monitoring and control

Monitoring

How can you find out what the environment is in your museum so that you can decide if you need to make any changes? There are two straightforward methods that you can use.

One is to go and look at the collections! The more familiar you are with your collections the easier it is to decide if there have been any changes. Try and walk around your displayed collections at least once a month, more often if possible and your stored collections at least once every six months. This will help you to avoid asking "has it always looked like that?"

It is not always possible to detect that there are problems with contaminants, light temperature and RH. The human body is a very poor detector and just because you feel cold it doesn't mean that the environment is incorrect. To be absolutely certain of the environmental conditions, it is necessary to use equipment to carry out monitoring. This will then help you to decide what, if any, modifications are needed.

Knowing your collections, making reasonable judgments and choosing monitoring that is appropriate to your circumstances and budget means that **all** museums should be able to implement good collections care.

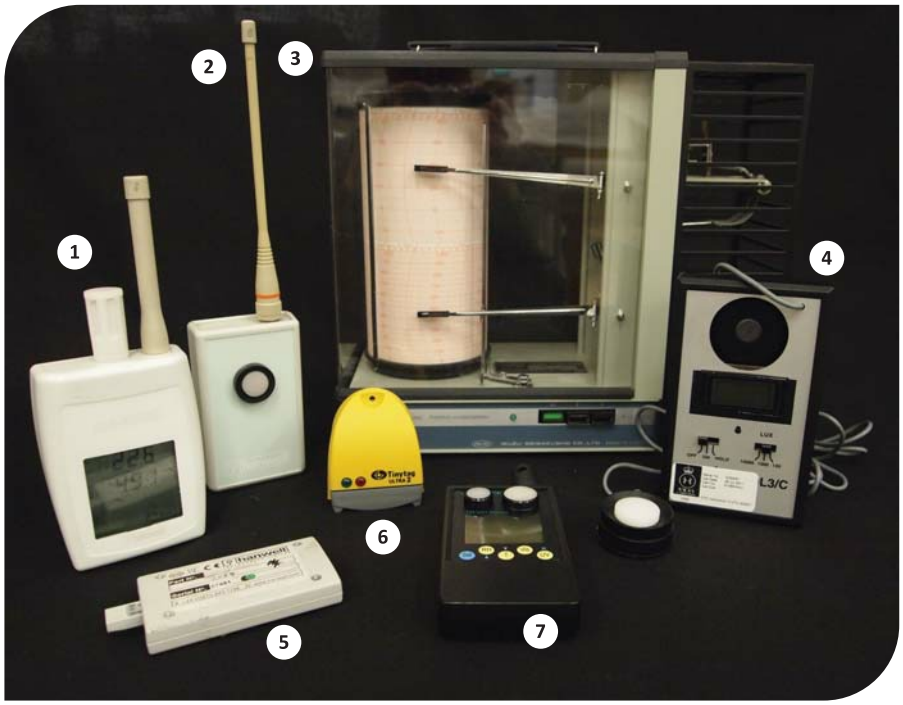
Contaminants can be monitored in several ways. Glass microscope slides can be put out to monitor solid particles – the speed at which the slides become dull shows how quickly the dust is formed and by looking closely at the particles it is possible to determine what particles are in the dust. There is a link in the references at the end of this guide to a paper that explains how to do this and has photos of dust – this is more interesting than it sounds! Gaseous pollutants can be monitored using sampling tubes, but there is a cost to this and generally you

will need a tube for each gas that you want to monitor. Alternatively, metal coupons (very thin pieces of pure metal, usually silver, copper and lead are used) can be placed in areas of concern. These coupons are carefully cleaned and the rate at which they tarnish/corrode is monitored. The coupons will show that there is a problem and will give an indication of the severity; the sampling tubes will show what the gas is that is causing the problem.

Light (measured in lux), temperature and RH can be monitored in similar ways. There are two main types of monitors: those that take a reading when a button is pressed and those that continually log information to build up a picture over time. Both are useful. The 'press-a-button-and-get-a-reading' types are known as Spot Meters and these are useful for setting light levels in an exhibition or for finding out what the RH and temperature levels are in a particular area. Continuous monitoring means that it is possible to see how the environment changes over time, particularly when the museum is unstaffed. This is the most helpful method for understanding how the environment changes each day throughout the year. A combination is useful, but if budgets are tight, continuous monitoring for RH and temperature and a Spot Meter for lux and UV is a useful combination. These meters and monitors need to be calibrated regularly, at least every two years and maybe more frequently if the conditions fluctuate a lot.

Methods of carrying out continuous monitoring:

- **Data loggers**. Cheap and small. Can hold a year's worth of data. Can be placed inside boxes or showcases easily. Must be physically connected (from time to time) to a computer to retrieve the information. This can be time consuming and the data may not be useful for control if it is not downloaded frequently. Can measure RH/temperature or lux, not usually UV.
- **Radio telemetry**. Generally bigger monitors so can be difficult to place. Expensive to set up. May need booster stations to get the radio signals through thick walls or around complex buildings. Data is live at all times so problems can be spotted quickly. No downloading required.



A range of environmental monitoring equipment. 1. Radio telemetry RH (Relative Humidity) and temperature sensor by Hanwell. 2. Radio telemetry Lux and UV sensor by Hanswell. 3. Recording Thermohygrograph by Isuzu. 4. Lux meter by Megatron. Front, from left – 5. RH and temperature data logger by Hanwell. 6. RH and temperature datalogger by Tinytag. 7. Combined RH, temperature, lux and UV meter by Elsec.

The positioning of sensors is important.

Can measure RH/temperature and lux/UV. Some systems have monitors that measure all four elements.

- **BMS (Building Management Systems) systems**. These are part of the heating/air con system and so are built in. Sensors cannot be calibrated so the actual values may not be accurate. Supplementary monitoring (as above) is advisable.
- **Recording thermohygrographs**. These were once the main type of monitors but now are becoming difficult to source. Expensive, bulky. Need calibrating every month. Difficult to analyse the data due to the amount of space needed to lay out graphs.

Do not be tempted by the kind of RH and temperature meters that are available from garden centres etc, as the sensor used to monitor the RH is made from paper and this rapidly goes out of calibration and cannot be recalibrated.

The placement of the monitors is very important and it is worth spending some time thinking about this. As a general rule, we want to know what the RH and temperature are around the objects. The conditions at ceiling or floor level are generally of less importance unless objects are in those spaces. Monitors should thus be placed in cases, on shelves in stores and on the wall in picture galleries in the same area as the pictures. The monitors are easy to steal, so placing them slightly above head height may help to prevent this, as will anchoring them to walls.

Once a monitoring system is in place it is important to analyse the data.

Check it weekly or monthly to ensure that there are no wild fluctuations, that the control mechanisms seem to be working and that the monitors are working. Further interrogation can be helpful; a simple piece of analysis is to determine the range of RH, temperature, lux and UV that your museum wants to maintain and then count the number of days in each month when the conditions have been within the range. It can be useful to keep a record of the external environment (e.g. . . . 'it snowed that day', 'wind chill pretty high') and of any work that goes on that might affect the environment, such as replacing a heating system. These can then be related to the internal environment and connected to any changes.

Pests will be covered in detail in a separate Success Guide (Successful Basic Conservation), but you may find the resources given in the references helpful. I would recommend that you carry out insect pest monitoring in-house. **It's fun**, cheaper than paying a pest contractor and it will give you greater control of the problem as you will see potential infestations immediately rather than waiting for a report.

Light

Light can cause quite severe damage to objects and this damage is irreparable. The obvious way to prevent this damage is to keep all light sensitive material in the dark. Light sensitive refers to all materials that can be damaged by light and this includes paper based objects, watercolours, textiles, wood, fur, feathers, plastics and some pigments in oil paintings.

The simplest method is to limit the amount of light (or exposure time) that falls on light sensitive objects. Ideally, outside of a museum's opening hours there should be no light falling on the objects at all. This means keeping case and gallery lights off until they *have* to be on and blocking daylight, either via a case cover that is then removed at opening or through blinds or curtains. Where possible, light sensitive objects should only be displayed for a short time, commonly three months or one season and then they are kept off display for a number of years, usually five. This can cause problems in displays where the collection does not contain many examples of a type of object that can be swapped in (also known as rotation). In these cases, light sensitive material may have to be on permanent display. The object may then be considered as 'sacrificial' and can be displayed at high light levels until the object is damaged beyond repair or strict light controls can be implemented to limit the amount of damage.

A slightly more complex method is to ensure that light only falls onto the object when it is required for viewing. A viewer-operated cover or a simple curtain is the simplest method. A push-button light can be used to illuminate showcases or rooms and sensors can also be employed to light spaces only when visitors are present.

A double blind system helps to control light levels.

Case covers at Aston Hall Astonish Gallery.

It is also important to control the actual level of light, measured in lux. Daylight on a sunny day can measure 10,000 lux. Recommended light levels for objects are 50 lux for light sensitive materials and 250 lux for non-light sensitive material. Note that these levels do not prevent damage; they just help to slow down the rate at which it occurs. Blinds to reduce the amount of light entering a space are very helpful and a double blind system with blackout for out-of-hours doubly so. Film can also be fitted to windows to reduce the amount of light entering – this can be in various shades of grey to reduce light by different amounts.

Artificial light is most easily controlled using dimmers. Where lamps will shine directly onto objects they should be individually dimmable. If they are used for lighting the space only, such as uplighters on a cornice, then the track can be dimmable. Case lights should also be dimmable. A hand-held light meter is required to be able to check the light levels achieved.

Light also contains UV (ultra violet) and this causes the same damage as lux, but faster, as UV has more energy. UV is not required for human sight and so the simplest way to manage UV is to remove it entirely. The lux reducing film will block UV, but there is also a colourless version; this can also be used on fluorescent tubes. Artificial lighting should have filters to remove UV, but it is now possible to select lighting (LEDs and fibre optics) that does not emit UV.

Incorrect temperature and relative humidity

Temperature is not, in itself, a problem to our collections. Getting the temperature wrong for particular objects may, however, lead to problems. As the temperature increases the rate of deterioration increases; in a museum context this means anything above 20°C. Lower temperatures slow down the rate of deterioration so for storage, cooler temperatures are often to be preferred. In display spaces staff and visitors often complain if the temperature is cool, so a balance has to be found between human comfort and the needs of the object.

Many museums adopt the range specified in the Government Indemnity requirements of 16-24°C with no more than a 4°C change in a 24 hour period.

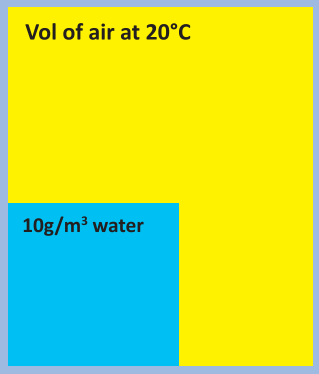
The main impact that temperature has on collections is its part in affecting RH (relative humidity).

Relative humidity, RH, is a measure of the amount of water held by air at different temperatures. It can be calculated as follows:

$$RH = \frac{\text{amount of water in a given quantity of air}}{\text{Maximum amount of water which the air can hold at that temperature.}} \times 100$$

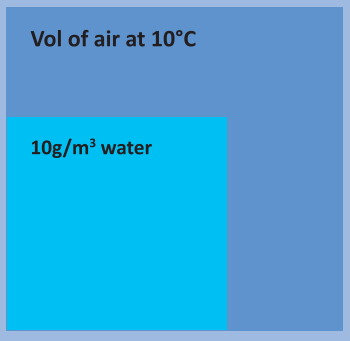
The main impact that temperature has on collections is its part in affecting RH (relative humidity).

WHAT IS RH (Relative Humidity)?

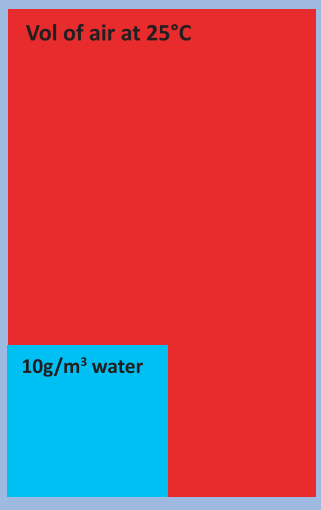


RH describes how much the volume of a quantity of air water occupies at a specific temperature.

Imagine a volume of air at 20°C that holds 10g/m³ of water (the amount of water is expressed in a weight per volume ratio). In the diagram, the water occupies about 20% of the volume of the air. This is described as 20% RH.



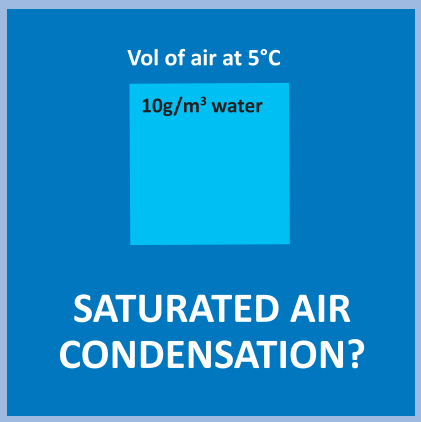
If the air is cooled, its volume decreases. If the amount of water again does not change, it then occupies more of the available space. In the diagram, the air has been cooled to 10°C and the water occupies about 80% of the space and is thus 80% RH. It has gone up because the volume of the air has decreased.



Now imagine that the air is heated up to 25°C. This allows the air to expand and the volume goes up.

If the amount of water is not changed, the amount of space it now occupies is less – about 10%.

The RH has gone down because the volume of the air has increased.



If the air is cooled further to 5°C, its volume decreases further until it is entirely filled by the water. This is saturated air or 100% RH.

If the air cools down yet further, its volume decreases more and it cannot hold all the water. The water thus falls out of the air as condensation on a cold surface like a window, or rain outside.

The majority of items in the collection will remain unchanged if the RH is kept in a mid range (40-65% with no more than a 10% change in a 24 hour period) and is kept stable.

What this means is that air at 50% RH is holding half the amount of water that it could hold. The *actual* amount of water that this figure represents varies, depending on the temperature of the air. It is not practical to try to measure the actual amount of water in the air, so museums use the relative scale. It is important to remember that changing the temperature of the air will change the RH.

Incorrect relative humidity can have a number of damaging effects on collections. It may result in splitting, cracking or warping. Very low RH may cause objects to become brittle; very high RH may result in corrosion or mould growth. High and low levels and fluctuations (more than a 10% change in 24 hours) cause most of the problems. Some objects need to be kept in specific humidities to prevent deterioration, such as archaeological metals, but the majority of items in the collection will remain unchanged if the RH is kept in a mid range (40-65% with no more than a 10% change in a 24 hour period) and is kept stable.

Note: objects will come to equilibrium with their environment and if there is no sign of damage, and the RH is stable and close to this range, it is often best to leave the environment alone!

Control can be achieved in a number of ways:

- Try to maintain stability by ensuring that the building and showcases are well sealed so that changes in the outside world only have a limited effect.
- Use boxes or showcases for vulnerable objects as the environment will be more stable inside them.
- Try to run heating 24/7 as this will help to maintain stability. Remember that you do not need to heat for people but to control RH so the heating does not need to be set at a human comfort level.
- Control heaters using humidistats – like thermostats, but they use the humidity of the space to control when the heating runs. The humidistat is programmed with the humidity level that you want to maintain and then the heater operates to try to maintain this. This can be linked to the monitoring system.
- Dehumidifiers may be needed for very humid spaces. These are big and need emptying daily, which takes time. They can be connected to a drain but this may need a hole punching through a wall in the building.
- Humidifiers may be needed to add moisture if the RH cannot be raised in any other way. These are also big and need filling daily, which takes time. They can be plumbed in, but this then raises the risk of leaks as there must be a water supply in an object space. Some people are concerned about the risk of legionella when using humidifiers. I have talked to colleagues and the manufacturers and am confident to state that there is no risk – there is no aerosol produced and the daily or twice daily fill means that the water is fresh.

5. Maintenance and improvements to the building

The building is the first line of protection for the collections, so it is vital to keep it in good condition. This is easier said than done, especially if your building is leased. Some suggestions for managing this are:

- Plan in regular walk-arounds of the building inside and out, including the roof if possible, to look for problems.
- Carry out maintenance little and often. The £300 roof repair bill will seem very reasonable when compared to the tens of thousands needed to fix the hole in the roof and conserve the damaged collections.
- Try to have a maintenance budget, even if it is very small. You'll be able to do something.

- Make the building as airtight as possible. Fill gaps, fit brush strips to doors and windows, cap chimneys. This keeps your controlled air **in** and keeps contaminants and pests **out.**
- Any improvements you can make to save energy will benefit the collection as these tend to make the environment more stable, e.g. insulation.
- Keep dust-generating surfaces (concrete, brick and breeze block) sealed as this will reduce dust.
- Doing something is always better than doing nothing.

6. Housekeeping and pest management

Regular cleaning of all collection areas will remove contaminants, food for pest and insects. This should be carried out with a vacuum wherever possible and this should be seen as an important job for everyone working with the collections. A vacuum with variable suction will enable you to clean the space and objects without needing multiple vacs. This is also one of the most effective methods to remove and deter pests and should be a key part of a pest management programme.

Entry mats help to remove contaminants as visitors enter. Keeping the front door closed will also help to prevent pollutants from entering, although if the door is very imposing this may also deter visitors! Revolving or closing doors or a porch creating a double door entry give an airlock effect. This is very effective but can be costly and may require listed building and/or planning consent.

The housekeeping programme is another that needs to be **planned in** to ensure that it happens at regular intervals.

7. Storage and display materials and methods

All materials used for storage and display should be inert; that is they are

Poor, and good, storage. Hopefully this guide will help readers avoid the top scenario and follow the good storage at Selby Manor, below, including inert boxes and cabinets.

materials that do not emit any chemicals that would damage the collections. They should also be robust so that they can support the collections. Showcases and boxes should provide good seals to ensure the environment within the case or box can be maintained and to prevent the entry of dust and contaminants.

Vacuuming – one of the best ways to remove and deter pests.

It's important to understand that the agents interrelate with each other and that a joined up approach is likely to be the most effective method.

Objects that are more likely to react to changes in environment should be kept in a box or case, more robust objects can be on open display or on open shelves in store.

Poor support may cause damage to objects (metal plate hangers can chip plates) or allow the object to collapse resulting in damage. Open display makes it easier for objects to be handled or stolen. Barriers can help here but vigilant staff are one of the best prevention tools.

The materials used for decorating the building and the interior of showcases should be selected so that they are as inert as possible. For example, paints should be water-based, wood and wood products should be sealed with water-based paint or varnish. Oak should be avoided as this emits large quantities of tannic and acetic acid, which act as contaminants.

Fabrics used to line showcases or display panels should be conservation grade fabrics or made from cotton, linen, nylon or polyester. These need to be washed before use (very hot and if a detergent is used this should be non-biological) and be aware that some dyes can be damaging. The British Museum maintains a database of materials that they have tested, including fabrics. For storage, cotton (washed as above) is useful as it is inert, does not attract pests and is easy to wash. The synthetic fabric Tyvek can be used unwashed and loses its anti-static properties if it is washed.

Be aware of objects that will give off pollutants. Wool gives off sulphur that will cause silver to tarnish (e.g. buttons on a uniform or a silver cup in the same case); leather will give off acids that can affect metals, paper and textiles, and many historic plastics give off acids that will also affect metals, paper and textiles.

By regularly checking the collections you will be able to see if damage is occurring and remove either the affected objects or the source of the pollution. Note that this won't be possible if an object has mixed materials and one of these is affecting the others.

What can I do about it?

The list can seem very daunting and it can be tempting to do nothing as the easiest option or to focus on only one agent to the exclusion of the others. It's important to understand that the agents interrelate with each other and that a joined-up approach is likely to be the most effective method. As budgets and time are likely to be under pressure, it is helpful to prioritise actions so that resources are focussed where they will be of most benefit.

- If you currently don't have any Collection Care activities in your work programme, carrying out an assessment will help you to decide where to start. The free RAPT (Risk Awareness Profiling Tool) online tool will give you an overview of your museum and may flag up some major issues that you need to resolve – it is more important to ensure that your organisation is sustainable first rather than getting bogged down in the minutiae of monitoring. If you are carrying out collection care, a review such as Benchmarks in Collection Care or Signposts to Collection Care will help to illustrate where improvements could be made (see References).
- Once you have carried out a review or assessment look at the areas for improvement and carry them out. Prioritisation is helpful – at Birmingham Museums Trust a matrix was set up to look at the risk of **not** carrying out the improvement, the cost and time to do so, and tackled the high-risk, low-cost, quick actions

first. This meant that we could achieve something and make a difference without spending too long trying to find the funding. You may wish to look at it a different way; the important thing is to generate an action list and take action.

- You may also find it helpful to think about the requirements of other stakeholders when trying to prioritise. For example, the Accreditation Standard requires you to carry out monitoring and think about risk. If you have objects on loan then the lender may have requirements that you have to fulfil and if you are looking to insure collections via the Government Indemnity scheme you will also have to fulfil requirements around security and environmental monitoring.

Summary

- Build collection care into your regular work programmes – covering cases as part of the opening and closing procedures for example. This way it won't feel like yet another thing that you have to do, it will just be part of the normal process.
- Encourage members of your team to get involved. That way each person only has a small task to carry out, there is less reliance on one person's schedule and it is less likely to stop if that person leaves the museum.
- Make sure that you share the information you are gathering to help the whole team to understand why collection care is important.
- Keep going! So much of good collection care is about repetition – the same tasks have to be carried out regularly, year in, year out. This can seem dull, so introducing an element of competition between teams can help to keep it interesting!
- A good diary or wall planner is a vital and helpful tool to ensure that the tasks are planned in and don't get missed.
- Collection care is a great excuse to get up close with the collection, surely the reason that we are all in museums any way, so enjoy it.

References

The Museum Environment
Gary Thomson 1994
Butterworth-Heinemann. The original text and still the only resource to gather all the aspects together.

PAS 198:2012 *Specification for managing environmental conditions for cultural collections*
British Standards Institute. A very expensive book but it has some useful information about damage rates caused by RH/temp and light.

The National Trust Manual of Housekeeping
The National Trust. This book has some good general information on collection care and a lot of directions on caring for specific types of objects. It is one of the few books that give good information on looking after buildings and their interiors.
The research carried out by the National Trust, English Heritage and others on dust monitoring and analysis can be found at http://www.nationaltrust.org.uk/document-1355786855222/

The Old House Eco Handbook
Suhr and Hunt 2013. Francis Lincoln. This book contains information on proofing windows and doors and products that can be used to accomplish this.

www.collectionslink.org.uk has a number of useful fact sheets including those produced by SHARE East on specific aspects of collection care. The site also holds the *Standards in the (museum) care of* series which give guidance on caring for specific types of collection. This is also where you will find Benchmarks in Collection Care.

Build collection care into your regular work programmes – covering cases as part of the opening and closing procedures for example.

Signposts to Collection Care is a mini Benchmarks-type assessment and may be a simpler place to start if you have never done this kind of assessment before. Swfed.org.uk/images/resources/Collections/Signposts_to_collection_care.pdf

Pest Management: A Practical Guide. David Pinniger 2009 Collections Trust. Good insect photographs, information on monitoring and trapping.

www.whatseatingyourcollection.com Website with lots of insect identification information (and the most comprehensive set of insect pest photos anywhere) and guidance on trapping, monitoring and troubleshooting.

On-line e-learning about certain aspects of collection care can be found at http://www.museumoflondon.org.uk/. These were developed for the non-specialist.

Risk Assessment Profiling Tool (RAPT) will help identify gaps in your collections management policies – www.raptonline.org.uk

Jane Thompson Webb studied Archaeological Conservation at Cardiff University and became a freelance object conservator, moving into collection care in 2001 working for Birmingham Museums Trust (BMT). In 2004 as part of BMT's Renaissance in the Regions programme she was involved in establishing the Renaissance at Work (RAW) collection care training programme to museums and heritage organisation across the West Midlands region, which she still delivers. It is her favourite part of the job.

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