Postcards: Navigating the Preservation Options

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The preservation of collections of postcards is at once simple and a complicated topic of discussion. While a prescription for ideal collections management is easy to write, determining the extent to which the achievement of that ideal is appropriate, given the nature, long-term value, and anticipated use of a given collection, can be challenging. To complicate matters, the cost implications of various preservation strategies vary significantly. Reviewed here are the issues, ideals, and compromises associated with the care of paper-based materials. Choosing from among options is the business of collectors, curators, and scholars.

The Hazards

Mechanical Deterioration

Postcards, if put to their intended use, are subjected to considerable handling. Typically, after manufacture they are packaged, shipped, unwrapped, put on display at a retail store (often in metal racks), and shuffled mercilessly by buyers as selections are made. Once purchased, postcards are likely to be stored carelessly (why not?) and are later written on--often with water-soluble inks. (In the past, writers sometimes chose water-soluble inks for fountain pens; today, many felt-tip pens carry inks that are fugitive in water. To test a pen for permanence of its ink, simply write on paper, allow the ink to dry thoroughly, and spray or splash lightly with water. The results are sometimes startling, and are fair warning to collectors to keep their holdings well protected from moisture.)

After stamps are stuck onto corners, postcards are slipped into mail- boxes where they are often crumpled under the weight of the day's accumulation. Next they are loaded into bags, transported to post offices and dumped on counters behind the scenes, fed through automated cancellation machines (or, rarely these days, hand-cancelled), sorted, rebagged, shipped, sorted again, delivered to a postbox, and retrieved by the addressee. From there, it's anyone's guess what happens to a postcard between the time it fulfills its intended mission and the time it is recognized as having sentimental, informational, and/or aesthetic value, and is collected. At this juncture, handling can either decrease because of a perceived heightened value, or it can increase because it has become part of a heavily consulted reference tool.

The consequences of handling are familiar to all who are interested in paper-based information resources—soil, oil, stains, edge tears, rounded and split corners, and creases. Among the collector's curatorial challenges is to halt mechanical deterioration to the greatest extent possible, recognizing that unless he or she is either wealthy, a conservator, or both, the damage that is already done will never be reversed. Rather, it will remain as a record of past use, and to some extent, an interesting part of each item's

history. Strategies for reducing wear and tear, and for minimal treatment of damage, are discussed later in this article.

Chemical Deterioration Resulting from Inherent Properties

Most postcard collectors have probably come across a discussion of the role of inherent acidity in promoting the deterioration of paper, and have handled brittle, crumbly specimens. Acid in paper catalyzes hydrolytic degradation, causing breaks in the long chains of glucose molecules that make up molecules of cellulose. These scissions cause paper to lose strength, which is often measured in terms of its ability to endure repeated folding without breaking (that is, "fold endurance").[1] Paper may be acidic for one or more of the following three reasons. First, the source of the cellulose from which the paper is manufactured may not have been fully processed to remove the acids inherent in natural plant material. Cotton requires minimal processing; wood requires extensive processing.[2] Second, even if the raw plant material has been cooked and bleached to remove acids and other impurities, acid may have been reintroduced through such processes as sizing to create an effective printing surface, and/or dying to produce color.[3] Third, acids may have been transferred to the paper during handling, or as a result of storage in an acidic environment (an acidic box, for example).

Since the appearance of the postcard on the communications scene post-dates the introduction of acidic papermaking processes, the overwhelming majority of all specimens is acidic. Deterioration is inevitable but can be slowed drastically. Several deacidification processes have been developed to neutralize acids and impregnate paper with an alkaline reserve. Alkalinity, on the opposite end of the pH scale from acidity, extends the life of paper. The presence of an alkaline reserve inhibits re-acidification over time, and is referred to as a "buffer" (thus the term "alkaline/buffered paper"). While deacidification is possible, it is rarely practical. Treatment must be carried out professionally to ensure that appropriate decisions are made regarding which papers can be deacidified uniformly and without damage (some cannot), and whether a change in pH is likely to initiate color changes. Even in the best of hands there are risks associated with deacidification. Its place is in the conservation lab.[4] It is far better to invest in the creation of a hospitable storage environment for a postcard collection than to attempt to alter its chemistry. The curatorial role is one of stabilization and care—not of treatment.

With every passing year more alkaline/buffered papers are produced for printing, largely because it has become more economical to retool a papermaking plant and convert from acidic to alkaline processing systems that to continue to make acidic products. Whether the postcards produced in years to come will be made from long-lived card stock remains to be seen. (Few of the relatively new cards tested by the author using a pH indicator pen, available through archival supply houses, were alkaline.) New technical capabilities, environmental issues, and market forces will surely alter papermaking practices in the foreseeable future, and trends are uncertain.[5]

Deterioration Caused by Heat and Moisture

There is no greater threat to the survival of collections of postcards than environmental conditions that heighten rather than diminish the effects of inherent acidity. Heat and moisture accelerate both the hydrolytic and oxidative processes that degrade paper. For many years, the preservation literature promoted the following guidelines for climate control in library stacks: 50% relative humidity (RH), and 68° F (the low end of the human comfort zone). Thanks to the work of Donald Sebera, we have a much clearer understanding of these matters today. Sebera points out that the potential useful life of a paper at one combination of temperature and relative humidity can also be achieved at a higher temperature if the humidity is reduced, or at higher humidity if the temperature is reduced. The two factors work together to influence environmental quality.[6] In "Isoperms: An Environmental Management Tool," Sebera cites examples to illustrate the usefulness of isoperm charts on which temperature, RH, and the expected life of a particular type of paper can be plotted. In one scenario he shows that where low-grade papers such as newsprint might have a useful life of 45 years under storage conditions of 68° F and 50% RH, at 95° F and 80% RH (conditions common to attics on humid mid-summer days), the estimated life is reduced to 16 months.[7]

Research done in recent years has confirmed earlier beliefs that the lower the storage temperature the longer paper lasts. Recent relative humidity studies, however, suggest that for unbound paper, RH levels ranging as low as 30% (but no lower) are desirable because of the strong relationship between moisture content and the rate that paper deteriorates through hydrolysis. Clearly, there is no easier way to destroy a collection than to allow it to bake in the attic or to languish in a damp basement. What can and should be accomplished within these two extremes is dependent on many factors. Strategies for improving environmental conditions are discussed later in this article.

A stable climate for paper storage is also critical. In controlled studies conducted recently by the Library of Congress Preservation Research and Testing Office,[8] papers were aged in a programmable oven. The temperature was held throughout at 90° C +/- 0.2° C, and the effects of four different RH levels were compared. Paper aged at 40% RH +/- 2% degraded most slowly (as measured by folding endurance, pH, and brightness levels), followed by paper aged at 50% RH +/- 2%. Papers that were subjected to a steady RH of 40% for 11 hours, followed by a one-hour transition to 60% RH, maintenance at 60% RH for 11 hours, followed by a one-hour transition back down to 40%, and the 24-hour begun again, aged almost as rapidly—and in some cases more rapidly—than did paper aged at a steady 60% RH. Researchers suggest several possible reasons why RH cycling speeds up degradation, but theories are not yet proven. The important thing to note is these laboratory test conditions are mild compared to the extreme variations in temperature and RH that can take place over short periods of time in a building that is not air conditioned.

Deterioration Caused by Fungi, Insects, and Small Animals

The effects of mold are well-known to anyone who has spent time poring over paper artifacts. Mold causes disfiguring stains both in its active and inactive stages (foxing, for example, probably results from the presence of inactive fungi). If allowed to flourish, mold draws nourishment from cellulose, weakening and ultimately eroding it. Damage is usually irreversible. Mold growth is almost inevitable when RH is over 70% for sustained periods.[9] Temperature also plays a role. "Most microbial forms will grow in temperatures ranging from 59°to 95°F, although there are forms which will grow at almost freezing and others which thrive at over 150°F."[10] Paper is most vulnerable to mold when it is actually damp or wet. Pipe breaks, leaking roofs, and storms have destroyed many private and public collections. While all but certain types of paper (coated stock, for example) are readily salvaged after becoming water-soaked, if mold is allowed to grow before action is taken, damage will be permanent. Once vigorous growth begins it can spread easily under certain conditions, infecting large quantities of material. Mold is a potential threat not only to paper, but to human health.[11]

Like mold, insects and rodents also appreciate a good cellulose-based meal. Cockroaches, silverfish, and booklice are common pests, leaving in their wake paper marred by holes, trails, and major losses. Mice and rats, if given the opportunity, make even quicker work of destroying paper.

Deterioration Caused by Light

As paper absorbs light energy, it becomes subject to photochemical deterioration. Photochemical processes are complex, but the effects of light that is too bright, too sustained, and/or that has a high ultraviolet (UV) component are easily discerned: discoloration, fading, and embrittlement. Certain media, water colors for example, are extremely light sensitive, while others take longer to react. The popular literature tends to focus on ultraviolet radiation as the chief concern of the curator. (The only type of radiation in wavelengths shorter than ultraviolet is x-ray. The shorter the wavelength, the more energetic the light and the greater its potential for inducing photochemical deterioration.[12]) Sunlight has a high UV component, as does light from many types of fluorescent bulbs. It is important to know, however, that *all* light, regardless of its nature and source, has the potential to degrade paper; and that in addition to filtering out UV, the intensity and duration of all light are factors that must be controlled. If an appropriate storage system is designed for postcards, light should present problems only when a collection is exhibited.

Deterioration Caused by Air Pollutants

Among the gaseous pollutants known to be damaging to cellulosic materials are sulphur dioxide, nitrogen oxides, and ozone. Sulphur dioxide, for example, readily converts to sulphuric acid under certain conditions, causing paper to darken and become brittle. Most pollutants pass from the outside in, through air handling systems and open windows. Some pollutants are generated from within buildings. Although surface finishes such as

paint and wallpaper, and materials such as fire retardant fabric and particle board, off-gas most intensely immediately after application or manufacture, emissions can persist for a long time thereafter.[13] Particulate matter, such as air-borne dirt (a particular problem in rural areas), sand, mold, and concrete dust, are also problematic. Some particulates are capable of causing chemical damage. Even the most benign dust is damaging. It settles on materials and readily absorbs and holds moisture, creating a humid blanket that stimulates degradative activity.

Appropriate Responses

Housing Systems—The First Line of Defense

Proper storage of postcard collections is an essential first step in their care, and may in fact be one of the few actions that the collector can take. Companies that supply a wide range of archivally sound storage products simplify decision making, in that they carry only merchandise that is widely regarded as appropriate for use.[14] Initial decisions hinge on whether a collection will be consulted frequently. At the very least, postcards should be stored in alkaline/buffered boxes of appropriate size. This system is vastly improved when the cards are placed in individual alkaline paper envelopes and then in boxes. Paper envelopes protect postcards from wear during sorting and searching; shield them from light; and are porous, so allow the escape of harmful byproducts given off as the postcards degrade. Best, they create an alkaline microenvironment that retards deterioration. A combination of envelopes and boxes provides some protection from water damage, and seems to buffer rapid changes in temperature and RH. Envelopes should have a pH of at least 7.5 and an alkaline buffer of at least 2%, and should be constructed using an adhesive that is not acidic. Whether the envelopes have a flap over the opening is a matter of choice, but there should be no thumb cut, which encourages repeated handling at the same spot each time a card is removed from its envelope.

If paper envelopes are to be marked, this should be done before postcards are inserted. Use a pencil, permanent ink (advertised as such in archival supply catalogs), a typewriter, or laser printer. Postcards can be stored on their edges for easy browsing. Boxes should have metal reinforced edges for sturdiness.[15] They should neither be filled so full that postcards are difficult to remove, nor so empty that postcards are lean and curl. To support cards in partially filled boxes, purchase alkaline-buffered corrugated board (available through archival supply catalogs), and cut spacers using a utility knife and heavy metal yardstick. These can be removed gradually as postcards are added. A low-cost alternative is to support the cards using crumpled alkaline paper.

Keep in mind that unless a box is advertised as being alkaline and buffered it is probably very acidic. Several types of alkaline box boards are available through archival supply catalogs. It is important that the board be alkaline throughout. Avoid those that are made up of an acidic core surfaced with alkaline paper. The core will off-gas harmful byproducts. Some boards are advertised “lignin free.” These are usually (but not always) tan colored. “Lignin is often called the cement that glues the fibers together in (a) shrub or tree and gives it the structural strength to stand straight and grow tall. [Unlike cellulose] Lignin is a three-dimensional polymer, it is amorphous, and it has no ordered

structure. It is not fibrous."[16] It makes up 1% of cotton fiber, 30% of a typical softwood, and 20% of a typical hardwood.[17]

Lignin is the component in newsprint that causes the paper to darken quickly when exposed to light. It has been widely regarded as a damaging impurity, and various means have been developed to remove it from pulp. Box boards that are advertised as "alkaline/buffered and lignin-free" probably have no more than trace levels of lignin. Those advertised as "alkaline/buffered" usually have an alkaline/buffered (but not "lignin-free") core, with lignin-free paper laminated to its surfaces. At present, whether lignin lowers the quality of board and paper is the subject of fierce debate, with many industry leaders asserting that lignin is not harmful.[18] It is anticipated that research into the relationship between lignin and paper permanence will begin in 1995. In the meantime, librarians, archivists, and collectors are buying a bit blind. If money is not a determining factor, curators typically store less valuable materials in boxes made from alkaline/buffered board that is lignin-free. For a small collection, there is little reason not to choose lignin-free board.

Small metal file drawers are acceptable alternatives to boxes. Newly purchased metal furniture should have a powder coat rather than a baked enamel finish. Baked enamel off-gasses, while studies to date suggest that powder coatings do not. These are sprayed onto metal in powder form (not liquid), and are fused using heat. Wood cabinets should probably be avoided if one has a choice. Wood furniture can off-gas harmful substances for years after its manufacture.

A system comprised of paper envelopes and boxes has a single disadvantage. A postcard has to be pulled out of its envelope each time it is consulted. This introduces the potential for damage (abrasion, edge tears, the transfer of dirt and oil from fingertips). In short, the system doesn't yield a readily browsable collection. Plastic sleeves are an alternative. Polyester is the preferred plastic (*Mylar Type D* and *ICI Melinex 516* are two frequently recommended brands). Uncoated polyester is extremely stable, strong, and clear; it lies flat (so does not promote curling); and is rigid enough to provide good support. Some forms of polyethylene are also stable and safe to use, but selection is difficult. Low-density types can contain anti-block and slip agents that cause the plastic to adhere readily to the surface of photographs (and thus, perhaps, to certain kinds of postcards). High-density types are naturally slippery, so do not require anti-block or slip agents, and thus have less tendency to stick. If one were to ask a vendor whether a particular polyethylene product were additive free, however, it's likely that he or she would be unable to answer the question. Buy from a reliable dealer (again, see footnote 14). Polyethylene is translucent rather than clear, soft (so less supportive), and scratches easily. It provides good protection from handling, however, which is a primary objective.

Avoid polyvinyl chloride (PVC). Says Henry Wilhelm, writing about the storage of photographs, "To make PVC flexible, plasticizers, usually organic compounds, are added in large amounts (40 to 100 parts plasticizer per 100 parts PVC) … Particularly when stored in high-humidity conditions, the plasticizers can gradually exude from the PVC, depositing sticky droplets or gooey coatings … [furthermore,] PVC plasticizers can support fungus growth in humid conditions …"[19] Many of the sleeves and album pages

available in retail stores are made from PVC plastic. Unsuspecting buyers, thinking they are investing in the protection of their collections, may instead damage them unintentionally. Purchase storage supplies from reliable source that specializes in "archival quality" products.

In addition to the main advantages that plastic sleeves have over paper (browsability), plastic provides more protection from water damage. One disadvantage is cost. (Polyester sleeves are the most expensive type available.) Another disadvantage is that because plastic is less porous than paper, the sleeves can trap both moisture and the damaging byproducts that are produced as acidic paper deteriorates. This problem has been noted increasingly in recent research. Acetate film rolled and stored in reel boxes, for example, deteriorates much more rapidly in an accelerated aging oven than do strips hung from the roof of the oven. Gasses emitting from the free-hung strips are allowed to escape into the surrounding atmosphere, whereas they inflict damage to film in reel boxes. This phenomenon has caused one researcher to go so far as to speculate that perhaps we should be storing preservation microfilm in perforated boxes.

In summary, comparing the attributes of alkaline envelopes and plastic sleeves illustrates the point that there are no perfect solutions. Leaving price aside, one has to decide which is more important for a given postcard collection: browsability, or optimum long-term protection. The answer will depend on both the artifactual value of the collection and how it will be used.

Albums are an alternative to envelopes and boxes for postcard storage. They can take many forms, and afford maximum browsability. If cards are to be mounted on paper pages, the paper, of course, must be alkaline/buffered, and the mounting technique must be non-damaging. It goes without saying that the cards should *not* be glued directly to pages. Polyester and alkaline paper mounting corners, available through archival supply catalogs, are an appropriate alternative. Such a system is impractical, however, if the back sides of the postcards are to be consulted often. Furthermore, repeated flexing of pages can abrade the surfaces of the cards. To reduce the potential for damage, pages should be turned one-by-one or a few at a time. To protect paper and other types of albums from dust and light, store them in metal-edged alkaline/buffered boxes.

Paper album pages are available with both polypropylene and polyester cover sheets. The plastic provides added protection from handling and greater security for mounted items. Polyester sheets are non-damaging. The polypropylene used in such applications is surface treated, however, and has been known to adhere to the surfaces of photographs.[20] A disadvantage is that cover sheets make access to the reverse sides of postcards even more difficult than if they were simply mounted on paper.

Album pages made from sheets of polyethylene, polypropylene, or polyester, welded to create pockets into which paper objects can be slipped, are also available. Again, polyester is a good choice. Both sides of the postcards are readily accessible provided they are not put back-to-back in pockets. As with polyester sleeves, these pages have the drawback of trapping moisture and the byproducts of paper deterioration—considerations that must be weighed against access.

There is also a type of pocket-style album page that is mounted on the same kind of metal strip as is used for hanging file folders. This makes it possible to store pages in standard file cabinets. Cabinets offer protection from light and dust, and are a tidy solution to storage. Unlike albums and three-ring binders, file cabinets do not allow for casual browsing. On the positive side, however, this system eliminates the abrasion that can result from repeated turning of pages.

Postcards with materials adhered to their surfaces (glitter or buttons, for example), and cards with vulnerable surfaces present special problems. An example of the latter would be a painted card—a miniature work of art. Handling glitter-covered cards, whether in envelopes, sleeves, or on album pages, will probably cause the decoration to shed; as will storage in plastic enclosures, which generate static electricity. This may or not be a concern. A card that carries a unique image, however, might well be worthy of first-class treatment.

An optimum storage solution is to mat the cards in alkaline/buffered rag board as if they were small prints. The services of a conservator ensure that appropriate materials, adhesives, and techniques are used. A postcard should “float” inside the window of its mat (that is, the window should be larger than the card so the edges of the card can be seen). Small paper objects often look best when mats are at least somewhat oversized. If a card has been properly hinged onto the back board of the mat, one should be able to lift the card (using a stiff piece of paper) to view its verso. Another option is to make the window double-sided so that the verso of a card can be viewed by flipping over the mat. The value of this approach is that the mat, because of its thickness, protects the surface of the postcard from contact with other materials. Collections of matted postcards can be stored in metal-edged alkaline/buffered boxes. To minimize movement of materials in a box, mats should be like-sized even if the size of the postcards varies. This is common practice in libraries.

Postcards made from materials other than paper also require special attention. Consideration should be given to storing wooden cards in paper rather than plastic, because of their acidity. Metal postcards, while they appear comparatively rugged, are subject to scratching; and damage from the corrosive oils, salts, and urea-derivatives present in fingerprints. Like paper cards, they should be protected from excessive handling. Leather postcards are sometime soft and pliable, and are prone to wrinkling. For safe storage, cut a piece of alkaline paper twice the height of the storage envelope that will be used, and just slightly narrower that the envelope. This paper will become a sleeve. Fold it in half across its height. Now the postcard can be placed in the sleeve, the sleeve folded, and the sandwich inserted into the envelope, folded edge first. The sleeve protects the postcard from wrinkling, abrasion, and handling as it is removed from and replaced in its envelope. Cards with moving parts (flaps that open and close, for example) will also benefit from a sleeve-and-envelope housing.

Cleaning

Unless a postcard is very dirty, it is best left alone. Cleaning can result in damage that is a great deal more defacing than the problem it was meant to correct. In general, there is no

need to refurbish postcards unless they have been stored in an extraordinarily dirty environment or have been through (and survived) a fire. Where cleaning is felt to be absolutely necessary, use a vinyl eraser ("Magic Rub" is one reliable brand) and a soft dusting brush (available at art supply stores and through archival supply catalogs). Work on a clean surface and proceed slowly and carefully. Every stroke of the eraser should begin away from the edge of the card and work outward. Alternating backward and forward strokes, beginning from the outer edge of the card and working inward, or working hastily is sure to result in damage. Brush eraser crumbs from the work surface at frequent intervals, and brush both surfaces of the postcard very thoroughly before storing it.

What to Do about Repair

To repair paper properly and with minimal risk requires appropriate tools, materials, and skills, and an ability to anticipate the ways in which various kinds of paper react to various kinds of treatment. (Conservators employ numerous techniques for paper repairing, making decisions based on multiple factors.) There are better ways to handle an edge tear than to repair it inexpertly. Simply store damaged postcards in polyester sleeves, even if the bulk of a collection has been housed in paper sleeves. The polyester sleeve helps to prevent further damage and protects the postcard from direct handling. A sleeve is mistake-proof and leaves no doubt about the condition of the card. Regarding pinholes and similar problems, they should be ignored.

A possible exception to the "protect-don't treat" rule is removal of the residue that remains on the backs of cards that were once mounted in photo albums. Paper and adhesive residues are not only defacing (a tolerable situation), but are also damaging. Assuming that the adhesive is an older, water-soluble type and not modern plastic glue, proceed as follows: Purchase distilled water (often available in grocery stores for use in steam irons), cotton swabs, and a slim metal spatula (available through archival supply catalogs). Work on a clean surface under good light. Dip a swab into water, then depress it against the sides of the water bowl to remove excess moisture. Roll the swab along the surface of the offending paper and glue residue. After the residue has softened, gently scrape away as much as can be removed easily, wiping the spatula clean whenever necessary. Redampen the remaining residue, again ensuring that the swab is not saturated and that the postcard does not become wet. Return to the card at intervals, gradually working away the paper and glue. When most of the residue has been removed, blot corners with white paper toweling and allow the postcard to air dry.

There are pitfalls associated with this practice. Patience is paramount. Residue needs to be worked off a little at a time. If a card is written on with water-soluble ink and the ink is allowed to become wet, it will run, and both the verso and the image side of the card may be damaged. Water can leave rings behind if applied immoderately, and applying too much pressure to the spatula can abrade the surface of the postcard. These problems are pointed out because treatment is generally risky business, and sometimes comes to no good end.

Climate Control

The development of an environment that is truly ideal for promoting the longevity of paper is extraordinarily expensive. Building features include top quality roofing, vapor barriers, and insulation; high-end fire suppression systems; surface finishes that don't off-gas (as many wall and floor coverings and finishes do); lights that emit minimal UV radiation; and an air handling system that filters out gaseous and particulate pollutants and is sophisticated enough to maintain low, stable RH levels regardless of conditions outside. Few major libraries, archives, or museums have been able to construct such buildings to date—let alone home owners. One's goal, then, is to understand the threats to collections of paper-based materials, and to make adjustments that are practical and affordable.

Basic strategies for improving a storage environment are obvious. Important collections of paper materials should be kept in the part of a building (be it house, library, or historical society) that is most likely to be consistently cool and dry. That may translate into nothing more than moving materials from a cabinet on the sun porch to a first-floor den. Rooms where fireplaces or wood stoves are used are inhospitable. The temperature, and consequently RH, will fluctuate wildly, and the air will inevitably carry higher levels of damaging gases and particulates than will other parts of the building. If there is a choice between an air conditioned room and a room where open windows suffice for summer relief, one should choose the former. (To some extent, air conditioners filter out particulates and prevent dust and dirt from blowing in on breezy days.) In spaces where humidity is a potential problem, a monitoring device of some kind is useful.[21] A household dehumidifier can be turned on when RH rises above 50%, and a fan can be used to circulate air. (Mold grows best where air is stagnant.)

Work on collections can be done in spaces where overhead and task lighting is incandescent rather that fluorescent, and collections can be shielded from direct sunlight at outdoor displays. If there are fluorescent lights in an area where a collection will be exhibited, bulbs can be fitted with sleeves that filter out most UV radiation (filters are available through archival supply catalogs). Where exhibit cases have interior fluorescent or incandescent lights (which transform them into accelerated ageing ovens), consideration might be given to declining an opportunity to display a collection. Plants can be removed from rooms where collections are stored (soil sometimes carries fungi that have potential for infecting collections), and rooms can be kept clean and food-free. (Food, of course, attracts insects and rodents.) The principles of integrated pest management can be applied, through actions such as caulking cracks in foundations, screening ducts, sealing pipe traces, repairing screens, removing debris from garages and basements, eliminating sources of standing water, and ensuring that trash is removed from the premises regularly.[22] The general principles of emergency management can also be applied. Librarians, archivists, and collectors alike should know how to prepare for, reduce the possibility of, and respond to the various kinds of emergencies that threaten or affect collections.[23]

Preservation of Library and Archival Materials, edited by Sherelyn Ogden and published by the Northeast Document Center with support from the Institute of Museum Services,[24]

explores environmental issues in practical terms. Connecticut State Librarian Richard Akeroyd once described this manual of technical leaflets as "out-of-the-gate information" (that is, it begins at the beginning). While the text is written for non-specialists and offers basic information regarding environmental control, storage, handling, conservation, and other key areas of concern, it draws from a rich body of scientific and technical literature, and benefits from the regular communication that takes place between researchers in the field and NEDCC staff. Brief bibliographies point the reader toward core literature. Because the target audience is librarians and archivists, some information is out of scope for the private collector. Nonetheless the manual is recommended to anyone who wants to understand and respond better to preservation issues.

The care of historical collections of any kind—be they public or private, large or small, of international value or of modest local interest—demands that the caretaker be well informed, thoughtful in decision making, attention to detail, and patient when preservation plans must be implemented incrementally. The basic ingredient in a successful approach to collections management is a commitment to ensure that the yield of a collector's efforts will be passed on through succeeding generations. The actions one takes follow naturally from that commitment.

Available from **http://preserve.harvard.edu**
http://preserve.harvard.edu/guidelines/postcards.pdf
Last updated: 1995

[1] Chandru J. Shahani and William K. Wilson, "Preservation of Libraries and Archives," *American Scientist* 75 (May-June), 240-51.

[2] For an understandable explanation of the differences between cotton and wood as sources of cellulose for papermaking, see Roy P. Whitney, "Chemistry of Paper," in *Paper Art & Technology: The History and Methods of Fine Papermaking with a Gallery of Contemporary Paper Art* (San Francisco: World Print Council, 1979), 36-44.

[3] A landmark overview of the history of papermaking, which focuses on decreasing quality over several centuries and the development of modern "acid-free" paper, is presented by Verner W. Clapp in "The Story of Permanent/Durable Book Paper, 1115-1970," *Scholarly Publishing* 2 (Jan., Apr., July 1971), 107-24, 229-45, 353-67.

[4] The SAIC Conservation Referral Group helps people locate and select professional conservation services, providing a computer-generated list of conservators who can meet a client's specific needs. Additional information is available from the SAIC office, 1717 K Street, N.W., Suite 301, Washington, D.C. 20006; telephone 202-452-9545.

[5] Trends and issues related to paper permanence are followed closely in the *Alkaline Paper Advocate* (Abbey Publications, 7105 Geneva Drive, Austin TX, 78723), a newsletter published six times annually.

[6] Donald K. Sebera, "A Graphical Representation of the Relationships of Environmental Conditions to the Permanence of Hygroscopic Materials and Composites," in *Proceedings of Conservation in Archives* (Ottawa: National Archives of Canada, 1989), 51-75.

[7] Donald K. Sebera, *Isoperms: An Environmental Management Tool* (Washington, D.C.:Comission on Preservation and Access, June 1994), 7.

[8] Chandru J. Shahani, Frank H. Hengemihle, and Norman Weberg, "The Effect of Variations in Relative Humidity on the Accelerated Aging of Paper," in *Historic Textile and Paper Materials II: Conservation and Characterization*, ed. S. Haig Zeronian and Howard L. Needles (Washington, D.C.: American Chemical Society, 1989), 63-80.

[9] Sandra Nyberg, "The Invasion of the Giant Spore, " *SOLINET Preservation Program Leaflet Number 5* (Atlanta: Southeastern Library Network, 1987).

[10] Mary Wood Lee, *Prevention and Treatment of Mold in Library Collections with an Emphasis on Tropical Climates: A RAMP Study* (Paris: UNESCO, June 1988), 12.

[11] "Mold as a Threat to Human Health," *The Abbey Newsletter* 18, no. 6 (Oct. 1994), 65.

[12] The properties of light are explained well by J. Macleod in "Museum Lighting," *Technical Bulletin 2* (Ottawa: Canadian Conservation Institute, April 1975).

[13] Norbert S. Baer and Paul N. Banks, "Indoor Air Pollution: Effects on Cultural and Historic Materials," *The International Journal of Museum Management and Curatorship* 4 (1985), 9-20.

[14] Companies that carry a broad range of preservation-related supplies include: University Products (517 Main Street, P.O. Box 101, Holyoke, MA 01041-0101; telephone 1-800-762-1165); Gaylord Brothers (P.O. Box 4901, Syracuse, NY 13221-4901; telephone 1-800-634-6307);and Light Impressions (439 Monroe Avenue, P.O. Cox 940, Rochester, NY 14603-0940; telephone 1-800-828-6216. Companies that carry a narrower range of (mostly storage) supplies include Archival Products (2134 E. Grand Ave., Des Moines, IA 50317; telephone 1-800-526-5640); Conservation Resources International; (8000-H Forbes Place, Springfield, VA 22151; telephone 1-800-634-6932); Hollinger Corporation (9401 Northeast Drive, P.O. Box 8360, Fredericksburg, VA 22404; telephone 1-800-634-0491); and Conservation Materials (1275 Keppy Lane #10, P.O. Box 2884, Sparks, NV 89431; telephone 702-331-0582).

[15] Good line drawings and discussions of this and other systems appear in *Gaylord Preservation Pathfinder No. 2: Archival Storage of Paper* (Syracuse, NY: Gaylord Bros., 1993). Available free from Gaylord, telephone 1-800-634-6307.

[16] Whitney, "Chemistry," 38.

[17] Whitney, "Chemistry," 38.

[18] Ellen McCrady, "Lignin on Trial: A Report of the ISR Workshop July 6-8 at ASTM Headquarters," *The Abbey Newsletter* 18, no. 3 (July 1994).

[19] Henry Wilhelm, *The Permanence and Care of Color Photographs: Traditional and Digital Color Prints, Color Negatives, Slides, and Motion Pictures* (Grinnell, IA: Preservation Publishing Company, 1993), 499. Chapter 14 of this book, "Envelopes and Sleeves for Films and Prints," 485-506, is a thorough exploration of the characteristics of various protective enclosures. Most of the information is pertinent to paper storage.)

[20] Wilhelm, The Permanence and Care of Color Photographs, 495.

[21] Monitoring Temperature and Relative Humidity," in *Preservation of Library Materials: A Manual*, revised and expanded, ed. Sherelyn Ogden (Andover, MA: Northeast Document Conservation Center, 1994), unpaginated.

[22] For an excellent discussion of integrated pest management that includes a good overview of preventive measures, see James D. Harmon, *Integrated Pest Management in Museum, Library and Archival Facilities: a Step by Step Approach for the Design, Development, Implementation and Maintenance of an Integrated Pest Management Program* (Indianapolis: James D. Harmon, 1993).

[23] "Emergency Management" in *Preservation of Library Materials*, unpaginated.

[24] *Preservation of Library & Archival Materials*, available for $40.00 including postage (Northeast Document Conservation Center, 100 Brickstone Square, Andover, MA 01810-1494).

