



BISHOP MUSEUM  
Art Conservation Handout

## **VICTORY AGAINST THE SPOILS : PRESERVING BOOK COLLECTIONS IN HAWAI'I**

*"In War, to the Victors go the Spoils...."*

In Hawai'i, the tropical climate is waging a war against your collection of valuable books. Year round warm weather, bright sunshine, and humid tropical breezes rustling through the palm trees evoke paradise. Surrounded by ocean, sheltered by mountains and forests, gleaming with waterfalls and fishponds, Hawai'i is a lush haven loved by kama'ainas and visitors alike.

Paradise...but not for your books and valuable works of art. Year round warm weather creates a breeding ground for insects which can attack and chew through books and art on paper. Bright sunshine contains harmful ultraviolet rays which cause fading and yellowing, and the high humidity provides a perfect atmosphere for mold and mildew. The combination of these factors makes Hawaii a hostile environment for books, art on paper, and photographs, and threatens their longevity.

In this article, friends and foes of your valuable possessions will be identified. Even in paradise, there are concrete steps you can take to preserve your books and enjoy them for many years.

### **What is a book?**

The objects we think of as books have been made of diverse materials throughout history. Cultures around the world have recorded information using available natural materials and technologies. Before paper, writing was chiseled on stone or clay tablets. The invention of paper in Han Dynasty China around 105 A.D. allowed writing to become portable. The Chinese developed a thin yet strong paper for writing and arranged the paper in accordion folded books, handscrolls, or sewn bindings. As paper and bookmaking moved east to Japan, south through India, and west to the Middle East with the trade routes, new forms and structures emerged according to cultural and religious needs.

### **Codex, or multi-section book**

The first example of the codex, or a book made of sheets gathered together like a modern book, was in the 1st century A.D. During this period in northern Africa, books were made of sheets of parchment or papyrus, and "bound" together with rings. Later books were given covers and actually sewn together. Throughout Europe, parchment was considered a superior material for writing, and monasteries produced beautiful vellum or parchment books and illustrations for religious texts. Paper wasn't made in Europe until the 12th century, eleven hundred years after its invention in China, when the first paper mills began operation in Spain and Italy. Eventually, paper gained acceptance with

scribes and bookbinders and its popularity soared by the development of movable type printing in the late 15th century. These early European papers were far superior to the papers of today, because they were made from cotton rags or linen, which are pure sources of cellulose. With the advent of machine made paper in the early 19th century, and the use of ground wood pulp instead of cotton and linen by the 1850's, paper quality declined radically.

But, ground wood pulp as a papermaking material did allow paper to be made cheaply and quickly. By the mid-19th century, common people could own books, read newspapers and serialized novels and stories. Unfortunately, these "advances" in technology led to a decline in paper quality. Ground wood pulp contains a complex acid called lignin, which is essentially self-destructive, causing paper to become brown and brittle with time. It is safe to say that almost any book printed after the 1850's is made of a ground wood pulp paper, unless it was from a fine press or it specifies the paper as acid-free. (also permanent durable).

### **The First Step: Triage**

Just like the casualties of war, books need to be sorted into categories for their preservation. Some books are more valuable than others, and "value" can be a very subjective term. In the book world, there are rare books, a designation that refers to books that are old or financially valuable, to books which are finely printed and bound, or to books which have been owned by famous people. Librarians, curators, and collectors develop categories for rare books, or special collections.

In your home, you might have books which are "special", and books which are "ordinary". In the special category might be an oversized art book, a favorite novel or book of poems, a family Bible, or a scrapbook of mementos or photographs. In addition, you might also have old yearbooks, textbooks from school or college, books of literature, books about a profession or trade. These are groups of books which are not looked at very often, but remain important reference tools. Books like paperbacks would constitute the "ordinary" category, books which might have once been enjoyed, but are easily replaced.

The first thing you need to do to take proper care of your book collection is ask a series of questions: how many books do you have? which books are most valuable? do you need to keep all the books in your collection? are there any books which could be given to schools or libraries?

Once you prioritize the items in your collection, the job of preservation is simplified. The enemies of books--insects, mold, and damage from light--do not discriminate between expensive books and cheap paperbacks. This article will outline suggested steps for preventive preservation, explaining specific ways to create a better environment for your collection.

### **Enemies of Books: Temperature and Humidity**

Books are made of organic materials, paper and board made from pulp, cloth made from natural fibers, leathers from tanned animal skins. All organic materials begin to deteriorate in reaction to the environment. Fluctuations in temperature and humidity cause these materials to expand and contract, which in turn can cause books to warp and buckle, crack and fall apart. While temperature and humidity affect paper, cloth, and

leather differently, fluctuations in temperature and humidity do even more damage on books because they are composite objects. All the parts are joined together to make an operating, three dimensional object, with folds and hinges.

Books are hygroscopic, meaning that they readily absorb and release moisture. The amount of moisture in the air can be measured as relative humidity (referring to the water vapor in the air relative to the greatest amount of water vapor the air could hold at the same temperature). Relative humidity is expressed in percentages, and in Hawai'i's humid environment, the relative humidity averages between 60% and 75%. High humidity causes mold growth, and increased insect activity. Moreover, daily and seasonal fluctuations in humidity are extremely damaging to books.

Temperature is also an important consideration. The higher the temperature, the faster the book will deteriorate, as the rate of chemical reactions is doubled with each increase in temperature of 18 degrees F. Hawai'i's temperature averages from 60 to 90 degrees Fahrenheit. As a result, books and paper objects are self-destructing in the high heat, which, combined with high humidity, leaves books extremely vulnerable.

### **Recommendations:**

The good news is that there is something you can do to slow down the deterioration. You can lower the temperature, or at least attempt to stabilize the fluctuations through air conditioning, and lower the relative humidity by using a dehumidifier. Stability is the key ingredient: libraries and museums recommend the ideal temperature of 70 degrees F and a relative humidity of 50-55% for the storage of valuable collections. These ideal conditions can be difficult to maintain throughout the house, so think micro-environments. Some people have one room which they seal off and air condition and/or de-humidify. In this room, they store all of their books, photographs, leather, and other materials that are sensitive to high humidity. You can also make airtight storage containers out of large Tupperware locking tubs, or another inert material (not wood, for reasons which will be explained under the Storage section), and line the container with silica desiccant. Place the silica packets or loose silica gel in the bottom of the airtight container, then build a ragboard "shelf" to separate the items from the desiccant. When the desiccant has absorbed a significant amount of moisture it will change color. Then you can dry it out in your oven and reuse it. Obviously, this will not work for an entire collection of books, but will be better than nothing for your most valuable treasures. Photographs, slides, and other photographic materials are extremely sensitive to high humidity, and also respond well to controlled micro-environments.

### **Enemies of Books:Pests and Mold**

There are few things worse than the heartbreak caused by pulling a favorite book off the shelf and finding evidence of insects or mold. Unfortunately, our humid climate makes Hawaii a paradise for mold and insects. This 18th century family Bible was in a Kaneohe home, untended on a shelf for years. When the owners recently renovated their home and moved their books, they discovered page after page destroyed by insects. Insects are an inevitable part of living in the tropics. Opulent homes and beach shacks alike have one thing in common: a never-ending war against pests! Hawaii has a large rat and cockroach population, and most homes also have ants and other insects. Be aware that insects need food, and books are a gourmet meal with sugary glues and paper sizing.

Common sense tells you not to leave food out in your kitchen, but many people do not realize that wood, leather, paper, tapa, and other materials in books are all "food" to insects.

Mold is another enemy of books. Mold spores, which thrive in relative humidity above 60-70%, have an easy time growing and living in our environment. The best way to reduce the incidence of mold growth is to follow the recommendations in the Temperature and Humidity section and attempt to stabilize the environment. Mold thrives in dark humid places, so air circulation is crucial. Periodically, check areas where books are stored and examine for insect and mold activity. To prevent insect infestations, follow the same guidelines you would to protect your house from termites and other pests: fix broken screens, reduce the ways that insects enter the house, line cracks and crevices (away from children and pets) with boric acid, and be aware of the items you bring into the house. Bringing cardboard boxes, cuttings from the garden, and items which have been stored outside into the house also allow insects to invade.

Common sense and good housekeeping can often prevent problems that affect art and book collections.

### **Enemies of Books: Light**

Light accelerates the deterioration of paper. Light embrittles and weakens the fibers in paper, made of cellulose. Exposure to light can cause paper to bleach, yellow or darken, and inks, pigments and dyes can fade or change color. Exposure to light is always damaging, and the damage is irreversible. The most damaging sources of light are the sun and artificial fluorescent lighting -- due to high concentrations of ultraviolet (UV) waves.

### **Recommendations:**

Light levels can be lowered through the use of drapes or blinds, (which also helps to lower the temperature in the home or office). UV-filtering plastic films or UV-filtering Plexiglas can be used on windows, and UV-filtering sleeves can be used on fluorescent tubes. This reduces ultra-violet waves, but does not filter them out completely.

### **Enemies of Books: Humans**

Poor handling and carelessness by human beings wreaks havoc on books in libraries and homes! People smash books down on xerox machines and break the spines, drop them and tear the paper, spill drinks on them and stain the pages, inflicting damage of every sort. Taking the time to care for books as objects is an important step for their preservation.

Books should not be pulled off their shelves by their spines, as this will break the spine or covers. Take care in photocopying; try to find a machine that has the platen on the side, so that the book can be placed face down on one page at a time, with the book kept at a 45 degree angle.

Books need to be stored upright on shelves, unless they are oversized, when flat storage is best. Books should not lean from side to side on the shelf, or be stored on their foredge, as this breaks the covers away from the pages, or textblock. Paper and cloth bindings should not be shelved next to leather, as acidity and oils can migrate from book to book.

## **Friends of Books: Storage**

Proper storage is a key component of preservation, as the previous sections have explained. How and where you store your books is important.

### **Recommendations: Shelving**

Wood should be avoided as a material for shelving valuable books. Wooden shelves and furniture contain acids which accelerate the deterioration of books and paper. In addition, wood is treated with chemicals like formaldehyde leaving fumes and gasses that are absorbed by books. If you have to use wood, there are safeguards you can take to protect your collection. Number 1: seal the wood, preferably with a water-based polyurethane. This will not provide a complete barrier from acids and off-gassing destructive elements, but it helps tremendously. Ideally you should allow the sealant to air for three weeks after drying. Then, to provide complete protection, shelves should be lined with aluminum foil, glass, plexiglas, or a combination of these with 100% ragboard. (Please note that the use of 100% ragboard alone will not provide a barrier against the acids and gasses in wood.)

Air circulation is crucial for book storage, especially in our humid climate. Many people have closed cabinets where they store their books. High humidity due to lack of air circulation, plus dark, closed cabinets provide a fertile ground for mold growth. Shelving against exterior walls should be avoided as well, as this put books in contact with excess moisture and humidity. Allow at least three inches between the wall and the book shelves to assure circulation.

### **Housekeeping**

Common sense and good housekeeping can add years to your collection. Books should be removed from shelves periodically. At this time, inspect the books for dust or evidence of pests. If books are dusty, dust with a dry, clean brush in a ventilated area or outdoors. Shelves should be dusted with a magnetic wiping cloth so the dust is absorbed and not simply rearranged on the shelves. (Use products like Dust Bunny, Dust Magnet, One Wipe, Endust.) If you use your vacuum cleaner, vacuum with the soft brush attachment and change the bag frequently.

### **Friends of Books: Boxing**

Placing books inside custom book boxes is one defense against the destructive forces of nature. Valuable or damaged books can be stored in archival quality boxes for their protection. Archival quality enclosures protect vulnerable books from light and excessive handling. Archival quality refers to materials that are pH neutral, either through the use of high quality raw materials or paper pulp which has been treated with an alkaline reserve. The term permanent, or permanent durable is being used increasingly to replace the term acid-free among conservators. After Hurricane Iniki, many libraries lost roofs and suffered excessive water damage, leaving wet and moldy books. The damage was irreparable. But libraries which had boxed their valuable books found that the boxes were damaged, but the books inside escaped unharmed.

Boxes can be fancy or plain, custom made or in standard sizes. They can be made of acid-free paper or binder's board covered in cloth or leather. A number of companies offer a range of boxes and acid-free storage supplies at competitive prices. The following

companies offer only acid-free, archival quality storage materials, and conservators endorse their products. You can call the 800 number and request a free catalog, then browse for the appropriate solution to your storage problems.

### **Custom Book Boxes for Rare or Valuable Books**

University Products  
Holyoke, MA  
1.800.628.1912  
(custom boxes, folders, all types of archival storage)

Light Impressions  
Rochester, NY  
1.800.828.6216  
(specialists in storage of photographic materials)

Booklab  
8403 Cross Park Drive Suite 2-E  
Austin, TX 78754  
512.837.0479  
FAX 512.837.9794

Kater-Craft Bookbinders  
4860 Gregg Road Pico  
Rivera, CA 90060  
310. 692.0665

### **Friends of Books: Book Repair and Conservation**

Even the best preventive care for books in libraries and homes cannot arrest the deterioration imposed by our climate. Good care in this generation cannot always overcome damage inflicted by previous generations. When books require repair or conservation, it is important to seek a trained practitioner, and not repair the books yourself. Librarians, curators, and conservators have seen far too many well-meaning home repairs inflict worse damage than if the book had merely been left alone. The following are some guidelines in the care of books.

#### **DON'TS**

- Do not use any kind of self-adhesive tape to mend torn paper or book covers. This means Scotch brand tape, duct tape, masking tape, or tape of any kind. These tapes have an acidic adhesive which migrates into paper, causing it to yellow, become sticky, and darken the paper. The damage can be irreversible.
- Do not use glues or adhesives of any type.
- Do not use any form of oil to treat leather bindings. Only a trained conservator or bookbinder can determine if a leather would benefit from such a treatment. Oils rot

paper and cloth, and do not help leather that is already powdery, or suffering from red rot.

- Do not use spray adhesives or spray fixatives on books.

For Further Reading and Technical Leaflets:

Preservation of Library & Archival Materials: A Manual. Available from University Products (see below) or

Northeast Document Conservation Center (NEDCC)

100 Brickstone Square

Andover, MA 01818-1494

TEL 508.470.1010

FAX 508.475.6021

## SUPPLIERS

### LOCAL

Supplier	Product
Min Plastics 921 Kaamahu Place Honolulu, HI 96817 808.847.1511	Plexiglas UF 3 grade UV filtering
Hawaiian Graphics 1312 Kaumualii Street Honolulu, HI 96817 808.841.7527	100% ragboard (shelving) soft brushes archival supplies art supplies

### MAINLAND

Supplier	Product
University Products P.O. Box 101 Holyoke, MA 01041 1.800.628.1912	archival storage solutions silica gel desiccant
Light Impressions	silica gel desiccant UV filtering light filters photographic storage

The Bishop Museum does not endorse any of the above companies or products, but offers this list as a resource.

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