

Collections Care: What to Do When You Can't Afford To Do Anything

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The last decade has been a hard time for museums and cultural preservation. Although collections preservation has increasingly been seen as a national priority, Federal and local funding have diminished drastically for many programs and institutions, often with serious consequences both for staff and for collections care.

Hard times can mean hard choices. Perhaps the hardest choices facing museums now are finding ways to put money and staff energy into exhibits and public programs to keep attendance up, while still finding the time and money to take care of the collections which are the reason for the museum's existence.

When time is scarce, we have to find new ways to use it to provide the greatest good for the collections as a whole. Improving collections care requires planning, inventiveness, commitment, and considerable effort; it is easy to fall prey to "displacement activities", and find ourselves shining the silver, or taking home the christening dress to bleach and starch, because these activities give us a feeling of having accomplished something.

New Lamps for Old

It is true that some interpretive uses may require an "as-new" appearance: for example, a weapon in active military use would have been kept shiny because it was military practice to keep troops busy cleaning and polishing (as well as keeping the weapons in reliable working order). However, most historic objects are valuable because of their age, and don't need to look new. In many cases, the "condition of last use" or the appearance of "old but cared for" is more appropriate. Artifacts are actually non-written historical documents, and the specific history of the piece and the technological information contained in it can be destroyed by overzealous cleaning. In addition, most objects are not as strong as they once were, and cleaning methods appropriate for new things may cause damage: textile fibers have been weakened by light and washing, and intergranular corrosion in metals may cause the object to crack if strong cleaners are used.

So, Where Do We Begin?

As in medicine, the first goal should be to "do no harm": to prevent damage rather than trying to correct it, and to stabilize physical condition rather than improving cosmetic appearance.

Some of what we do to prevent damage to collections does require money, for example for acid-free storage materials; but in most cases we can begin with materials obtained by contribution (that tax receipt is a powerful tool!), upgrading as funds become available. Preferred materials will be discussed below, even though they may require supplementary funding, because knowing where you are going is an important part of starting.

The first step is to realize how many resources we do have, even if staff are in short supply. Most collections care projects can be broken down into smaller units which can be accomplished by groups of colleagues or by volunteers, although an overall plan is necessary in order to develop the smaller projects which will fit together in a meaningful way.

Heritage institutions know, better than most, how people have coped in hard times past, and we can adapt those techniques to our needs today. For example, although the number of volunteers available to do storage upgrade projects has diminished, “barn-raising” provides a model for “storage parties”, in which staff from neighboring museums can help each other on a day when the museums are closed, to vacuum, dust, and re-house artifacts. This puts an encouraging dent in an otherwise overwhelming project, while pooling ideas and supplies, and maybe even having fun.

Supplies, too, can be had inexpensively. Of course acid-free, archival quality boxes are best for storage, but if these cannot be acquired immediately, artifacts can be temporarily stored on paper-covered shelves under fitted dustcovers pieced together from old sheets. Humidity-sensitive objects can be placed carefully in labeled cardboard boxes, lined first with heavy polyethylene sheeting or aluminum foil, and then with well-washed white cotton bath towels or sheets donated by a local hotel. This is far preferable to having things on the floor in an inaccessible heap, vulnerable to floods and insects.

Information comes least expensively of all: the appended bibliography provides the specific information you will need for the care of different types of materials, for preparing plans for emergency preparedness and for long range preventive upgrading, for regular collections maintenance, and for grant applications.

Many of these books and articles are available on loan from local heritage associations. Those useful for frequent reference might be funded by a grant or by an astute donor. Heritage associations also provide workshops, which may include specialty advice from a conservator or environmental engineer, or may focus on sharing successful ideas within the professional community. Either way, the networks of resources built at these workshops are an important addition to the technical information provided.

The Canadian Conservation Institute has an excellent website on heritage preservation: <https://www.cci-icc.gc.ca/index-eng.aspx>

It is most helpful to have the advice of a specialist who can point out problem areas and help to determine priorities to fit your situation. Grants can pay the fees for an on-site visit and report by a conservator, and by a preservation architect for historic buildings.

Large museums may be able to provide lists of conservators in the area, although for legal reasons they may not make comments about quality, and are usually inclusive rather than selective. You may receive more specific advice if you can describe the type of problem you have, so that the conservator in the museum can attempt to suggest people who can address your specific concerns. Be sure to check references: not all conservators have experience with collections in historic buildings.

What You Can Do On Your Own

The Building Structure

You can start with a careful inspection of the physical structure of your building, taking account of past problems (leaks, flooding basements). Important elements are the roof, gutters and downspouts (where do they drain? directly into the foundation?), cracks in the walls, moisture penetration from deteriorated mortar or sandblasting, and the drainage on the site.

Eventually you may need the services of a structural engineer (one experienced with historic buildings, if your institution is in one) to advise on repair priorities and costs. However, you can begin to assemble information and record changes that will justify the expenditure for professional help, and make the engineer's inspection quicker. If you do not have a written building maintenance plan, this is the time to develop one.

Controlling the Environment

Mechanical systems to heat, ventilate, and cool the environment are desirable to maintain a constant relative humidity, if they are designed for your museum, rather than only for human comfort, as is the case with office systems. When museum standards are not taken into design consideration, office or residential systems may actually cause damage. A system compatible with collection needs may not cost much more; for this reason it is advisable to seek initial design advice from an engineer with experience in environmental controls in museums and historic houses.

Microclimates

When it is not possible to control the environment in an entire building to museum standards, humidity-sensitive objects (for example, those made of organic materials) can be kept in enclosed spaces such as display cases or storage cabinets or boxes, where environmental changes can be controlled more easily. It is advisable to seek the advice of a conservator experienced in environmental issues to decide how best to adapt this concept for your institution.

Humidity-Buffering Materials

Although extreme levels of relative humidity beyond recommended norms will permanently affect artifacts, by far the greatest damage is caused by sudden changes of more than 10 % within a few hours. If external changes can be slowed down before they reach the artifact materials, damage will be reduced.

This can be achieved by enclosing or wrapping artifacts with humidity-buffering materials: silica gel is perhaps the best-known example, but natural organic materials such as paper, cloth, and cardboard, also absorb excess humidity and release it slowly, slowing the environmental changes around the artifact. (If we are not to replace one type of damage with another, it is essential that these materials be free of acids and other undesirable volatile materials either inherent or added during manufacture. For this reason, wood is not recommended as a buffering material.)

Examples of recommended humidity-buffering materials include: acid-free tissue (preferably "non-buffered", which in this case means without the addition of alkaline substances to counteract acidity), washed linen or unbleached cotton muslin, washed old white sheets and towels, acid-free folder stock, acid-free mat board, and acid-free corrugated cardboard.

“A Box Within A Box”

In designing a passive humidity-buffering microclimate (one that controls changes in relative humidity by means of its innate physical properties, rather than through the use of mechanical HVAC control systems), it is helpful to use the concept of “a box within a box”.

In this concept, we think of the building structure as the first “box”, or protective enclosure, the storage room or gallery as the second “box”, a display case or storage cabinet or dust-cover enclosed storage rack as the third, a storage box or container as the fourth, and humidity-buffering wrappings or case lining materials as the fifth. Each of these “boxes” is a line of defense against damaging environmental fluctuations.

Monitoring

A recording hygrothermograph is useful (and expensive, but grant-fundable) because it automatically records the amount and timing of the fluctuations in relative humidity; the shape of the curves produced on the machine’s chart can also be diagnostic to an HVAC engineer in determining the adequacy and condition of your equipment. Two sources are:

Art Preservation Services, 44-02 23rd Street, Suite 102. Long Island City, NY 11101-5027 (718-786-2400) or <http://www.apsnyc.com>

Four-speed unit # 08368-60 from Cole Parmer (1-800-323-4340).

Each time a chart is changed, the machine should be checked for calibration with a battery-operated psychrometer (equivalent to the Cole Parmer model N-03312-20). The correct time, RH, and reasons for any unusual events (for example: “thunderstorm” or “school tour” or “rental wedding”) should be noted on the chart.

The battery-operated psychrometer should also be used to make spot checks of individual areas (ideally noted on a copy of a floor-plan). These should be taken in the same spot in the early morning, and again late in the afternoon, to determine the effect heat gain has on relative humidity. This will acquaint staff with areas of environmental extremes to avoid in designing exhibits. Anomalies may also indicate problems with the building structure that should be further investigated by a structural engineer.

Storage

Good storage is secure, clean, dry, and insect-free, with a stable environment, and no internal pollutants.

The **chemical stability** of all the materials used around collection materials is of critical importance to the preservation of those objects. Although some inexpensive substitutes for specially-manufactured archival materials can be used (for example, old washed white bath towels instead of silica gel as a humidity-buffering material), it is generally preferable to seek grant funding so that the work involved in a re-housing project need be done only once.

Until archival quality materials can be obtained, one may begin with the careful use of inexpensive materials, with a barrier layer (Mylar Type D, or aluminum foil with a cotton cover, or Marvel-Seal #1311) between the objects and the acidic material. The acidic materials can be upgraded later on. However, in high relative humidities, acids can be released from these materials as gaseous pollutants (noticeable from their odor) into the air surrounding the objects, so this situation should not be allowed to continue over the long term.

Examples of safe materials for storage:

- **Polyethylene** (for example clear sheeting, some slide storage pages, or Dow Ethafoam) (check with the manufacturer to get a product that has minimal manufacturing additives, such as “slip agents”; dry-cleaners’ bags are not recommended)
- **Polypropylene** (for example Microfoam, or some slide storage pages)
- **Polystyrene** (for example, clear storage boxes)
- **Polyester** (for example as fiberfill, or Dupont virgin Mylar Type D sheet)

Examples of materials that should not be used:

- cardboard that is not manufactured to archival standards
- tissue paper that is not manufactured to archival standards
- felt or colored fabrics that have dyes or chemicals introduced during manufacture
- poly(vinyl chloride) (VINYL) whether as sheet material, photo enclosures, or solid pipe
- plywood, Masonite, or fiberboard (some storage units may be retrofitted by sealing the exposed surfaces with a metal-polyethylene film material such as Marvel-Seal 1311)

Structural plywood panels trademarked by the American Plywood Association (APA) are reported to be made with phenol resin, not urea resin, which means that they less likely to outgas formaldehyde. However, the acidic gases from the wood itself must still be sealed with a barrier sheet.

No liquid sealants are known as this time to have been proven in practice to be both effective and inexpensive. C. Miles reports in Wood Coatings for Display and Storage Cases that neither shellac nor polyurethane is an effective barrier coating for wood or wood by-product materials used around collections materials, while oil-modified coatings (alkyd paints) actually cause corrosion. Two-component epoxy paints, and some moisture-cure urethanes show promise, but tend to be expensive. Hence the recommendation for the use of Marvel-Seal, since this is used in the construction industry as a vapor barrier, and it may be possible to obtain free remnants from building projects.

The selection of storage furniture is complex, involving the evaluation of variable risks, so the assistance of a conservator is recommended. For closed cabinets, avoid “baked enamel” coatings, as these are usually alkyd paints which can cause corrosion and possible textile fiber damage; select “powder coatings” instead. Open shelving should be of industrial strength; old units will probably have fewer volatiles from the paint than new shelving does, so the solicitation of donated shelving from downsizing industries is recommended.

Storage Questions You've Raised

Acid Free Boxes

Q *Should I use buffered boxes or not?*

A Buffered paper materials have an alkaline substance added (usually calcium carbonate) to neutralize any residual acid from manufacturing, and to keep them from absorbing acid from the environment around them.

Concern has been raised that alkaline residues could possibly react with materials made from proteins (wool, hair, leather, some kinds of historic photographs). This is a legitimate concern, but unfortunately the only boxes that are both acid-free and non-buffered also tend to be extremely expensive, and will probably be used only for extremely important artifacts.

(Available from Conservation Resources, 1-800-634-6932, or

[http://www.conservationresources.com/.](http://www.conservationresources.com/))

The most reasonable solution seems to be to use the best quality box you can afford, and to store protein-based materials separately in acid-neutral materials; professional advice is recommended.

Please remember that acid-free tissue is not a barrier to acid migration: this requires Mylar Type D or Marvel-Seal.

Q *How can I tell if the boxes have an alkaline buffer?*

A Sometimes only with difficulty; look for the designation "pH 8.5" which indicates that alkaline material has been added; most suppliers of archival materials include a description of their manufacturing specifications *somewhere* in the catalogue, which you can find if you are persistent.

Q *What is the shelf life of acid-free boxes and tissue?*

A This depends on the quality of the air around them. If the boxes are sealed in a powder-coated storage cabinet, in a room free of wood products, in an area with pollution-free air, you can expect years of life; on the other hand, a roll of acid-free tissue stored on a plywood shelf next to acidic cardboard boxes in a polluted urban environment may absorb acidic gases into the outer layers within a year.

It is good practice to use a Color-pHast strip to check the quality of newly arrived products (discard the outer two or three layers of tissue), and to check perhaps annually thereafter. Wet the Color-pHast strip in distilled or deionized water, and press it firmly against the paper for a few moments, then compare to the color chart on the package. An Archivists' Pen can also be used (be careful not to put the dot of ink near collections materials), but its range is very limited, and may not tell you all you need to know.

Q *To bag or not to bag?*

A It depends what you are protecting your collection from. If you are downwind from a gas well, or if you have recurring insect infestations, these may be considered greater hazards than contamination by plasticizers and manufacturing additives in the bags (see Williams, Stable Materials for Use in Storage), or the possibility of condensation during power failures.

If you can use archival quality polyethylene or polypropylene, you will reduce the hazard, and if you wrap the object first in acid-free tissue, you will avoid the danger of water staining from condensation, even though you lose visibility.

Q *But plastic is plastic, right?*

A Wrong. Many plastic materials may be manufactured with additives to facilitate handling (slip agents and anti-static chemicals) or to extend shelf life. For example, some dry cleaners' bags were observed to cause yellowing of white fabrics: this turned out to be due to BHT added to the polyethylene. It is preferable to choose archival quality plastics from specialized suppliers, and leave the Baggies for lunches.

A Little Support

When deciding on how to store or display an object, it is important to consider the "natural position of rest" of the object, in order to determine whether it needs some form of support or padding.

The "box" concept helped us to decide on how many enclosures are needed to protect the object from the environment, by conceptualizing from large to small. In order to design supports, we must reverse the process and think from the object out:

- Does the object need padding to prevent abrasion or vibration?
- Does it need a support to prevent sagging or to hold it in place?
- Is a box or case needed for support or for a microclimate enclosure?
- How big does the container need to be to contain the object and padding/support, without crowding or folding?
- How will this container best fit in the cabinet or on the shelf to provide easy access?

Shedding Some Light...

By now everyone should be able to chant in unison, "50-100-150 lux", so this topic will be left to the specialized discussions in the literature. However, on a practical note, most visitors can see quite well at low levels, providing that they have been led gradually from bright outside areas and windows to lower light levels, and that even, wall-washer illumination is used rather than bright spots and dark shadows. See the full discussion in Thomson, [The Museum Environment](#), a copy of which should be in every museum.

The lux- or footcandle light meter is a useful museum tool, as it is difficult to evaluate light levels by eye. Inexpensive models may be obtained from Edmund Optics (Lutron LX-101 Lux Meter), 101 E. Gloucester Pike, Barrington NJ 08007-1380 ([1-800-363-1992](tel:1-800-363-1992)); or from ExTech Instruments Corp (model AC 401025 Foot Candle/Lux Meter), 9 Townsend West, Nashua NH 03063 (877-239-8324).

Handling

A good resource, such as The ABCs of Collections Care, published by the Manitoba Heritage Conservation Service, should be read by each person handling collections, since careless handling is the second greatest cause of damage to museum collections.

Receiving and workshop areas should be kept clear of obstructions, with clean padded tables for receipt and inspection of incoming material.

Mobile racks or shelving can be used in temporary storage areas to maximize use of space, prevent accidents, and to help organize workflow. The wheeled chromed-wire racks used for restaurant food storage are excellent for this if the shelves are padded with a layer of Microfoam. Zipped nylon dust covers are available, which provide a neat appearance, and protect the objects within from dust and curious fingers.

Cafeteria tray carts are more compact and useful for moving smaller items, and are acceptable as long as objects are not left on the plastic trays longer than a few days. Baker's carts with aluminum trays (to be padded with Microfoam) offer slightly larger dimensions and are chemically more stable. Many of these items can be donated or acquired from restaurants going out of business.

Pests

Many museums have a history of problems with insects, moulds, and errant rodents and birds.

Some have a regular pest control contract but this is usually not a significant substitute for an integrated program of pest prevention.

In many places, staff prepare food and eat on the premises: this is a high-risk hazard, which can be minimized if all food is kept in the refrigerator, and the preparation area is swept daily.

It is also advisable to restrict the consumption of hospitality food to a reception space outside the galleries and away from storage areas.

Recommendations

- Assign food preparation area cleanup to individual staff members on a rotating basis to ensure that no food residues remain that could be attractive to insects.
- Implement an integrated pest prevention program:
 - Install "sticky traps" and monitor for insect specimens, especially in storage, as many insects avoid the light and are not visible unless deliberately sought.
 - When collection areas are swept, debris should be collected and examined in strong light under magnification for evidence of insect activity such as cast skins, eggs, and larvae.
 - Insect occurrences should be logged in a central place to learn what patterns of infestation may exist, and for treatment reference if necessary.

- A copy of A Guide to Museum Pest Control should be available for reference (see bibliography for ordering information).
- It is helpful to have an entomologist set up a reference box of museum pests and common non-pest insects to facilitate the identification of specimens found in the museum. These should be logged in a central place for reference by staff and by pest control specialists.
- Inspect roof areas for birds and bats, whose droppings harbor infestations, as well as being health hazards. A product called "Bird Tanglefoot" has been used to good effect in getting rid of nesting pigeons.
- The list of pesticides in A Guide to Museum Pest Control should be used to check any sprays or powders proposed by pest control contractors. Baseboard sprays usually have an oily base that should not be allowed to come into contact with museum objects.
- Incoming collection materials should be inspected and vacuumed to remove insect eggs in an isolated holding or preparation area before being placed in storage.

Collections Maintenance

Dusting and custodial care are as important for collections in museums as they are for homes, although certain familiar materials and techniques may not be recommended for museum use. In general, oily "dust collectors" and sprayed polishes should not be used: clean lambswool dusters are preferred.

All furnishings and boxes should be moved at least once a year to remove dust (all around, on all surfaces), and to remove possible havens for insects.

A written maintenance schedule should be developed (see Museum Housekeeping: Developing a Collections Maintenance Program by Pamela Randolph, in the publication by the Virginia Association of Museums) and should be rigorously followed. The Manual of Housekeeping by the National Trust of England discusses all aspects of maintenance for most historic materials, and is very highly recommended (especially since we do not have an American equivalent), even though the English tone may take some interpretation. A video version is also available.

Cleaning of Specific Materials

This is a lengthy topic, and cannot be covered adequately in this article. The bibliography lists excellent books and handouts for most materials. Groups of museums may also wish to consider joining together to conduct regional (and grant-fundable) workshops by conservators to teach specific techniques such as textile washing and repair, furniture maintenance, and metal cleaning and polishing.

Recognizing Problems

The NY State Conservation Consultancy series, now issued by the Smithsonian Press as the book Conservation Concerns edited by Konstanze Bachmann, lists recommended storage techniques for various categories of materials, along with descriptions of how to recognize problems, and when to call a professional. All museums should have a copy.

Planning

Emergency Preparedness

Plans should be updated annually, and should contain the following:

- written schedules for maintenance of emergency systems and fire extinguishers, and for regular drills and tests of alarms;
- lists of staff responsibilities in emergencies;
- lists of supplies for recovery of the collections after fire or other disaster, the location of off-site recovery caches of these supplies;
- priority lists and locations for the most valuable collection items. (This list may be kept as a separate section with restricted distribution.)

Local emergency preparedness coordinators (fire, city, county, and state) should have copies of the plan, should be consulted during its development, and should be informed of the special nature of the building and its contents.

The bibliography lists a number of publications on emergency preparedness planning; however, it must be admitted that the preparation of emergency preparedness plans is tedious and time-consuming. Given the small size of the staff of most institutions, this might be assigned to a board member or contracted out. dPlan (<http://dplan.org/>) is a free online template emergency plan, with lists of supplies. This will give you a workable plan quickly; it can then be refined during the annual review.

Planning New Space

Successful collections maintenance sometimes leads to a need for new space: planning is the most important phase, and should be started well in advance of political probability, to ensure that nothing is left out in the usual rush to build.

Several articles have been listed relating to planning museums and museum spaces; one of the best is Gail and Barry Lord's book, The Manual of Museum Planning.

Early in the conceptual stage, the building planning team should seek advice from an engineer experienced in HVAC systems for museums, a conservator, and someone from a museum who has already gone through the process.

For collections storage, it is essential to have a list of collection types and materials: this will allow a conservator to help you by recommending storage furniture and environmental zoning. Typical sizes, and quantities, for each type, along with growth and usage projections for the next 25 years, could be plugged into a computer spreadsheet to help plan the space and storage furniture configurations required.

The intended kinds of programming will have an effect on planning: for example, an active temporary exhibit program will require large staging areas and a different kind of workshop from a permanently installed collection; “accessible” storage needs more space than traditional “dead” storage.

If “accessible storage” is desired, experience has shown that it is cost-effective to take the time to plan cases around the collection objects to be put into them, rather than commissioning elegant generic cases in which the objects cannot be safely accommodated.

At the end of construction, an independent engineering firm should be employed to check and test all construction and mechanical systems to ensure that they have been installed to specification and that they function as required. This will save enormous amounts of staff time finding and following up on deficiencies, and may even allow rectification during the warranty periods.

Long Range Conservation Plan

Evaluate your collections carefully before taking conservation action. Survey the physical aspects of your museum to determine their impact on your collections. Identify projects for improvements in storage and display, and know which items in your collection are both significant and in need of conservation treatment. Thoughtfully prepare a prioritized long-range conservation plan to guide your actions. Become familiar with the techniques, tools, and materials that will help you to carry out the plan.

Varying ways to approach these plans are discussed in the technical information articles of the Conservation Awareness Project of the Virginia Association of Museums; this project may be a useful model to help you develop a workshop to compare and discuss long range conservation plans with museums similar to yours. However, it is important that *your* plan be developed within the context of your own institution's goals and capabilities, by the people who will have the responsibility for implementing it.

Finally, remember to update your Plan at least annually, and keep a list of the projects you have accomplished (with photographs!), so that on those dark days when it seems that you just can't do anything, you can look back and see how much you have in fact achieved.

NOTES

1Dennis Piechota, of Object and Textile Conservation, 16 Central Street, Arlington MA 02174, first articulated this concept.

2 This article was first suggested and published as Technical Insert # 54 in 1991 by the Illinois Heritage Association; it was expanded and included in the Interiors Conference for Historic Buildings II (1993) at the request of the National Park Service, and was reprinted again as a Technical Leaflet by the American Association of State and Local History.

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