

PRESERVATION RESPONSIBILITIES: MATERIAL CARE AND MATERIALS SCIENCE FOR PAPER-BASED RESEARCH COLLECTIONS

The following is based on an article, prepared at SCMRE by Dianne van der Reyden, for *Materials Issues in Art and Archaeology IV* (Materials Research Society Symposium Proceedings, Pittsburgh, PA, 1995, vol. 352, pp. 63-71)

ABSTRACT

Recently many cultural institutions have reevaluated preservation responsibilities required by any comprehensive program to preserve research collections. There appears to be consensus about core responsibilities with specific action steps and targeted goals, which can be achieved by addressing seven key responsibilities:

- 1. preservation management** (responsible for policies, assessments, resource allotments, etc.);
- 2. reformatting/duplication** (preservation photocopying, microfilming, digitization);
- 3. environmental control** (storage & exhibits, disaster & integrated pest management);
- 4. collections maintenance** (handling & housing);
- 5. conservation treatment** (cleaning, stabilizing, repairing);
- 6. conservation research** (materials characterization, treatment development);
- 7. preservation training** (in all of the above).

The following includes an [introduction](#) to the topic, [explanations](#) of core preservation responsibilities, and a [table](#) outlining activities to be implemented if these responsibilities are to be met. Graphics illustrate core [preservation responsibilities](#), as well as [issues of concern](#) in preservation.

INTRODUCTION

Scenario: Let's say you have finally gotten your entire collection of visual images of "Women in the last 200 years" digitized and stored onto a compact disk and it's now available for world-wide access. So now that you have discharged your duty to make the information easily accessible to anyone, you can dump those pesky originals back in the research collections, since they're immaterial unless they're called for exhibition, or some researcher wants to "see the original." Right? Wrong! Do you know which visual images are hand-colored lithographs, chromolithographs, or photographs? Why do the materials matter? Well, for dating and authentication, for one thing. Each of these media, and specifically their subcategories, has distinct dates that may be determined (along with a wealth of other information about material culture, technology and use) by close examination and analysis of the original material item. A great deal of information lies buried within the material evidence, to be extracted by the methods of materials science if, that is, the integrity of the item has not been destroyed by poor material care.

Evidence and Information

Research collections often depend on paper-based materials, ranging from fieldnotes to photographs, for validation and supplementation. Such paper-based materials frequently have high *informational and evidential value*. Information derived from text and visual images in paper-based collections can be preserved and accessed in many formats, from photocopy duplication to digitization. However, intrinsic evidential or artifactual value is preserved only in the original and can not be accessed through any reformatted version. This material difference between the *original and the duplicate* is what fundamentally distinguishes history from Disney. The artifactual evidence preserved in the original material can only be fully accessed by *materials science*, which characterizes materials based on chemical, physical and optical properties. However, the quality of "knowledge" extracted from the original material by materials science is dependent upon the quality of care used to preserve the original. Thus, preservation of research collections involves a two-prong approach: preservation of evidence through storage and controlled access to collections, and preservation of information through both controlled access to collections and general access to duplicates like photocopies, transparencies, digital images, etc.

Storage of Evidence, and Access to Information

Material care requires the establishment, first, of responsible handling and storage policies for collections and second, responsible access to information. *If you don't have it, you can't access it.* Preservation of the physical and chemical content of the material is necessary before preservation of its intellectual content can be assured. Even digitization ensures access to only that information which has been extracted from original material to date. To illustrate but one example, duplication of the image of an old photograph in no way reveals whether the photograph is a vintage product of a single negative or a composite of separate pieces that may or may not be of the same period. This information can be determined by analysis of the old photograph (coatings, emulsion, paper, mount) using the chemical and physical measurements of materials science. Stored improperly, a mounted photograph may lose valuable visible information that might or might not be "recovered" through digitized image-enhancement techniques. A color transparency of an old photograph may replicate enough visual content to meet some research needs, but in no way does any duplicate provide all the informational content preserved in the original photograph, such as the photographer's working methods and materials. Technical information inherent in the original photograph may be determined through materials science if this information has not been irretrievably lost because of deterioration resulting from poor storage and care.

Preservation Strategies and Tactics

Material care and materials science are essential elements in any comprehensive preservation program, incorporated within key functions of *preservation administration, duplication, environmental control, collections maintenance, conservation treatment, research and education*. Key strategies employ *preventive care and phased conservation*. Despite the depletion of economic resources exacerbating the depletion of natural and cultural resources, these strategies can *maximize minimum resources* in several ways. Cost-benefit analysis and risk management assessment support a strategy emphasizing damage control through

preventive care, since fiscally responsible prevention of damage forestalls fiscally costly intervention to correct damage. For example, one tactic is to develop a triage method for care. In some cases, cost-benefit is greatest in the proper rehousing of large quantities of not-yet deteriorated materials (thereby postponing indefinitely the start deterioration), than in conserving a few extraordinarily damaged materials. Resource management favors a strategy of phased conservation that advocates step-by-step tactics or initiatives based on assessment of short, mid and long-term needs. Many initiatives (such as writing handling guidelines and supply specifications, or conducting assessment surveys) can be implemented quickly at low cost and have high impact. Such initiatives form the basis of preservation activities in the strategic plans of federal cultural agencies such as the Library of Congress and the National Archives.

EXPLANATION OF PRESERVATION RESPONSIBILITIES

A review of several institutional strategic plans revealed a growing consensus to identify and coordinate at least seven specific and critical preservation activities, having clear objectives and options, as explained below.

1. Preservation management is required for the implementation of policies that are based on established standards and practices (such as risk management, cost-benefit analysis, handling guidelines, supply specifications). Effective planning should be done in conjunction with assessment surveys of institutional environment and security; collection priorities based on value, use, and risk; and item-level condition and housing needs to ensure responsible levels of accessibility and care that is appropriate to the needs of collections. A consideration of the budget, staff, supplies, space, and time resources of the repository is mandatory. Preservation planning facilitates reformatting, environmental control, collections maintenance, treatment, research, and training.

2. Reformatting, or duplicating, to make preservation copies can protect original documents from handling while increasing accessibility for general use. The original formats of collections must be assessed using objective selection criteria (value, use, and risk). These selection criteria determine the most appropriate reformatting options based on permanence, cost, time, personnel, quality, etc. to produce and distribute new formats (e.g., photocopies for low value, use, and risk originals; color transparencies and digitization for high value, use, and risk collections) following current published criteria and cost-benefit analysis. Various formats (original, archival original, preservation master copy, duplication master copy, and user copies) are then stored according to individual optimum environmental criteria.

3. Environmental control preserves collections by controlling critical factors (light, temperature, relative humidity, pollution, and pests) throughout a facility to meet the needs of various formats (e.g., cold storage for original and masters, cool for duplication copies, and ambient for user copies). Effective environmental control depends on the use of appropriate furniture (closed shelves or shallow drawers), containers (horizontal or vertical file, print or document boxes), and housing (paper or polyester enclosures). Appropriate procedures incorporate integrated pest management and emergency preparedness into building and collections maintenance (Wilcox, 1995; Roberts, 1995).

4. Collections maintenance preserves by preventing loss of informational, evidential and intrinsic value by controlling environment and handling to ensure accessibility of collections. To aid accessibility and protect the collections, some documents might receive limited on-site physical stabilization (flattening and reinforcement), while rare documents might be selected for more comprehensive professional conservation treatment.

5. Conservation treatment can chemically and physically stabilize selected individual or batches of deteriorating documents (e.g., illustrations having brittle mounts or sticky tapes) to facilitate accessibility. Selection criteria and scheduling might follow a triage protocol for remedial, batched, or customized treatments, based on standards and practices developed through conservation research.

6. Conservation research utilizes materials science to characterize the technology, nature, and deterioration of collections to augment their use for research in the cultural and natural sciences. Conservation research also helps enhance preventive and interventive care protocols for collections and develop, test, evaluate, and modify models and theories for new standards and practices to improve preservation administration policies.

7. Preservation training ensures that all the responsibilities noted above are implemented to the highest standards. It encompasses in-house and outreach education for all levels of internal and allied staff, as well as the public. Training incorporates introductory orientations, mid-career updates, career enhancement, and advanced scholarly programs. Training and educational curricula should target each of the responsibilities outlined above, starting with preservation administration and assessment.

Ultimately, the preservation of research collections requires a balancing act guided by two facts: "if you don't use it (the collection), you lose it (the information);" but even more importantly, if you don't use it (the collection) carefully, thoroughly, and responsibly, you may lose it (the collection and all its inherent information) forever.

Summary

The following table outlines the seven preservation responsibilities with parallel action steps or options and targets or goals.

TABLE OF PRESERVATION RESPONSIBILITIES

<p>1. PRESERVATION MANAGEMENT:</p> <p>Implements established standards and practices in the preservation field (AAM, AIC-BPG, AIC-PMG, ANSI, ASTM, ISO, SAA, ALA) by facilitating multiple functions (reformatting, environmental controls, collections maintenance, conservation treatment, conservation research, and preservation education). Assures responsible accessibility of collections material, i.e. determines level of accessibility appropriate relative to the preservation needs of the collection. Serves as a resource center or clearing house for information.</p>	<p>Functional Options:</p> <p>a) assessment of short and long term preservation and resource needs for reformatting, environment, maintenance, treatment, research, and education.</p> <p>b) policy formulation, dissemination, implementation.</p> <p>c) guideline and procedures formulation, dissemination, implementation.</p> <p>d) establishment of internal and external advisory groups.</p> <p>e) designation of inhouse and off-site resources (i.e. storage, contracts).</p> <p>f) on-going monitoring, evaluation and revision of all policies, options, etc.</p>	<p>Resources (products):</p> <p>a) conservation assessment and preservation priority surveys.</p> <p>b) coordinated policies to increase efficiency and cost-effectiveness.</p> <p>c) manuals to enhance staff performance.</p> <p>d) maintenance of currency in preservation.</p>
<p>2. REFORMATTING/ DUPLICATION:</p> <p>Administrating appropriate reformatting options requires first evaluating special and general collections based on objective selection criteria (i.e. whether a collection constitutes high, medium or low value, use or risk, etc). Once evaluated, the collection can be matched to the most appropriate reformatting option (based on high, medium or low cost, time, personnel,</p>	<p>Functional Options:</p> <p>a) preservation photocopying</p> <p>b) preservation photo/negative duplication</p> <p>c) preservation microfilming</p> <p>d) digitization</p> <p>e) motion picture transfer</p> <p>f) audio transfer</p> <p>g) other</p>	<p>Resources (selection criteria):</p> <p>a) photocopying for low value, use and risk collections if a low cost, fast, easy copy of lesser quality is appropriate.</p> <p>b) photo duplicate for high value, use and risk collections if a moderate cost, time, and specialized process of high quality is appropriate.</p> <p>c) microfilm for moderate value, high use and</p>

<p>quality or other factors). Once a collection is reformatted, the master, master copy, and user copies must be stored using appropriate options (outlined under environment below).</p>		<p>moderate risk collections if a moderate cost, time, and specialized process of moderate quality is appropriate.</p> <p>d) digitize for high value, use and risk collections if a high cost, moderate time, and highly specialized process for high quality, flexibility and accessibility is appropriate.</p>
<p>3. ENVIRONMENT FOR STORAGE AND USE:</p> <p>Environmental factors include facility and climate control (i.e. exposure to high, medium or low levels of light, temperature, relative humidity, pollution and pests, etc.); furniture (horizontal or vertical storage on open or closed shelves, drawers); containers (individualized or bulk storage in vertical, horizontal or rolled orientation); and housing (paper, polyester film), among other things (such as accessibility and controls for handling and disaster control including integrated pest management).</p> <p>Each of these factors consist of options that can be matched to master collections (specialized or general), master copies, and user copies.</p> <p>If appropriate environmental and storage procedures are followed, the first steps toward</p>	<p>Functional Options (for storage):</p> <p>a) storage temperatures</p> <ul style="list-style-type: none"> -cold -cool -ambient/temperate <p>b) storage relative humidity</p> <ul style="list-style-type: none"> -low -moderate <p>c) furniture (must consider materials and technique of structure, movable or stationary, etc.)</p> <ul style="list-style-type: none"> -open shelves -closed shelves -drawers <p>d) containers</p> <ul style="list-style-type: none"> -vertical or horizontal boxes (buffered or neutral record unit, document, 	<p>Resources (use)</p> <p>a) special collections, master copies.</p> <p>b) user copies and general collections.</p>

<p>integrated pest management (IPM) and other disaster prevention functions is assured. Disaster prevention includes proper building maintenance, environment and handling practices, as well as IPM and disaster response and recovery plans.</p>	<p>clam-shell, phase, adjustable, or solander boxes, etc.)</p> <ul style="list-style-type: none"> -folders -tubs -canisters <p>e) housing (vertical, horizontal, or rolled orientation)</p> <ul style="list-style-type: none"> -paper folders, wraps, mats, etc. -polyester folders, pockets, wraps, etc. 	
<p>4. COLLECTION MAINTENANCE:</p> <p>Preventive conservation care activity including assessing and monitoring of environmental climate, storage, exhibition, IPM; light cleaning, flattening, fastener replacement, and rehousing to stabilize, support and enhance accessibility of collections; co-ordination of supply purchases, etc.</p>	<p>Functional Options:</p> <ul style="list-style-type: none"> a) assessing and monitoring of environmental climate, storage, exhibition, IPM. b) light cleaning, flattening, fastener replacement, and rehousing to stabilize, support and enhance accessibility of collections. c) spot testing and humidification of rolled materials. d) co-ordination of supply purchases, etc. e) upgrading of supplies. f) upgrading of procedural manuals. 	<p>Resources (needs and products):</p> <ul style="list-style-type: none"> a) supplies and equipment. b) accessible collections. c) reduction in cost of interventive conservation treatment.
<p>5. CONSERVATION TREATMENT:</p>	<p>Functional Options:</p> <ul style="list-style-type: none"> a) conduct condition 	<p>Resources (products):</p> <ul style="list-style-type: none"> a) collections stabilized at

<p>Interventive conservation care to chemically and physically stabilize carefully selected individual or batches of jeopardized, fragile, disfigured, or rapidly deteriorating materials (i.e. with biological infestation, acidic staining tapes and brittle mounts collections material) in order to facilitate accessibility for use, reformatting, exhibition, loans, etc.</p>	<p>assessments with treatment recommendations.</p> <p>b) consult on treatment priorities, options, time tables, personnel.</p> <p>c) advise on the effects of exhibits and loans.</p> <p>d) advise on material stability.</p> <p>e) select, develop and implement treatment protocols.</p> <p>f) train collections maintenance staff.</p>	<p>an appropriate level of care.</p> <p>b) a phased approach to care composed of discrete but interrelated phases to maximize minimum resources similar to a triage method.</p> <p>c) improved accessibility of collections to users.</p> <p>d) enhanced research value.</p>
<p>6. CONSERVATION RESEARCH:</p> <p>To insure that all the above functions represent the optimum level of care, as well as to aid staff and users in extracting optimum information from collections materials (for historical, social, cultural, etc. research), requires research on materials characterization, technologies of production and use, deterioration mechanisms, and both short and long-term preventive and interventive conservation care procedures. Conservation research leads to theories and models forming the bases for guidelines that then are enacted as practical measures; these measures are then monitored, tested, evaluated, and</p>	<p>Functional options:</p> <p>a) characterization of materials, their technologies, and deterioration mechanisms.</p> <p>b) evaluation of impact of handling and environmental issues.</p> <p>c) testing and development of preventive conservation care maintenance and interventive conservation care treatment measures.</p> <p>d) development of standards and testing procedures and equipment.</p>	<p>Resources (products):</p> <p>a) care of archival collections (paper-base, photo, film, magnetic and electronic media).</p> <p>b) testing of storage materials.</p> <p>c) care of modern materials.</p> <p>d) development of evaluation of care and treatment protocols.</p>

<p>modified by conservation research to formulate improved theories and models.</p>		
<p>7. PRESERVATION TRAINING:</p> <p>In order to comply with established standards and practices for the care of collections outlined in all the functions above, all staff and users need systematic and on-going short- and long-term theoretical and practical training.</p>	<p>Functional options:</p> <ul style="list-style-type: none"> a) preservation management. b) identification, nature/characterization, and deterioration of materials. c) handling. d) environment, storage, exhibition, transport. e) disaster prevention, preparation, response and recovery. f) collections maintenance. g) conservation priorities and practices. h) long-term research, regular analysis and monitoring of stability, maintenance and testing of collection standards, and development of research plans. i) publication and dissemination of all of the above. 	<p>Resources (audiences):</p> <ul style="list-style-type: none"> a) inhouse staff (collections managers, curators, librarians, archivists, exhibits staff, specialists, technicians, etc.) for practical training and career development. b) users (handling, nature of materials, etc.) c) allied agencies and professionals.

GRAPHICS:

**Areas of Concern in Preservation of Collections
Preservation Responsibilities**

ACKNOWLEDGEMENTS: The author would like to acknowledge work done in this area by others, including Mary Lynn Ritzenthaler, Karen Garlick, Diana Alper, Alan Calmes, Diane Kresh, and Amparo de Torres.

ENDNOTES:

1. There are many types of value in addition to informational and evidential (including intrinsic, artifactual, artistic, aesthetic, associational, monetary, administrative, etc.) which may be variously defined depending on relevance to a bureau's mission statement.
2. There are many types of, and definitions for, originals (such as master original, vintage original, archival original, etc.). For example, a printing-out photographic process may produce an original negative and multiple "original" contemporaneous photographic prints (i.e. vintage original negative and photographs). A collection may have these vintage originals (i.e. the original "master" negative and a original "master" photograph) or a later reprint or copy. Depending on circumstances, any of these three items, if they are the sole example in the collection, might also be called an "archival original," meaning that they should be protected from access as much as possible. "Archival originals" should be duplicated to make a "preservation master" and a "duplication master." Each "archival original" and "master" should be stored in the most appropriate manner technologically available. The "duplication master" is used to generate "user copies" for general access. There are other terms and other definitions, and standardization within an institution should be encouraged.
3. van der Reyden, D. "Case Studies in Photography Conservation Including a Survey of 15,000 Photographs," The Imperfect Image: Photographs, Their Past, Present and Future, Conference Proceedings, Windemere, England, 1992, pp. 347-361.
4. ----- "Maximizing Minimum Resources for Paper-Based Archives, Library, and Research Collections," International Institute for Conservation - Preventive Practice, Theory and Research: Summaries of the Posters at the Ottawa Congress, 12-16 September, 1994, Ottawa, 1994, p. 32.