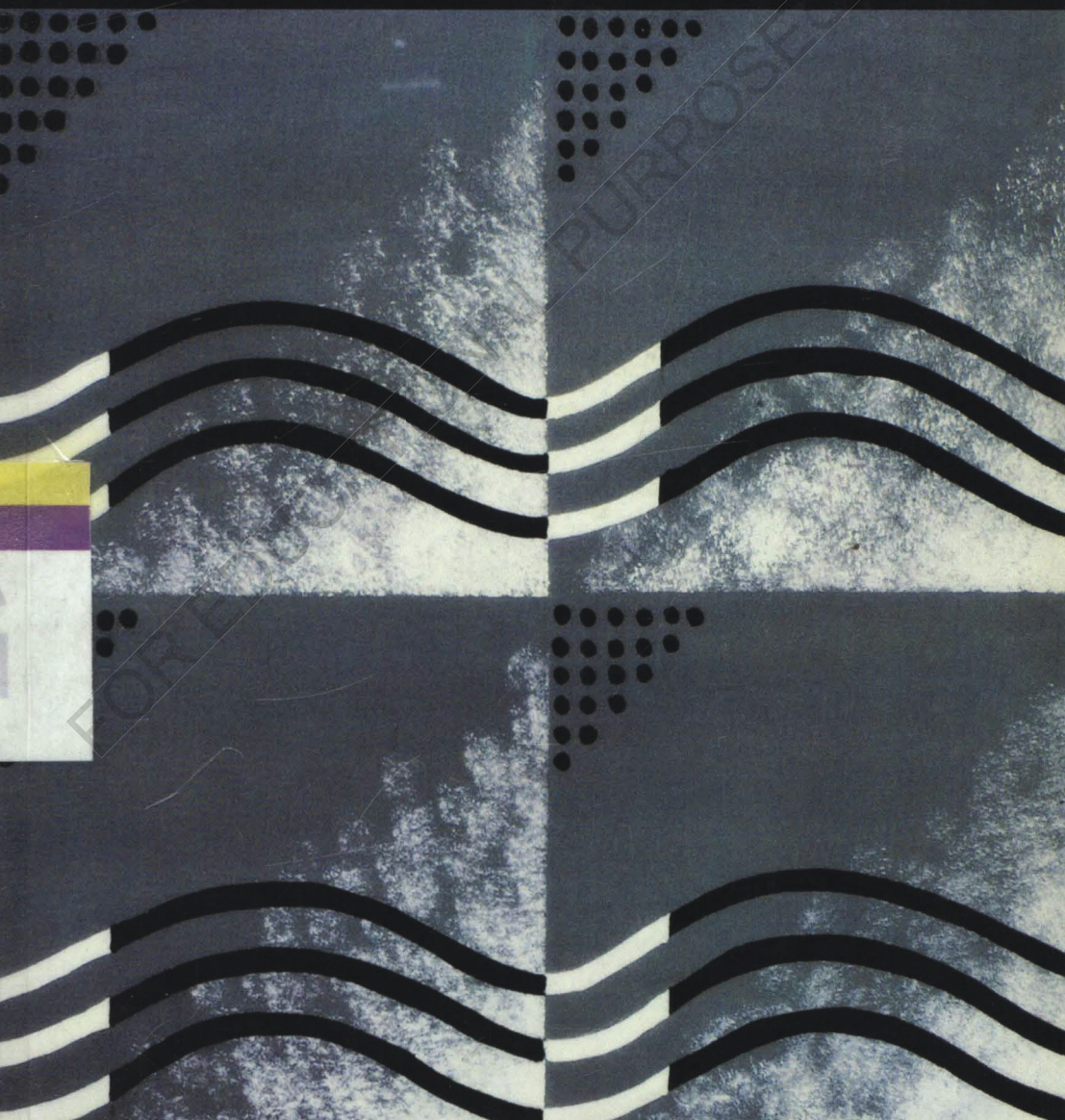
# Conservation Concerns

## A Guide for Collectors and Curators



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Editor



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Cooper-Hewitt, National Museum of Design, Smithsonian Institution, Gift of Donald Deskey, 1975-11-29

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# Foreword

Cooper-Hewitt, National Museum of Design, Smithsonian Institution, is responsible for the preservation of one of the largest repositories of design in the world. With nearly a quarter of a million objects in its collections, ranging from drawings and prints, books, wallcoverings, and textiles to silver, glass, metalwork, ceramics, and furniture, Cooper-Hewitt is faced with the same problems that confront all who care for collections. *Conservation Concerns: A Guide for Collectors and Curators* is an expression of the Museum's belief in the importance of conservation.

In 1981 the Cooper-Hewitt Museum New York State Conservation Consultancy was established with a grant from the New York State Council on the Arts. Its goal was to further preservation of the cultural heritage of New York State. As part of its educational mission, the Consultancy commissioned a series of bulletins providing basic information on the care of collections. The popularity of these publications made it apparent that the need for information on conservation is great. *Conservation Concerns* presents the Consultancy bulletins in a single volume.

This important collection of essays is infused with the knowledge and dedication of Konstanze Bachmann, Paper Conservator at Cooper-Hewitt. Her concern for the preservation of our cultural and artistic patrimony was the impetus for making this informatior available to a wide audience. Nancy Aakre, Cooper-Hewitt Editor, has worked closely with Ms. Bachmann to bring this work to press.

Support from the New York State Council on the Arts and the J. M. Kaplan Fund has made the production of this volume possible. We are grateful to them for their assistance.

Dianne H. Pilgrim
*Director*

# Acknowledgments

Many people have contributed to this book and helped to make it possible. I would like to thank New York State Council on the Arts for their funding and support of the Cooper-Hewitt Museum New York State Conservation Consultancy. Heartfelt gratitude goes to Lisa Taylor, who had the vision to undertake the Consultancy and who first encouraged me to publish these essays, and to Nancy Aakre, who cheered me on from beginning to end. My fellow conservators have been generous with their time, advice, and thoughts, and to them I extend a special thank you. Finally, I would like to express my appreciation to Dianne Pilgrim, Director of Cooper-Hewitt, for her belief in the importance of this book and for her continuous support.

Konstanze Bachmann

# Introduction

The essays presented in this book were born of the desire to share knowledge and information about conservation with others. The intention has been to make the basic concepts of preservation and conservation readily accessible to everyone caring for collections, especially those who lack the resources and trained personnel that usually are available to larger public collections.

Frequently private collectors and curators in small institutions assume that conservation of their collections must be different in kind or quality from conservation in large institutions. In fact, if differences exist, they should at most be ones of extent, not of intent. Conservation is the responsibility of all owners and collectors regardless of resources, and it is a responsibility that all can meet.

Collection care is not a new idea. The practice of restoration can be traced as far back as antiquity. Over the centuries, conservation was generally limited to repair or disguise of past damage and was usually carried out by artists and artisans experienced in making the kinds of objects they repaired. The sixteenth-century artist and biographer Vasari thus writes of restoring Pietro Lorenzetti's frescoes at Arezzo "at his own expense and with his own hands."

Changes in attitude toward the preservation of art and artifacts are first documented in the late eighteenth and early nineteenth centuries when advances in science brought new understanding of the material world. Conservation remained the domain of artist-restorers, but the stage was set for the collaboration of professionals in science, art history, and restoration.

By the early twentieth century, large museums and public institutions had founded their own restoration departments. At the Berlin State Museum the interdisciplinary approach to conservation began in 1888; at the British Museum, in 1921; and at the Louvre, in 1930. In the United States, the earliest collaborative effort was undertaken in the mid-1920s by a conservator, a chemist, and a museum professional at the Fogg (George L. Stout, Rutherford J. Gettens, and Edward W. Forbes, respectively).

The first international conference on conservation took place in Rome as recently as 1930. Out of this beginning grew the International Council of Museums (ICOM), founded in 1946, with headquarters in France; the International Institute of Conservation (IIC) in 1950, based in London; and the American Institute of Conservation (AIC), formed in 1973. With increasing concern about preservation, interest groups and associations have formed worldwide to promote training and research in conservation.

Conservation today is a scientifically informed discipline guided by general principles as well as by a growing body of written information. This is not to suggest that conservation is a science. Scientific investigation and research have greatly contributed to a better understanding of the processes of deterioration and have provided safer methods of testing and treatment; however, only the sensitivity, knowledge, integrity, and skill of an individual can make possible a synthesis of science and art within the framework of ethical strictures that bound the practice of conservation.

The basic tenet of conservation is above all do no harm. Yet even this simple injunction is difficult to uphold. The cleaning of paintings, for example, although often thought to be easily accomplished, can be quite difficult and cause considerable damage if not done correctly. Paint surfaces are easily abraded by the mechanical action necessary to remove dirt and varnish, and solvents used to remove surface coatings may dissolve the paint beneath. Likewise, materials sufficiently aggressive to remove stains and discoloration are often damaging to an artifact. Bleaching of paper, for this reason, is no longer a commonly accepted practice. As conservators have come to understand the chemical processes underlying their treatments, they have become more conservative in their approach.

Another principle, namely, that every treatment should be reversible, also must be understood within the context of conservation. Some treatments by their nature are not reversible. Cleaning procedures such as varnish removal obviously cannot be undone; similarly washing a textile or paper is irreversible. In designing a treatment conservators must take into consideration that present and future research may bring better understanding and knowledge. At times the best course is to stabilize an object in storage until a safe treatment can be found.

Research and codification in the field of conservation have put an increasing number of proven treatments at the disposal of conservators, yet even established procedures are not always appropriate. Ultimately, many other factors affect the choice of treatment: the nature and use of an object, its historical significance and documentary value, aesthetic considerations, personal experience, the taste and biases of the surrounding culture, and such uncontrollable outside influences as climate and geographic location.

As the global environment has changed, acid rain and air pollution have become an issue to the extent that preservation for outdoor sculpture may mean removal from an original site. The advanced deterioration of much of the sculpture from the Acropolis, for example, has required its removal from the place it held for over two thousand years. Whether to preserve documentary evidence or aesthetic properties is a dilemma inherent in the treatment choices for archaeological metal; removal of corrosion may reveal original surface appearance but at the same time cause alteration in dimensions and destroy part of an object's history. The debate over the removal of past changes, for example a repainted surface or a fig leaf added during a more censorious era, is still very much alive. Whether changes that are not original should be left depends on an object's history and use. The fact remains that the restoration of an aged artifact to its original state lies outside our reach since no one present can bear witness to its original appearance.

Even though every treatment is an intervention and may cause changes, repair of damage is necessary at times and must be part of preservation planning. At present,

minimal treatment is preferred; this leaves an object closer to its original appearance, presents a lesser risk, and affords the opportunity to await a better treatment technology. The thinking that underlies this approach has evolved over the past twenty years and is the basis for the change in orientation from treatment for a single object to preservation of whole collections or classes of objects. The emphasis in conservation today is on prevention of deterioration through control of the environment, in climate, storage, and on exhibition.

The continued survival of collections depends on the willingness of collectors, scientists, and conservators to support preventive conservation. Preservation is not the responsibility of a single profession, it is the obligation of all in charge of private and public collections.

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# Principles of Storage

Konstanze Bachmann and Rebecca Anne Rushfield

Whether or not an object will be preserved for the future is most dependent on the kind of storage provided for it. Costly and complicated conservation treatments are of little use if the objects treated are subsequently returned to damaging environments. By providing the best storage possible, we are taking the first and most important step toward preserving our cultural heritage.

The condition of an object depends on two factors: the materials and methods of its manufacture, and the environment it is exposed to over the course of its lifetime. Most often little can be done to correct the results of inherently poor materials and craftsmanship; much can be done, however, to lengthen the life of an object by controlling its environment.

Ideal museum storage space has climate controls and monitors for relative humidity, temperature, fire, and theft. The space should be closed and accessible only to a limited number of staff members. Within this space, objects should be accessioned, inventoried, and arranged according to a system of organization—whether by material, size, or cultural/historical grouping—in storage units fabricated from materials that meet strict conservation standards. In planning storage no matter how small or large the budget, it is important to keep an optimum system in mind.

## Planning

The primary consideration in planning for storage is the nature of a collection. A collection that is composed solely of flat works of art on paper, for instance, requires only one type of storage, whereas a collection of artifacts in many media and in various sizes needs a variety of storage units and spaces.

In the planning stage it is important to have a complete record of all items in a collection—a catalogue, or listing, that is cross-indexed by location, type of artifact, material, or other significant factors. While full technical and historical cataloguing is the ideal, the minimum requirement is that every object have a unique and permanent code (typically a number) and be marked with it. This accession/catalogue number clearly establishes the individual identity of each object and makes it possible to keep track of its location. A museum that has a complete record of its collection can use this data to make an inventory of the types and sizes of the objects it owns, and to calculate spatial requirements.

Other variables to consider when designing storage space are whether or not an area will house a study collection that is on view to the public; whether or not objects are moved in and out of storage frequently; or whether the institution has one permanent exhibition and keeps the rest of its collection in storage.

## Location

Storage areas ideally should be located in a central space within a museum building, away from outside walls, heating plants, water mains, and daylight. Direct access to related facilities (registrar's office, loading dock, fumigation chamber, conservation laboratories, and curatorial offices) will also contribute to the safety of the objects. Basements and attics are the worst possible locations for storage because they are closest to the exterior of the building and are exposed to extremes of relative humidity and temperature. Unfortunately, they are often the only locations available; an understanding of the special problems of such spaces can help make basements and attics better environments despite their inherent limitations as storage space.

## Climate Control

A storage facility should be designed to exclude the ambient environment. Rapid fluctuations in temperature and relative humidity are particularly harmful to objects, especially those composed of organic materials, which undergo dimensional changes with changes in relative humidity and temperature. Generally acceptable temperature and relative humidity standards for most museum objects and artifacts are 65°–70° F (18°–21° C) at 47%–55% RH.

The best method of controlling the environment is centralized climate control: a system in which incoming air is washed, cleaned, heated or cooled, adjusted to specific conditions, and then injected into the storage space. The installation of such a system is often a financial impossibility. An alternative is localized climate control; air conditioners cool the air and absorb some of its moisture while filtering out gross particles; they do not condition the air, nor do they filter air pollutants. More sophisticated systems that use activated carbon filters and have humidity controls are also available. To adjust levels of relative humidity and heat, one can use humidifiers (evaporating type) and/or dehumidifiers (condensing type for hot climates), coupled with fans and/or heaters, as well as wall covers of plasterboard panels, fabric, and other moisture-absorbing materials. If no funds are available for the purchase of equipment or costly materials, all vents, doors, windows, and passages that allow an exchange of air between interior and exterior should be closed off and locally applicable controls should be used.

It is important that all equipment be maintained and cleaned regularly to insure its continuous functioning. A constant environment cannot be maintained if the equipment is turned on and off cyclically.

## Lighting

Light, both visible and invisible, is damaging to most objects. The quantity, or level of illumination (number of footcandles, or lux), as well as the quality of light, or type of wavelength (ultraviolet to infrared, measured in nm), must be considered. Ultraviolet radiation (UV) is extremely damaging to many materials; it is part of daylight but can also be emitted by other light sources. Recommendations for light levels or general background illumination are 5 footcandles (50 lux) for highly sensitive objects, usually of an organic nature, such as textiles, watercolors, and paper, and 15–20 footcandles (150–200 lux) for moderately sensitive objects like oil paintings. Higher levels are acceptable for short periods of time for certain functions such as scholarly examination.

Natural sunlight should be eliminated from storage areas by closing off all windows in the space or by covering the windows with heavy black curtains or

shades. Fluorescent tubes and/or tungsten-halogen lamps within the storage facility must be covered by filters that absorb the ultraviolet component of their light, especially if these lights are used as the primary light source. In general, lights should be turned on only when people are in the storage area. Excessive use of incandescent lamps should be avoided since they generate heat and can create localized fluctuations in temperature and relative humidity. Care must be taken that bulbs and lighting tubes are located sufficient distances from objects to avoid fire hazards as well as to prevent deterioration of materials. Lights in storage areas should be turned off when the areas are not in use. If emergency lights are required, they should be located in areas with less light-sensitive materials.

## Storage Materials and Methods

Good storage should be accessible, permit easy movement of objects, and be safe for both objects and persons. Museum collections are usually made up of various types of objects and more than one kind of storage unit and layout is necessary to meet those requirements.

The basic types of large storage units available are cabinets, flat-drawer files, bins, and shelves (either stationary or on casters). Such units are widely used in industry and are readily available in many sizes and materials.

If open shelving units are to be used for the storage of artifacts, the shelves must be padded; foamed polyethylene (Ethafoam, for example), cotton, synthetic felt, or similar materials, such as non-glued polyethylene batting, will cushion the objects placed upon them and prevent them from moving in response to vibrations. If wooden shelves must be used, they should be coated with an inert sealer to reduce the migration of acidic material from shelf to object. They should be lined with a material such as polyester sheeting (Mylar) or other barrier materials such as laminated metal foil (Marvelseal). Some hardwoods are acceptable, but oak is not. If plywood is considered, only exterior adhesive-grade type I with A or B veneer should be used. Inert, open-mesh shelving, or grating, can be used for lightweight objects, such as woven baskets, which require continuous air circulation. Any open shelf unit should have barriers across the front of its shelves to prevent objects from falling off.

It is preferable to place smaller or more fragile objects inside storage boxes that are housed on shelving units rather than to place the objects directly upon padded shelves. When choosing a storage box, the rigidity and durability, the composition and buffering quality of its liner, and the ease of opening and closing must all be taken into consideration. Another option for the storage of small objects is open-drawer storage with divided compartments. Flat objects, such as textiles or prints, can be stored in flat-file drawers or in boxes. Flat objects should be separated from one another by sheets of tissue or placed in individual folders or trays made of paper.

Vertical sliding racks are used for storage of paintings, mirrors, and other framed objects. Since sliding racks require a space twice the length of the screen, they may be impractical in many situations. Another system is a series of narrow wooden or metal slots (large bins close to the floor and smaller bins above.) These slots (bins), as well as any cabinets or shelving units, must be raised at least six inches above the floor level to reduce the possibility of damage from flooding. Large objects, such as furniture or musical instruments, should be placed on raised platforms padded with carpeting.

## Maintenance

Even if there is no budget for equipment or supplies, storage can be upgraded through a regular maintenance program. Museum storage must be kept free from dust and other airborne particles, since dust attracts insects, is abrasive, and contains mold spores, to mention only a few reasons. The ideal method for controlling airborne matter entering a storage room is a positive pressure system in which the air pressure within the room is higher than that of the adjacent rooms.

If storage space is furnished with cabinets having tight-fitting doors (sealed with inert gaskets) and with curtains or venetian blinds for open units, and if all vents and windows are sealed, the level of dust and dirt reaching the collection will be minimized (fans can be used for ventilation). Individual objects can be wrapped in neutral tissue or undyed or unbleached cotton or linen and covered with plastic sheeting such as polyethylene to prevent abrasive dust particles from settling on them. The tissue or fabric is needed to protect the objects from abrasion and to prevent condensation as well as static charge from the plastic. Storage areas should be cleaned on a regular basis and be kept in good repair. When it is time to repaint the storage room, a water-based acrylic paint (acid and sulfur free) should be used.

A record of the environmental conditions of the storage area is an important part of a good maintenance program. Various types of recorders for humidity and temperature are available. Regular tours to inspect the condition of objects in storage are another important part of this program. Objects composed of organic materials and metals should be checked periodically for warning signs of environmentally linked problems—brittleness, discoloration, mold growth, pest infestation, and spreading corrosion. Regular checking and maintenance discourage pests from establishing themselves. Incipient pest infestations should be dealt with immediately with the assistance of a professional exterminator.

## Handling

Standard handling procedures must be followed during condition inspections and whenever objects are moved; only trained personnel should handle collection items. The rules for handling are as follows:

- No object should be moved from its present location until a space has been prepared to receive it.
- Heavy, large, or awkward objects should never be moved by one person alone.
- Padded trays or dollies (for large objects) should be used to transport objects.
- Anyone moving an object must have clean hands; clean cotton gloves must be worn when handling metal objects.
- Objects should be grasped with two hands around or below their widest part—and never by a handle or other protrusion.

## Security and Safety

Museum collections are made up of objects having great historic and/or monetary value. If they are misplaced, stolen, or destroyed by fire, they cannot be replaced. Security and fire protection are an essential part of a comprehensive storage program.

Intrusion detection and alarm systems that are sensitive to sound and movement may be installed in storage areas; such systems should be tied in with a central board at the institution and a commercial central station, or where possible, the local fire or police department. The least costly method for preventing thefts, however, is to limit access to storage

areas. All visitors to storage, regardless of who they are, must be accompanied by a staff member. There should be a record of all movement of objects and persons in and out of storage.

Every collection should be protected by a modern early-warning fire detection system using smoke detectors (photoelectric or ionization sensors). A fire alarm must be sounded *prior* to any attempts to put out a fire. As in the case of intrusion detection, it is important that any alarms be sounded within the institution and to appropriate outside agencies. A supervised sprinkler system with a two-zone alarm will protect a building and collection in case of fire and minimize danger from mechanical failure of the controls. Halogenated extinguishing systems work only under very particular circumstances; an institution considering such a system should carefully evaluate the environmental impact of Halon.

Hand-held fire extinguishers of approved rating can put out a small, localized fire or flame and contain its spread. Personnel must be trained in the use of this equipment; in the hands of an untrained person, a hand-held unit could do more harm than good. Fire extinguishers should be placed at strategic locations within a building; the minimum requirement is a fire extinguisher at every exit and entrance. One must remember that hand-held units are not meant to fight large fires.

Most important, every institution must have a flood and fire emergency plan. Disasters cannot be prevented. A well-prepared plan for such occurrences will make it possible to save much material that would otherwise be lost.

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