



Module Two of Ten

Preservation of Materials

TRAINING *in* PRESERVATION MICROFILMING

Module Two of Ten

Preservation of Materials

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National Library of Australia
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Introduction

Welcome to Preservation of Materials.

The purpose of this module is to provide you with the knowledge and skills necessary to arrange for the preservation of items in the collection. This includes **preventive preservation, disaster management** and **recovery**.

Prerequisites

This is the second module in a series of training materials on preservation microfilming. There are no formal prerequisites for this module. However, before you start on this module, it is suggested that you read through the introductory module, **Preservation Microfilming - Basics**. This will give you a useful foundation for understanding the information in this module.

Learning outcomes

When you have successfully completed this module, you will be able to:

- I identify measures that can be taken to avoid or minimise damage to library materials caused by environmental factors (light, air, water, temperature, humidity etc.)
- I identify problems associated with storage, housing and use of library materials and ways of minimising their damage
- I assist in putting a disaster recovery plan into practice.

In competency-based training models, the **learning outcomes** closely relate to the term **elements of competency**.

Recognition of current competencies (RCC)

You may already have knowledge, experience and skills which are relevant to this module.

This means that if you wish to complete a formal Preservation Microfilming course, you may not have to study all of it. Please discuss this with your course coordinator or lecturer. Evidence of your microfilming competence, and/or an assessment, such as a practical test, will be required.

Assessment

If you are formally studying the Preservation Microfilming course, you must meet certain **performance criteria** in order to demonstrate your competency in each unit or module. These criteria form the basis of your assessment. They are listed at the beginning and end of each topic.

As you work your way through these training materials, you will need to keep a record of the **performance criteria** and other learning **activities** that you have completed.

Conditions

You will also need access to:

- I examples of damaged materials
- I a collection of materials that can be surveyed for damage.

Check with your lecturer or mentor if there are any problems with access to these materials.

There are two types of learning activities in this module, which are indicated by the icons below:

■ Activity

Responses to these activities are written in this book. They are usually short tasks which keep you involved with the issues you are considering and may also require you to apply what you are learning.

Some of the activities in these training materials require you to perform tasks such as loading a camera, or operating a processor. A lecturer or assessor will observe you performing the tasks and then examine the results or the product (e.g. the newly processed microfilm) to check that it meets requirements. Major activities are marked with the symbol .

● Reflect

Here you will be asked to think about key issues, usually in consultation with workplace colleagues, and come to some conclusions. The purpose of these activities is to allow you to share your understanding with others, and benefit from wider experience than your own.

You will need to be prepared to discuss your findings or conclusions with your assessor or lecturer who will be signing off the relevant **performance criteria**.

▲ Submit

When this icon appears, you are ready to record in the **Log book** that you:

- I can meet the **performance criteria**
- I have satisfactorily completed the **activities** for a topic.

You can record these by marking off the boxes in the shaded columns with a ✓ **yes** or ✗ **no**.

You can then ask your lecturer or assessor to verify that you can meet the **performance criteria** and that you have satisfactorily completed the **activities**.

If you work through the various activities along the way, you will find the assessment activities relatively easy to complete.

Resources

 **There are a number of resources available on preservation and preservation microfilming. A librarian can help you find out where these resources are available.**

Below are a few:

Printed materials

Adcock, Edward P. (ed. & comp.) 1998, *Principles for the Care and Handling of Library Material*, International Preservation Issues, number 1, IFLA-PAC, Paris.

Address: IFLA Core Programme for Preservation and Access (PAC) Bibliotheque Nationale de France, 2, rue Vivienne, 75084 Paris Cedex 02, France.

(Available online at IFLA website as *Principles for the care and handling of library material*, <<http://www.ifla.org/VII/4/news/pchlm.pdf>>, accessed 4 May 2003.)

Alegbeleye, Bunmi, 1996, 'How Should Preservation Procedures be Implemented in Africa', *International Preservation News*, no. 13, December, pp. 9–11.

(A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VII/4/pac.htm4>>, accessed 12 May 2003).

Berthon, Hilary 2001, 'Preserving together: collaborative library activities in Australia', *International Preservation News*, no. 24, May, pp. 22–25.

(A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VII/4/pac.htm4>>, accessed 12 May 2003).

Dean, John 1999, 'Collection care and preservation of Southeast Asian materials', *International Preservation News*, no. 20, December, pp. 10–14.

(A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VII/4/pac.htm4>>, accessed 12 May 2003).

Dean, John 2000, 'National and Regional Preservation Planning – background to the establishment of cooperative programs,' in *Proceedings of the International Meeting on Microform Preservation and Conservation Practices in Southeast Asia: Assessing Current Needs and Evaluating Past Projects*, February 21–24, 2000, Chiang Mai University, Chiang Mai. pp. 19–20. Available from SEACAP website, <<http://www.seacap.chiangmai.ac.th/>> accessed 12 May 2003.

Dean, John & Henchy, Judith 2001, 'Preservation in Southeast Asia: a new beginning', *International Preservation News*, no. 24, May, pp. 15–19.

(A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VII/4/pac.htm4>>, accessed 12 May 2003).

Doig, Judith 1997, *Disaster Recovery for Archives, Libraries and Records Management Systems in Australia and New Zealand*, Charles Sturt University, Wagga Wagga.

Edmonds, Penelope 2001, 'Pesticide contamination of Native American Artefacts', *AICCM National Newsletter*, no. 78, March, pp. 1–4.

Harvey, Ross 1993, *Preservation in Australian and New Zealand Libraries: Principles, Strategies and Practice for Librarians*, 2nd edn, Charles Sturt University, Wagga Wagga.

Heritage Collections Council Secretariat, Department of Communications, Information Technology and the Arts 1998, *ReCollections: Caring for Collections Across Australia*, Heritage Collections Council Secretariat, Department of Communications, Information Technology and the Arts Canberra. (See especially parts *Caring for Cultural Material 1 and 2*, and *Damage and Decay*.)

(The resource *ReCollections* is also available online from the Museums Australia website, <<http://amol.org.au/recollections/>>, accessed 15 May 2003.)

Heritage Collections Council 2002 *Guidelines for environmental control in cultural institutions*, Heritage Collections Council, Consortium for Heritage Collection and their Environment, Canberra.

IFLA-PAC 2000, *Safeguarding Our Documentary Heritage*, (CD Rom), UNESCO Memory of the World Programme, Paris.

Jian Li 1999, 'Description of Microfilming Efforts of Public Libraries in China', *International Preservation News*, no. 18, March, pp. 19–21.

(A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VII/4/pac.htm4>>, accessed 12 May 2003).

Kenjo, Toshiko 1997, 'Preservation Environment in Library Stacks and Anti-disaster Measures', *International Preservation News*, no. 15, August, pp. 20–24.

(A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VII/4/pac.htm4>>, accessed 12 May 2003).

Lin, Zuzao 1999, 'The Traditional and Modern Preservation of Library Rare Books and Precious Rare Material in China', *International Preservation News*, no. 19, July, pp. 8–11. (A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VII/4/pac.htm4>>, accessed 12 May 2003).

Maidment, Ewan 1998, 'Roving the Pacific: Pacific Manuscripts Bureau Microfilming in the Pacific Islands', *Microform and Imaging Review*, Vol. 27 no. 2, Spring, pp. 55–62.

Maidment, Ewan 2001, 'PAMBU: Microfilming in the Pacific Islands', *International Preservation News*, no. 24, May, pp.7–10. (A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VII/4/pac.htm4>>, accessed 12 May 2003).

Microform and Imaging Review 1972– , (journal), quarterly, K. G. Saur, Munich, Germany.

Micrographics Year Book 1981– 2001 (annual), G. G. Baker, Windlesham, Surrey, UK. (Last edition 2001).

Museums Australia (Inc.) 1996, *Previous Possessions, New Obligations: A Plain English Summary of Policies for Museums in Australia and Aboriginal and Torres Strait Islander Peoples*, Department of Museums Australia Inc., North Fitzroy, Victoria.

Museums Australia (Inc.) 1998, *Caring for Our Culture: National Guidelines for Museums, Galleries and Keeping Places*, Department of Communications and the Arts, Canberra.

National Preservation Office 1994, *Preservation: a Training Pack for Library Staff*, National Preservation Office, British Library, London.

Perumal P & Wheeler Michael 1997, 'Traditional Practices for the Control of Insects in India', *V&A Conservation Journal*, April, pp. 8–9.

Roze Jean-Pierre 2002, 'Disaster Planning', *International Preservation News*, no. 27, August, pp. 11–16. (A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VII/4/pac.htm4>>, accessed 12 May 2003).

SEACAP (Southeast Asian Consortium for Access and Preservation) 2000, *Proceedings of the International Meeting on Microform Preservation and Conservation Practices in Southeast Asia: Assessing Current Needs and Evaluating Past Projects*, February 21–24, 2000, Chiang Mai University, Chiang Mai. (Available from the SEACAP website, <<http://www.seacap.chiangmai.ac.th>>, accessed 4 May 2003).

Strang, T. 1996, 'Do do that Voodoo...: Myth, Magic and Managing Pests', *International Institute for Conservation – Canadian Group (IIC-CG) 22nd Annual Conference, May 22–23, Training Workshop, Abstracts*, Montreal, Institute for Conservation – Canadian Group, pp.46–52.

Wendell, Laura 2001, 'Taking care of books', *International Preservation News*, no. 25, August, pp. 6–9. (A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VII/4/pac.htm4>>, accessed 12 May 2003).

Internet sites

(As internet sites change frequently, you may need to use a search engine to identify the latest location)

AICCM (Australian Institute for the Conservation of Cultural Material Inc.), <<http://www.aiccm.org.au>>, accessed 15 May 2003. Address: GPO Box 1638, Canberra ACT 2601, Australia.

AIIM (Association for Information and Image Management), <<http://www.aiim.org>>, accessed 4 May 2003, and its sub group the Film-based Imaging Association, <<http://www.fbi.aiim.wegov2.com>>, accessed 14 May 2003. The film-based imaging association has a buyers guide of U.S. manufacturers and distributors of micrographic equipment and supplies. Address: 1100 Wayne Avenue, Suite 1100, Silver Spring MD 20910 USA

ANSI (American National Standards Institute) <<http://www.ansi.org>> accessed 15 May 2003. ANSI administers and coordinates the U.S. standardisation system. Address: Customer Service, American National Standards Institute, 25 West 43rd Street, New York, NY 10036.

Artlab Australia, <<http://www.artlab.sa.gov.au/>>, accessed 3 May 2003. (Artlab provides a range of conservation and preservation information and services.) Address: Artlab Australia, 70 Kintore Avenue, Adelaide South Australia 5000, Australia.

BSI Group (British Standards Institution), <<http://www.bsi-global.com>>, accessed 13 May 2003. The source of information and supply of British microfilming standards. BSI Group 389 Chiswick High Road, London, W4 4AL, UK.

CLIR (Council on Library and Information Resources), <<http://www.clir.org/>>, accessed 3 May 2003. Address: 1755 Massachusetts Avenue, NW, Suite 500 Washington DC 20036, USA

COOL (Conservation Online), <<http://palimpsest.stanford.edu/>>, accessed 14 May 2003.

Hosted by Stanford University, USA, this is a comprehensive source for online information for preservation in libraries and archives.

ECPA (European Commission on Preservation and Access), <<http://www.knaw.nl/ecpa/expo.htm>>, accessed 3 May 2003. Hosts GRIP – which is a Gateway for Resources and Information on Preservation.

Address: Royal Netherlands Academy of Arts and Sciences, Kloveniersburgwal 29, P.O. Box 19121 NL-1000 GC Amsterdam, The Netherlands.

EXTOXNET (Extension Technology Network), <<http://ace.orst.edu/>>, accessed 16 May 2003. Provides information about pesticides for non-experts.

G.G. Baker and Associates, <<http://www.ggbaker.com/>>, accessed 15 May 2003.

This organisation provides detailed advice about micrographic systems. The web site includes links to suppliers and also provides background information about areas of microfilming from jacketing to linking with electronic document management systems.

Address: Saffron Hill, Chedworth, Glos. GL54 4AL UK.

IFLA (International Federation of Library Associations and Institutions) Preservation and Conservation (PAC) Core Programme, <<http://www.ifla.org/VI/4/admin/general.htm#1>>, accessed 15 May 2003.

IFLA-PAC Bibliotheque Nationale de France,

Address: 2, rue Vivienne, 75084 Paris Cedex 02, France.

- See also *Principles for the care and handling of library material*, <<http://www.ifla.org/VI/4/news/pchlm.pdf>>, accessed 15 May 2003.

- A number of back issues of *International Preservation News* are available direct from the IFLA website, <<http://www.ifla.org/VI/4/pac.htm#4>>, accessed 15 May 2003.

- The IFLA-PAC Centre at the National Library of Australia maintains a *Documentary Heritage Preservation Register*. This provides information about preservation projects in the Southeast Asian and Pacific regions such as microfilming, training, basic conservation and collection surveys, <<http://www.nla.gov.au/dhpr/>>, accessed 15 May 2003.

IPI (Image Permanence Institute)

<<http://www.rit.edu/~661www1/>>, accessed 15 May 2003. The IPI is a university-based research laboratory devoted to image preservation.

Address: Rochester Institute of Technology, 70 Lomb Memorial Drive Rochester NY 14623-5064, USA.

ISO (International Organisation for Standardisation), <<http://www.iso.ch/>>, accessed 15 May 2003.

Address: ISO Central Secretariat PO Box 56 CH-1211 GENÈVE Switzerland.

Library Preservation and Conservation Tutorial – Southeast Asia. Designed for librarians and conservators in Southeast Asia, it has a range of information on preservation, including microfilming, <<http://www.librarypreservation.org>>, accessed 15 May 2003.

The Microfilm Shop, <<http://www.microfilm.com/>>, accessed 15 May 2003.

Provides product information, news and views with a focus on business applications.

MICROLINK-L is an email discussion list on preservation microfilming jointly owned by the National Library of Australia and the State Library of South Australia, <http://www.nla.gov.au/nla/listserv/microlink_l.html>, accessed 15 May 2003.

Museums Australia, <<http://amol.org.au/>>, accessed 15 May 2003.

Address: PO Box K36 Haymarket NSW 1238.

(The resource ReCollections is also available online from the Museums Australia website, <<http://amol.org.au/reollections/>>, accessed 15 May 2003.)

National Library of Australia <<http://www.nla.gov.au/>>, accessed 15 May 2003.

Address: Canberra, ACT 2600, Australia

National Library of Australia. *Policy on Preservation Copying of Collection Materials*, <<http://www.nla.gov.au/policy/micro.html>>, accessed 15 May 2003.

National Library of Australia. Anica – Australian Network for Information on Cellulose Acetate, <<http://www.nla.gov.au/anica/index.html>>, accessed 15 May 2003.

See also MICROLINK-L

<http://www.nla.gov.au/nla/listserv/microlink_l.html>, accessed 15 May 2003, and IFLA-PAC *Documentary Heritage Preservation Register* <<http://www.nla.gov.au/dhpr/>> accessed 15 May 2003.

The National Preservation Office (UK).

Address: British Library, 96 Euston Road London, NW1 2DB, UK <<http://www.bl.uk/services/preservation/>>, accessed 15 May 2003.

NEDCC (North East Document Conservation Center), <<http://www.nedcc.org/>>, accessed 15 May 2003. A U.S. site with a list of other internet resources about preservation. A number of their publications are available online.

NSSN: a National Resource for Global Standards, <<http://www.nssn.org>>, accessed 15 May 2003. Provides a fee-based information service which includes international standards and technical data. Address: Customer Service, American National Standards Institute, 25 West 43rd Street, New York, NY 10036.

PAMBU (Pacific Manuscripts Bureau), <<http://rspas.anu.edu.au/pambu/>>, accessed 15 May 2003. Based in the Research School of Pacific and Asian Studies, Australian National University, the aim of the Pacific Manuscripts Bureau is to locate and preserve archives, manuscripts and other unpublished or semi-published material through microfilm. Address: PAMBU, Research School of Pacific and Asian Studies, Australian National University, Canberra, ACT, 0200, Australia.

Preservation Resources is a division of OCLC. (Online Computer Library Center Inc.), <<http://www.oclc.org/oclc/presres/microfilm.htm>>, accessed 15 May 2003. It offers services such as preservation microfilming to libraries, including duplicating, scanning and polysulfide treatment.

RLG DigiNews is a newsletter conceived by the members of the Research Libraries Group's PRESERV community. Funded in part by the Council on Library and Information Resources (CLIR) from 1998-2000, it is available internationally via the RLG PRESERV web site, <<http://www.rlg.org/preserv/>>, accessed 15 May 2003. Address: Research Libraries Group 1200 Villa Street Mountain View, CA 94041-1100 USA.

SEACAP (Southeast Asian Consortium for Access and Preservation), <<http://www.seacap.chiangmai.ac.th>>, accessed 14 May 2003. The aim of SEACAP is to encourage and support collaboration amongst libraries, archives and other institutions and interested individuals in order to preserve and provide access to the published and documentary heritage of the region.

Smith, Wendy *Sources of online information about caring for collections*, <<http://www.alia.org.au/~wsmith/>>, accessed 4 May 2003.

Spring Singapore, <<http://www.psb.gov.sg>>, accessed 15 May 2003.

The source for information and supply of Singapore Codes of Practice relating to microfilming.

PSB Building, 2 Bukit Merah Central, Singapore 159835.

Standards Australia, <<http://www.standards.com.au>>, accessed 14 May 2003. Address: GPO Box 5420 Sydney NSW 2001, Australia.

UNESCO *Memory of the World Programme*, <<http://whc.unesco.org/nwhc/pages/home/pages/homepage.htm>>, accessed 15 May 2003.

Topics 1, 2 & 3

Identifying and dealing with damage to materials

Performance criteria

You will have achieved the performance criteria for this topic when you can:

- I identify environmental factors that cause damage to library materials
- I identify and explain the potential for damage by:
 - biological and human factors
 - housing and storage
- I explain methods of minimising the damage from all of these factors
- I apply given criteria to assess the extent of damage caused by all of these factors
- I decide on action appropriate to the damage for different types of materials, noting those requiring immediate action, specialised attention, replacement or other alternatives
- I follow specified procedures to avoid or minimise damage.

Preservation and conservation

The first module, **Preservation Microfilming – Basics**, introduced the concepts of preservation and why some materials may be at risk.

The term **preservation** is a broad ‘umbrella’ term that includes all activities that prolong the life of materials or their information content. It commonly refers to the treatment of individual items (e.g. repair work) to safeguard them for the future.

Preservation includes a whole range of factors from handling items carefully and appropriate housing and storage, to preservation reformatting and disaster planning. This is reflected in the table below.

preservation management developing the policies and priorities	environmental control temperature, relative humidity integrated pest management	appropriate housing and storage	preservation reformatting microfilming, photocopying, transcriptions, digitising	disaster planning
--	--	--	--	--------------------------

P R E S E R V A T I O N

careful handling see module, Preparation for Microfilming	basic ‘housekeeping’ maintenance of collections	security of collections	education of staff and users	conservation treating individual items
--	--	--------------------------------	-------------------------------------	--

This module focuses largely on the factors of **environmental control**, **housing and storage**, and **disaster planning**—the shaded areas in the table above.

The careful handling of materials is discussed in the module, **Preparation for Microfilming**. All modules deal with microfilming as a **preservation reformatting** strategy.

 Further information on other preservation issues is available from the list of **Resources** at the front of this module.

The nature of materials

A number of the common materials in library and archival collections and the reasons why they deteriorate are briefly discussed below. Paper, which makes up the bulk of these collections, is one of the key materials at risk.

The following information is drawn from:

- *Preservation in Australian and New Zealand Libraries* (Harvey 1993)
- *ReCollections: Caring for Collections across Australia - Caring for cultural material 1 and 2 and Damage and Decay*, (Heritage Collections Council Secretariat 1998).

Paper

Paper is made from cellulose fibres. Early European papers were made from the cellulose fibres in old rags. More recently, paper fibres have come from a range of plants, including flax, hemp, cotton, trees and 'paper mulberry'.

A large proportion of the paper produced today is made from ground wood and is not intended to last. Wood pulp contains **lignin** which breaks down to produce yellow-brown substances as well as acids. The acids attack the paper fibres, weakening the paper and making it brittle.

Additives, introduced during the manufacturing process, are another cause of deterioration. These include:

- rosin/aluminium sulphate as a sizing agent, which reduces the absorbency of the paper
- bleaching agents, used to produce white paper.

The additives leave residual acids in the paper, which further break down the cellulose. Thus, modern paper decays rapidly because of its composition.

This deterioration is hastened by exposure to heat, high humidity, visible and ultraviolet light.

- A key way to measure the life-expectancy of paper is a measure of its pH—the degree of acidity or alkalinity.
- pH is measured on a scale of 0 to 14. A reading of 0 is highly acidic, while 14 is totally alkaline and 7 is neutral.
- 'Archival standard' paper is now being produced. It has a pH of 7 or higher.
- Many of the 'archival standard' papers contain an alkaline buffer to help protect them from the acidity of pollution.

Leather, parchment and vellum

Until the nineteenth century European books were traditionally bound in leather. Early leather was vegetable-tanned—a process that left protective salts on the skins and made them resistant to acid deterioration.

Newer tanning processes have produced leather which lacks the protective salts and also introduces sulphur dioxide. The result is called 'red-rot' deterioration that turns the leather reddish-brown and powdery.

Parchment and vellum are made from the skins of calves, sheep or goats. The skins are cleaned, soaked in a lime solution to remove hair, then dried and stretched.

Both parchment and vellum are very sensitive to changes in humidity. Severe distortion and damage can result from swelling, which occurs when humidity is altered.

Palm leaves

A number of manuscripts in the Asian region are on palm leaves. These can be susceptible to damage by insects. Exposure to atmospheric changes makes them become rigid over time and they need to be oiled to maintain their flexibility.

Ink

Early writing inks were made from carbon, usually lampblack mixed with gum arabic. These did not fade when exposed to light.

Later writing inks contained ferrous sulphate which eventually oxidised to produce sulphuric acid. This eventually resulted in a loss of the text.

Since 1945, dye-based writing inks have replaced the ferrous inks. Many of the inks in library materials, especially manuscripts, are dyes or pigments which dry by being absorbed into the paper. Some are soluble in water and will run in conditions of high humidity. They are also extremely light sensitive.

 Further details about the nature of materials in library and archival collections can be found in *Preservation in Australian and New Zealand Libraries* (Harvey 1993) and *ReCollections: Caring for Collections across Australia - Caring for Cultural Material 1 and 2* (Heritage Collections Council Secretariat 1998).

■ Activity 2.1

Deterioration experiment

Find a sheet of 'thermal' fax (facsimile) paper with text on it, or a sheet of newspaper. Expose the sheet to strong sunlight for a period of a few days, or until you notice a change.

What deterioration did you observe?

What factor(s) caused the deterioration?

Environmental factors that cause damage, and ways of minimising the damage

Major environmental factors which can cause damage are:

- I visible light, UV (ultraviolet), and infrared radiation
- I temperature and relative humidity
- I dust
- I atmospheric pollution.

Visible light, UV (ultraviolet), and infrared radiation

When visible light and UV radiation fall on an object they deliver forms of radiant energy. In turn, this causes various chemical reactions to take place, as with the experiment with the thermal paper and newspaper.

Light and UV radiation can cause extreme and irreversible damage to many materials—especially organic materials which come from plants and animals, such as paper, dyes, inks and palm leaves. Light and UV speed up the process of chemical breakdown—they may bleach paper and inks and cause fading of images. If lignin is present, the light will react with it to cause the paper to yellow or darken.

Infrared radiation heats materials and causes them to expand, leading to stresses. It can also cause chemical changes to progress more rapidly.

Once started, photochemical reactions can continue, even after the exposure to light and UV radiation has stopped.

Minimising damage

Limiting light damage is simple. Keep light levels in collections as low as possible and where possible keep them in the dark. Curtains or blinds and UV-absorbing plastic films over windows and skylights can filter the light. Where possible, keep items in boxes.

Temperature and relative humidity

Relative humidity (RH) is a measure of the amount of water vapour contained in the air at a particular temperature. This is compared with the total amount of water vapour that the air can contain at that temperature. It is expressed as a percentage.

If temperature and relative humidity are too high, they speed up the rate at which chemical reactions take place and thereby increase the rate of deterioration. Under these conditions, mould is also likely to grow.

Changes in relative humidity and temperature are potentially far more damaging to most materials than are constant, extreme conditions. These changes occur, for example, with sudden changes in the weather, when the air conditioning breaks down or when objects are moved.

Organic materials, such as paper, vellum and palm leaves, are **hygroscopic**—they expand and contract as moisture levels rise and fall. Therefore they will swell or shrink with changes in temperature and relative humidity, causing warping or buckling.

High humidity will also cause water-soluble inks to run while very low humidity may cause materials to become brittle.

Minimising damage

To reduce the damage caused by high levels of temperature and humidity Ross Harvey recommends two things:

- **LOW** ☞ keep the TEMPERATURE as low as possible
- **SLOW** ☞ slow down the rate at which TEMPERATURE and RELATIVE HUMIDITY change.
(Harvey 1993)

The relationship between temperature and relative humidity is complex. For example, lowering the temperature may raise the relative humidity, as cool air holds less moisture than warm air.

Before making any changes to temperature and humidity in a collection, ask a conservator for advice.

Ideal environmental control

ReCollections recommends and comments on the following critical levels (Heritage Collections Council Secretariat 1998).

Factor	Level	Comment
relative humidity level	50% ± 5 %	for the safe-keeping of collections in libraries and archives
constant temperature level	about 20°C ± 2°C	appropriate for safe housing of most types of materials found in library and archival collections
dangerous relative humidity levels	over 65% below 35%	mould grows at this level some materials dry out at this level

In some countries where there is a high level of funding, air conditioning can be installed. This can help to keep temperature and humidity levels low, provided that the supply of electricity is regular.

The reality

In many countries and climates it can be extremely difficult to come close to the levels in the table above. The option of air conditioning and cold storage can be far too costly.

In arid zones, fluctuations of temperature between night and day may be severe. Harsh winds can blow large quantities of dust and sand into a building.

In tropical zones, relative humidity will be very high, especially during the monsoon season.

In tropical and arid climates, it is especially important to follow Ross Harvey's principles of LOW and SLOW:

- keep the temperatures as low as possible
- slow the rate of change in temperature and relative humidity.

Traditional building methods and a well-maintained building may provide a stable environment. Make sure that roof gutters are cleaned out, cracks and holes are repaired in walls and ceilings, and leaky roofs are checked. These steps will improve the stability of the humidity and temperature inside.

The most stable area of a non-air conditioned building is an internal room on the ground floor.

This is because it has other layers to protect it against climatic changes. Basements can provide a cool temperature—but they may be damp.

It is important to remember that many objects can become conditioned to their environments. You can damage an item which is stable, but in an extreme climate, by moving it too quickly into another environment that meets with the recommended levels. **Always check with a professional conservator before moving anything.**

Dust

Dust can build up in areas that are hidden or which may trap particles. Dust absorbs moisture, so that areas with a large build-up of dust can have a higher local humidity. Dust also attracts and harbours pests, enabling insects to hide.

Dust and grit can cause physical damage, such as scratching of the original item. Dust also absorbs pollutants, leading to further damage in adjacent material. (Dust is also called a 'solid pollutant'—see below.)

Living with dust and pollution has become a way of life in many countries.

Atmospheric pollution

Most air pollution can be classed as either gas or 'solid' (particles suspended in air). Polluting gases such as sulphur dioxide, nitrogen dioxide, and hydrogen sulphide combine with water in air and produce acids which are harmful to library and archival materials. Ozone is another gas which makes paper and leather brittle through oxidation.

Solid particle pollutants are often classed as dust. If they contain nutrients, they may encourage the growth of mould or fungi. Solid pollutants can also cause scratching of the original items. If they contain acidic substances, they may stick to the surfaces of library materials and cause further deterioration.

Atmospheric pollution can come from outside and inside a building, through a workshop, a kitchen, or even from materials used to store or display objects.

 An excellent summary of typical preservation problems faced by many Southeast Asian libraries is provided by John Dean (Dean 2000).

John Dean points out that simple solutions of good housekeeping and building maintenance are often more practical than trying to install an expensive air conditioning system, especially when the supply of electricity is unreliable.

Minimising damage

The following steps, taken from *ReCollections: Damage and Decay* (Heritage Collections Council Secretariat 1998, pp. 62-63), are recommended to protect collections from dust and pollution:

- Clean and dust regularly ('good housekeeping').
- Provide door mats.
- Double doors or screens on doors and windows will provide greater protection.
- Keep windows closed, if possible. As this will depend on the building, seek the advice of a conservator. It not a good idea to keep windows closed in tropical climates because air circulation is needed to reduce mould growth.
- Filter any air vents.
- Use strips around doors and windows to seal them.
- Use protective enclosures. Cover objects in boxes, wrap in cloths or enclose in a 'preservation-standard' protective cover.

 Further information on simple methods of preventing damage is given in:

- Adcock 1998
- Alegbeleye 1996
- Dean 1999.

The excerpt by Adcock, and the articles by Alegbeleye and Dean are reproduced with permission on the following pages.

Improving the environment

If the objective is to retain a collection or specific individual items indefinitely, then very close attention needs to be paid to the environment in which the items are stored. The ideal environment includes controlled temperature and relative humidity, clean air with good circulation, controlled light sources, and freedom from biological infestation. Good housekeeping practices, security controls, and measures to protect collections against fire, water, and other hazards complete the range of environmental concerns.

Library buildings should be designed as far as possible to meet preservation requirements. These requirements affect many aspects of planning: design and orientation of buildings; building materials (which can, under some circumstances, be used to produce satisfactory internal climatic conditions in preference to mechanical air control systems); internal building and refurbishing materials; and materials used for furniture, including shelving as well as lighting, both natural and artificial.

Indigenous and traditional building methods and materials in subtropical and tropical areas often provide better storage conditions for library material than those that are imported.

It is always worth considering constructing a sealed area within a building for material which needs tight temperature and relative humidity control.

Practical measures to improve the environment

In many places heating, ventilating, and air conditioning systems (HVAC) may be too costly to install and maintain or may have to be restricted to specific collections. Nevertheless, there are many rudimentary measures and precautions that can improve a library's environment and protect collections.

A first step in all efforts to improve the environment should be sealing the structure. This step alone will improve the physical condition of the building by reducing air infiltration, pest access, heating loss or heat gain, and air and particulate pollution. Making the building watertight will also reduce the sources of moisture within the structure and may significantly reduce relative humidity levels.

- Use draft excluders and weatherstripping to make the building weathertight.
- Ensure windows and doors fit securely.
- Ensure good air circulation by appropriate use of fans and windows.
- Use dehumidifiers and humidifiers to reduce or increase relative humidity.
- Use insulation methods to reduce heat gain or loss.
- Use UV-filters on windows and fluorescent lighting.
- Use screens, blinds, shutters (preferably outside the windows, as this reduces solar heat gain), and heavy curtains to keep out direct sunlight.
- Ensure storage facilities are dark.
- Ensure buildings are properly maintained to keep out dampness during rainy periods.
- Use close-fitting enclosures (boxes and envelopes) wherever possible to protect important and valuable library material. These can create a microclimate around the object, which delays the effects of changes in temperature and relative humidity. They also shield the item from light, and can act as a buffer against atmospheric pollutants and prevent particulate deposits.
- Paint the outside of the building with a pale-coloured light-reflecting paint in hot climates.
- Be aware that while trees and vegetation near buildings can reduce heat gain, they can also encourage insect and pest activity.
- Locate plumbing and heating pipes outside storage areas.
- Locate sanitary premises and sinks outside storage areas.

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Housekeeping

To ensure the protection of the collections against particulate pollutants, a regular and sustained programme of cleaning should be maintained, undertaken with care and under supervision. Clean surroundings also discourage fungi, insects, and pests. The cleaning programme should include the examination of collections not only to provide early warning of biological or chemical damage but also to observe conditions throughout the area.

Cleaning the floors of storage accommodation and book stacks may be left to non-specialized staff under instructions to respect the collections and not to touch library material or shelves. Directions should be given to retrieve pieces of bindings, record slips, etc., from the floor (noting where they were found). Library material on the shelves should only be cleaned by properly trained members of staff.

It is important to provide appropriate materials and equipment which remove rather than redistribute dirt and dust. Cleaning cloths to which particulates adhere rather than dusters which merely spread them around in different places should be used to clean library fittings. Floors should be vacuum cleaned (not swept) and damp-mopped once a week. Cleaning agents must be nontoxic and pose no threat to the collections from solvent fumes or abrasives. Products containing oil, chlorine, alum, peroxides, and ammonia should be avoided.

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HOW SHOULD PRESERVATION PROCEDURES BE IMPLEMENTED IN AFRICA ?

Preventive conservation may be defined as those activities deployed to slow down or even prevent ongoing deterioration of library and archival materials. Preventive conservation, also called preservation (see frame 1 in opposite column) is to be distinguished from conservation and restoration treatments. It deals with minimizing deteriorative factors, maximizing security in libraries and archives and proper handling of documents. Preventive conservation should be the concern of every user and all library and archive staff in Africa as elsewhere.

Surveys of the condition of library and archive materials in Africa which were conducted by Mazikana, Alegbeleye and many others, indicate that the seismic scale is a major preservation issue. There is obviously no absolute solution to the preservation and brittle book problems facing African libraries and archives. There is also no single approach to be followed. Options available include: preventive conservation measures; use of acid-free paper for protective enclosures, facsimiles and for producing original publications; conservation and restoration treatments; mass deacidification (mass or manual treatments) and reformatting or conversion of the information onto other formats. But for preventive conservation, all the other approaches mentioned above are relatively expensive. Reformatting involves converting the information from paper to microform or even to machine readable format or making facsimile editions.

Preservation need not be technology-driven

Why is preventive conservation advocated and canvassed for African countries? It conforms to the age-old adage that prevention is better than cure. To African countries with dwindling revenues and widespread poverty, preventive conservation is a more economical approach. It is not technology-driven and does not require a great deal of expertise which is acutely lacking in African countries.

Environmental conditions in libraries or archives have a direct bearing on the preservation and longevity of a collection.

This is not the first time that IPN has attempted to provide African librarians with information that addresses their specific conservation requirements. Certainly the first step to an effective preservation strategy begins with architectural protection. This was discussed in IPN #6. In the present issue, Bunmi Alegbeleye sums up the main points to help prevent damage.

Frame 1

Note from the editor:

The terms "preservation" and "conservation" seem to be understood differently by different people, depending on their acquaintance with the English or French language. In order to make it clearer to conservation non-specialists, a few definitions from several sources have been listed:

From **Wendy Smith** in *Library Preservation Management Training Program*, 1996:

Preservation - all activities that prolong the life of materials or their information content.

Conservation - activities involving treatment of individual items - often labour intensive.

Restoration - a conservation treatment restoring an item to its original condition.

From **John Feather, Graham Matthew and Paul Eden** in *Preservation Management*, Adeshot: Gower Publishing, 1996, p. 5.

Preservation. The managerial, financial and technical issues involved in preserving library materials in all formats - and/or their information content - so as to maximise their useful life.

Conservation. The maintenance and/or repair of individual items.

From **Miriam Foot**, interviewed by Edward Simpson. *Paper Conservation News*, 70, 1994, p. 2.

Preservation includes everything that is conducive to the wellbeing of collections. [It] not only concerns [...] the development of good-storage conditions and book handling but also administrative effort, so even budgeting for conservation work comes under preservation. In fact preservation covers everything that [...] benefits the physical wellbeing of the collections, whereas **conservation** is the active work carried out on the collections.

In *Preservation of Library and Archival Materials*, by Northeast Document Conservation Centre, **Sherilyn Ogden**, the editor, makes a further distinction. She separates preventive preservation from remedial preservation. Then comes conservation treatment. Her text goes: "**preventive preservation**" plays much the same role in respect to library and archival materials as do public health and preventive medicine for people." Under the wording "**remedial preservation**" fall mass-deacidification and reformatting.

Therefore efforts have to be made to control factors such as light levels, relative humidity and temperature, which are inter-dependent, and pollution in order to slow down the rate of deterioration. Ideally, preservation problems in an institution should be pointed out by means of a collection survey.

Light is the most chemically and physically potent agent of deterioration. Ultra-violet radiation from sunlight and fluorescent bulbs in our libraries and archives can be warded off by means of window curtains, blinds, etc. Fluorescent sleeves can be used too.

Temperature and relative humidity can be very problematic, especially in tropical and hot countries. The lower the storage temperature and humidity level, the longer paper documents will remain intact. The rate of most chemical reactions, including deterioration, doubles with each increase in temperature of 10° C. Large and frequent fluctuations in environmental conditions must be avoided as well as discrepancies of levels between storage areas and reading rooms.

High levels of temperature and humidity facilitate the growth of mould and encourage the survival and proliferation of rodents and different types of insects which consume library books and papers. These levels can be stabilized by the use of air-conditioners, dehumidifiers and humidifiers. Fans are also useful. It should be reminded that

money spent on air-conditioners is well invested, provided that they are switched on on a full time basis. Simple mercury thermometers and dial humidity indicators for measuring both temperature and humidity respectively are inexpensive (see frame 2 below in left margin).

Cleaning and dusting must not be underrated

Pollution, because of its damaging effect on materials can be devastating and should be carefully controlled. When fossils burn, sulphur impurities combine with oxygen to form sulphur dioxide which makes paper become acidic as particles seep into library rooms in the form of nitrous oxide. This type of damage can be decreased by seeking the co-operation of organizations that monitor pollution and can recommend controls. Sulphur dioxide test papers also help indicate whether an area is polluted with sulphur dioxide. They can be found on the African market.

Routine cleaning and dusting are a sound basis for eliminating nitrous oxide particles and detecting pest infestation. A good housekeeping programme is an inexpensive approach to prevent insects and rodents from infesting libraries.

Storage areas and shelves must be cleaned often and regularly with a wet cloth. These are simple and low-cost measures that can be carried out everywhere provided that staff are motivated and aware. A proper handling of library and archival materials certainly prolongs the life of the materials. Both library and archive staff as well as their users should know how to handle these materials (1).

Finally, preventive conservation entails the establishment of a disaster control plan. Such a plan enables library and archive staff to anticipate a disaster and be prepared to prevent, alleviate and recover from it (2).

A pledge from the JICPA

Such is the scale of the preservation and conservation problem in Africa that a concerted African-wide approach has become necessary. Happily enough, representatives from IFLA and the International Congress on Archives (ICA) met in Dakar in February 1996 and established a joint

IFLA-ICA Committee for Preservation in Africa (JICPA). JICPA's main objectives are:

- (a) To identify African, sub-regional and national needs in the field of preservation.
- (b) To formulate strategies and policies related to specific African issues.
- (c) To encourage the formation of national commissions on preservation and conservation.
- (d) To raise awareness particularly among governments and policy-makers.
- (e) To encourage and support training programmes in the field of preservation.

The Chairman of JICPA is Mr. Komlan Afanou from the Benin University Library at Lomé, the Secretary is Mr. Musembi, Director of the Kenya National Archives while the Coordinator of Education and Training is Dr. Bunmi Alegebeleye of the Department of Library, Archival and Information Studies, University of Ibadan, Nigeria.

In view of the enormous task of the JICPA, it pleads for the support of all libraries and archives including all library schools in Africa so as to make a success of its assignment.

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- Alegebeleye, G.** Government Information and Official Publications: Some Preservation and Conservation Issues. Anglophone Africa Seminar on Government Information and Publication, University of Zimbabwe, Harare, December 15-18, 1994.

Frame 2

Note from the editor:

As far as air-conditioning systems are concerned, the Principles for the Preservation and Conservation of Library Materials, states that:

"In many places air-conditioning systems may not be able to be provided [...] and simpler measures may be used in limiting the extremes in temperatures and humidity, such as the following:

- a) ensuring good air circulation by appropriate use of fans and windows,
- b) use of dehumidifiers to reduce humidity in badly affected areas of book stacks,
- c) use of insulation methods to reduce heat and use of blinds to keep out direct sunlight,
- d) ensuring buildings are properly maintained to keep out dampness during rainy periods."

(1) Editor's note: there is a very enlightening article by Diana Rosenberg on this issue entitled "Everyday care of books in libraries" in Proceedings of the Pan-African Conference on the Preservation and Conservation of Library and Archival Materials, Nairobi, Kenya, June 21-25 June 1993. Ed. by J.M. Anouit, V. Kremp and M. Musembi. IFLA Professional reports, n° 43. The Hague: IFLA Headquarters, 1995, p. 77-87. English or French version. Copies of the article can be obtained freely from the editor.

(2) Editor's note: Dr. Alegebeleye wrote a thoroughly interesting and complete book on disaster prevention in Africa. See the review on page 23 in this issue.

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Collection Care and Preservation of Southeast Asian Materials

For a variety of reasons, collection care in Southeast Asian, especially in the northern regions, is fraught with many difficult challenges. Climates that are unfriendly to paper-based materials, poor economies, war, and civil unrest, are just a few of the reasons that librarians and archivists find it extremely difficult to ensure the survival of cultural property. The rate of deterioration can be slowed and, in some cases, reversed, through actions that are relatively low-cost and uncomplicated.

The paper will discuss some of the strategies employed by the Cornell University Department of Preservation and Conservation to preserve materials in Burma, Cambodia, Laos, Viet Nam, and Thailand in projects conducted over the last ten years. The need for careful needs assessments and clear articulation of them will be discussed in the context of competing for the necessary resources from international funding agencies, along with descriptions of stabilization operations.¹

In the recent IFLA Conferences, substantial portions of the program were devoted to the discussion and demonstration of advanced electronic technology, mostly designed to improve bibliographic access to library and archive materials. However, given the substantial presence at IFLA of librarians from countries facing grave difficulties in fulfilling the promise of bibliographic access with continued physical access, it seems appropriate to consider some rather more basic preservation challenges.

Since 1987, Cornell University Department of Preservation and Conservation has been actively involved in the preservation of collections in the upper regions of Southeast Asia, primarily Burma, Cambodia, Laos, and Vietnam. Although there have been some basic improvements in recent years, the environment for books and manuscripts in these countries still remains unsatisfactory and contributes substantially to their deterioration. All of Cornell preservation programs in the region have tried to address environmental problems as an integral

part of projects designed to establish conservation and reformatting programs. At the same time, Cornell preservation internship program, which brings librarians and archivists from Southeast Asia to Cornell for six-months training periods, emphasizes achievable solutions to preservation problems and the development of programs to acquire resources.

Most of the common problems affecting the longevity of library materials in many libraries in the region are correctable, and they fall into five broad problem areas as follows:

- 1 The building fabric of many structures is often very deficient, with un-insulated walls, windows that are sometimes without glass and almost always without insect screening, poorly maintained roofing that leaks during heavy rain, with down-spouts that pour rainwater over external walls, and often non-existent air movement. These conditions allow birds and insects free rein within the structure and the periodic growth of mold on interior walls and shelves. Walls, roofs and floors that are not maintained encourage a variety of pests to find homes, including rats, mice, and insects. Security is often lax, placing collections at risk from theft or deliberate mutilation, and buildings are often vulnerable to fire because of faulty and outdated electrical wiring and uncontrolled smoking in virtually every part of the building.
- 2 Shelving systems are often deficient, constructed from wood that provides homes for wood-eating insects, inflexible with un-adjustable shelves, precarious because of uneven book distribution and insufficient anchoring, and badly oriented. The insects generally most responsible for eating books in libraries are the larvae of several different types of wood-eating beetles, thus wooden shelving is to be avoided if possible. One important research library in Vietnam that I have worked with for a number of years actually transferred all its wooden shelves from an old insect-infested building to a

Library staff working on the construction of protective enclosures for palm-leaf manuscripts at the Royal Palace in Phnom-Penh, Cambodia.



new building, with predictable results. The library has since replaced these with aluminium shelves which has much improved the situation. A great deal of damage results from book structure distortion caused by trying to cram books onto too small, un-adjustable shelves, and often the shelf ranges are poorly oriented, blocking the circulation of air and allowing light damage from direct sunlight. Loose unsupported books are damaged by lack of compression which allows book structure distortion especially in conditions of high humidity, as the slumping books settle almost permanently into curved shapes.

- 2** Housekeeping is lacking in most libraries, in that the books are carelessly shelved, the floors are frequently dirty and covered with debris, and food is cooked and eaten in the library. Many of the most important libraries are in large polluted cities, with increasingly heavy traffic producing large amounts of harmful particulates in the form of fine dust, grit, and soot. Because of the open windows, this is regularly deposited on books and shelves, which is in turn transferred to inner texts when the books

are used, and which form nutrients for mold and insects in conditions of high humidity.

- 4** Handling is especially hazardous for library materials, as many have lain untouched for several years but in just a few minutes can become soiled, smudged, torn, and disfigured with only one careless use. Texts are often soiled because of unwashed hands and dirty work surfaces, and even vulnerable formats, such as valuable photographs, are handled carelessly and without protective gloves.
- 5** Storage of non-paper materials, such as photographic negatives and microfilm, is sadly deficient in most libraries in the region. This is especially troubling for the archival negatives of microfilm, which should be stored with consistently maintained low levels of temperature and relative humidity and in a separate location from the other generations of film. While the temperature should be as low as possible, preferably no higher than 20 degrees Celsius, it is more important that the relative humidity not be higher than 30 percent.

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Although the standard Western approach to some of these problems would be to install air-conditioning, embark on building renovation projects, and construct new storage facilities, these options are rarely available to librarians in countries lacking in resources. What then are the solutions?

Conservation Strategy

While the Cornell internship program is designed to expose interns to all aspects of preservation, including complex conservation treatment, digital imaging, micro-filming, and various managerial functions, there is no doubt that without some resources, training alone will not achieve speedy results. Many of the problems manifest in libraries in Southeast Asia require substantial investment to be fully resolved, but they can be significantly ameliorated by a more systematic approach to environmental control and housing, which can be achieved at modest cost. Wooden shelving can gradually be replaced with metal, windows can be covered with insect screening to prevent the ingress of insects, a higher standard of cleanliness can be established and maintained, the consumption of food and drink can be more tightly controlled, smoking banned in the library, more responsible handling procedures can be established, protective housing can be applied or improved, and the cooperative storage of film materials developed.

It is undeniably very expensive to alter a large environment, such as an entire building or a large stack space, but a measure of control can be obtained by creating micro-environments. Protective enclosures, such as boxes, portfolios, and map cases, not only add an insulating layer to reduce the effects of varying levels of temperature and humidity, but also can provide other opportunities for control. As most of the libraries operate with closed stacks, protective enclosures are particularly appropriate. For example, in a facility with serious insect problems, the large-scale fumigation systems employed by many libraries and archives are harmful to books, staff and readers, and are only temporarily effective. But a well-made box can contain and retain a mild insect repellent that will deter insects, and has the added advantage of being effective even when the material is transported to another location. If the box is constructed from alkaline and chemically stable products, the object can be substantially stabilized within the enclosure. A steel map cabinet with a base can be treated through placing a dessicant and insect repellent in the hollow base creating a stable environment to help safeguard the contents of the cabinet from mold and

insects. Protective enclosures can be made quite easily from models that are readily available and generally do not require complex and expensive equipment or even extensive skills. While it is extremely risky to entrust a valuable book or manuscript for treatment to an untrained technician, there is little risk in having the same technician construct a protective enclosure. However, an important *caution* is the need to ensure that adhesives are not made from starch or protein, and that any bookcloth or cover board is as unpalatable to insects as possible.

A systematic survey of library and archive collections will reveal numerous instances where protective enclosures can produce more stable environments as well as immediate protection. The survey can also provide the basic data from which a long-term preservation strategy can be developed, which in turn can help to articulate preservation objectives that can be achieved through sensible funding proposals to international funding agencies. The latter point is extremely important as, ultimately, corrective preservation programs cannot be developed and sustained without resources and, in most cases in the poorer Southeast Asian nations, these resources must of necessity come from outside the country.

Conclusion

The body of preservation knowledge and practice on which Western preservation systems are built is the result of a long and tortuous evolution from the wholly craft/trade-based bookbinding tradition, to the present level of quite sophisticated and highly technical programs. The libraries and archives of Southeast Asia have operated to a very different time-frame, and set of cultural and historical circumstances. The industrialization that revolutionized the West in the nineteenth century was barely known to parts of Southeast Asia until the modern military conflicts of the second half of the twentieth century. Solutions to preservation problems are not entirely the same in the East as in the West, and the few attempts to inflict Western standards and practice, unaltered by locale, have been unsuccessful. For example, the stock response to high levels of temperature and relative humidity by Westerners is to call for air conditioning systems to be installed. Experience has shown that this can be a costly mistake in tropical regions, especially when books and manuscripts are removed from the library for study, or when untrustworthy electrical supplies fail. In these circumstances, the drastic increase in temperature and relative humidity causes moisture condensation on



John Dean at his office in Cornell University

the colder materials and interior walls and the consequent rapid development of mold. In Southeast Asia, it is important to recognize that preservation priorities are probably not the same as in the West, that short-term teaching and training alone will not result in viable programs without sustained financial support, preferably secured by librarians *in situ*, and that the Western response to deteriorating materials and adverse conditions must be learned from experience with the advice and support of the people of the region. Preservation projects should build towards the achievement of some coherent plan, and all projects originating in the West, whether for training or preservation production, should be seen as merely transitional to the time when the nations of Southeast Asia are able to mount and support their own preservation programs to begin to stem the tide of deterioration sweeping over their collections.

Before concluding, it is important to acknowledge the tireless efforts of three individuals to establish preservation programs likely to have a widespread and long-term effect. U Thaw Kuang, the recently retired director of the Universities Central Library in Rangoon, continues in his efforts to organize a national preservation program for Burma. Ms. Chu Tuyet Lan, director of the library at the Sino-Nom Institute in Hanoi, whose intelligent persistence is beginning to bear fruit with the completion of a long-term preservation strategic plan, the securing of substantial preservation grant funding for her institution, and the consequent gradual development of a model preservation and conservation program. Dr M.R. Rujaya Abhakorn of

Chiang Mai University in Thailand, has made outstanding contributions through his successful projects to microfilm and stabilize northern Thai palm leaf manuscripts, but perhaps more important, the leadership he has shown in organizing the nations of the northern region of Southeast Asia. In 1990, Dr Rujaya was awarded a grant from the government of the Netherlands to bring together librarians, archivists, and scholars from Burma, Cambodia, Laos, Thailand, and Vietnam, to initiate discussions on the founding of an international preservation centre for this region. Although progress in developing the centre into a functioning reality is slow, the planning process and objectives strongly influenced Cornell University preservation internship program. Perhaps fittingly, the first interns to complete the six months concentrated program were Junchay Praphamphod of the National Library of Thailand, and Chu Tuyet Lan, the Sino-Nom Institute, Hanoi. The other interns involved in the internship thus far are: Wantana Kitisrivoraphan of Burapha University, Thailand; Emma Rey, the House of Representatives Archives, the Philippines; So Soe Sein, University Historical Research Centre, Burma; Y. Dari, the National Archives of Cambodia; U Pe Thein, University Historical Research Center, Burma; Francisco Altea, Peoples Archives, the Philippines. The current interns are Nguyen Thi Bac, the General Science Library, Ho Chi Minh City; Noriyah Md. Nor, of the University of Malaya. The next interns for the session January to June 2000 will be from Cambodia and Indonesia.

A vital part of the internship process is the strong emphasis on strategic planning and its implementation. There are compelling cultural reasons for preservation priorities to be defined in terms of traditional manuscripts, and as these are of incalculable value, they are often accorded the most stable and secure available storage and are rarely used on a regular basis. However, more general collections that are heavily used, carelessly handled, and poorly stored, are often completely ignored, even though collectively they represent the real research and teaching core of the library. Long-term planning that reviews the whole breadth of the collection and its levels of use in order to define preservation priorities is vital if meaningful solutions are to be found and sustained. ■

Paper Given at the IFLA Conference,
Bangkok, 24th of August, 1999

John Dean
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■ Activity 2.2

Environmental factors which cause damage

a) Identify *one environmental factor* which has caused damage to items in a collection to which you have access.

b) Describe the damage to item(s) that has occurred.

c) How could you minimise the damage in the future?

Other factors which cause damage—biological and human, storage and housing

Apart from the previous environmental factors, there are other factors that can cause damage to material in collections. These are:

- I biological—insects, rodents, moulds and fungi
- I human
- I factors relating to housing of the material.

Moulds and fungi

Moulds and fungi spores are always in the air. They will grow whenever there is:

- I moisture (about 70% relative humidity and higher)
- I poor air circulation.

Once the mould is growing, other factors which will increase the rate of growth are:

- I darkness
- I warmth (about 25°C and higher).

Nutrients are also needed for moulds to grow. These may be found in cellulose, leather or other solid particles present in pollution.

Moulds weaken and stain paper. They may react with trace elements in paper and with local condensation to produce small brownish patches known as **foxing**. If mould damage is extensive the effects are irreversible.

Controlling moulds

To control the growth of fungi and moulds you need to:

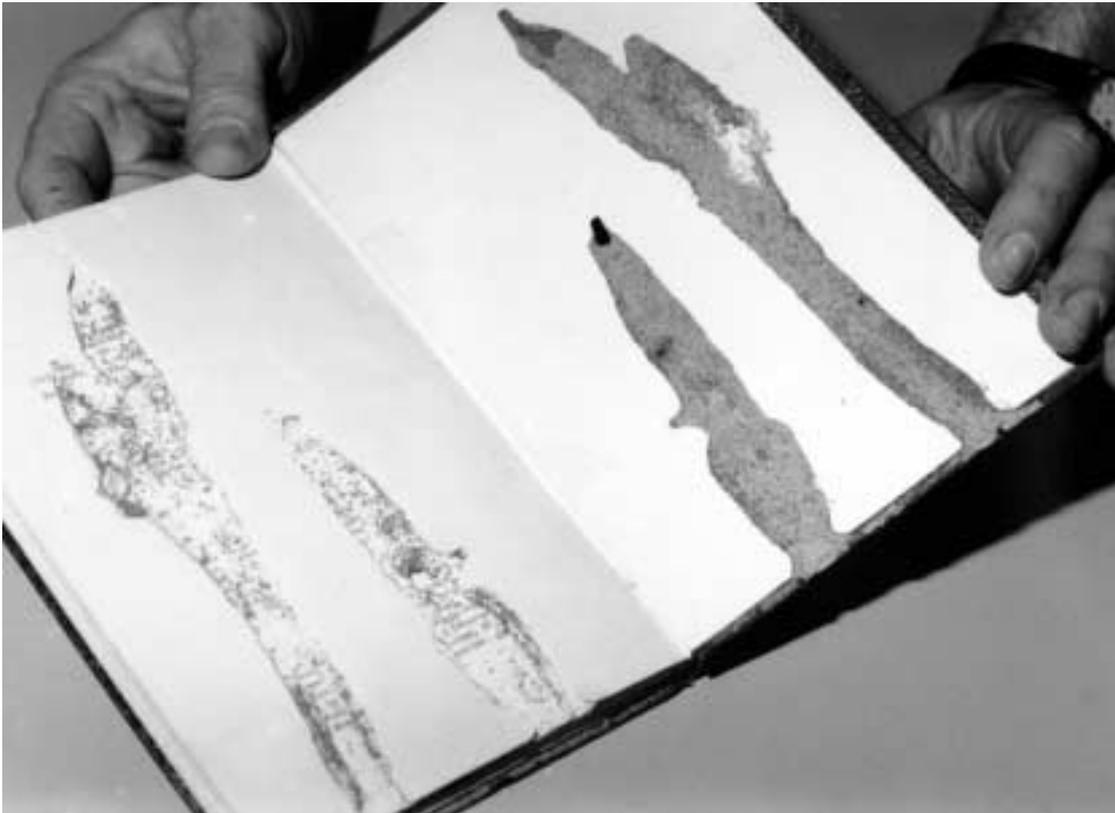
- I maintain temperature and relative humidity at levels which discourage growth
- I keep the air circulating
- I remove dirt, dust and other solid particles.

Insects

Insects that commonly cause damage include cockroaches, silverfish, termites, book-lice and beetles. Living insects feed from dead insects trapped in and around bird nests and spider webs in areas such as light fixtures and window sills.

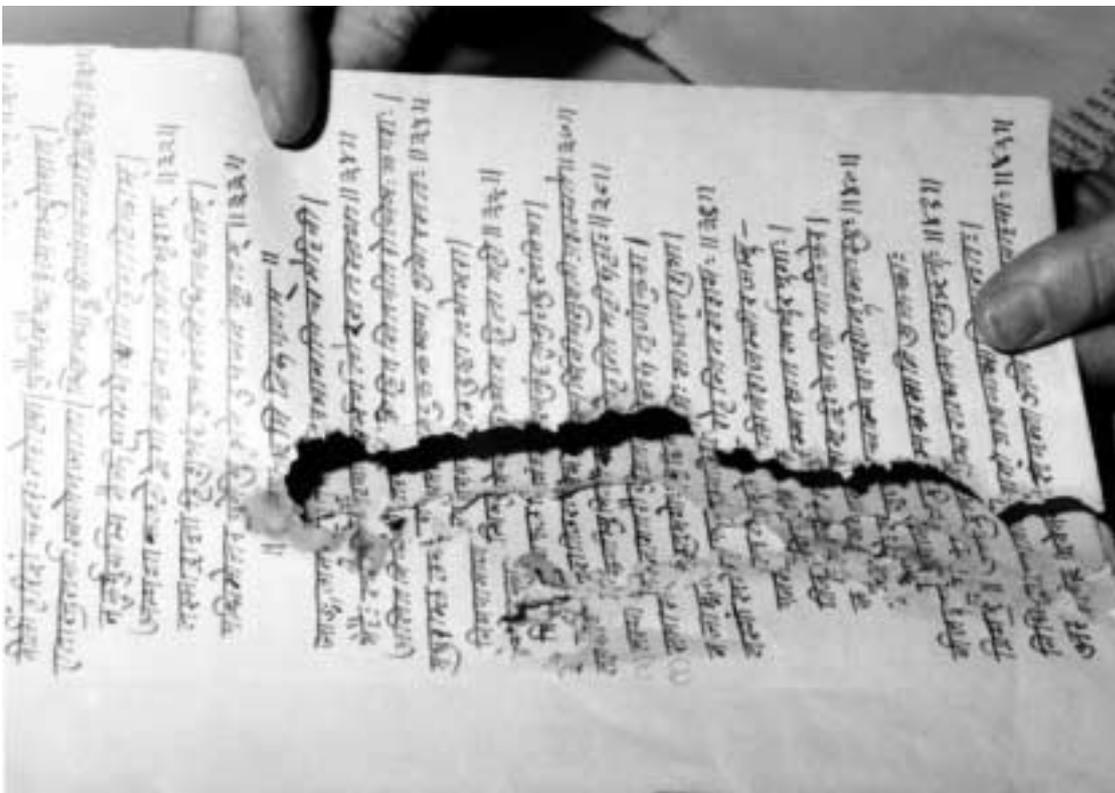
The insects feed on organic substances, such as the cellulose in paper, and proteins in glues, leather and book cloth. Like moulds, they thrive in damp, poorly ventilated and warm conditions. Book-lice and silverfish need moisture.

The damage caused by insects is often irreversible—as holes and the erosion of text cannot be replaced.



Book damaged by termites

© Photograph courtesy of State Library of South Australia



Indian manuscript damaged by insects and water

© Photograph courtesy of State Library of South Australia

Controlling insects

Insects can be controlled by 'sealing the building' (blocking up cracks and crevices), keeping storage areas clean, and maintaining good circulation of air (e.g. by using fans). Food should not be eaten in nearby areas. Areas should be checked regularly. Insect traps can be placed and inspected to detect any insect activity.

The following steps are recommended if a pest infestation is found:

- inspect and remove all infested or suspect material
- thoroughly inspect neighbouring material
- thoroughly clean the area
- apply pesticides *only if and where necessary* (pesticides should not be applied to objects)
- use traps
- carry out later inspections.

ReCollections: Damage and Decay recommends the use of non-chemical methods of control first, as these are not toxic to humans. (Heritage Collections Council Secretariat 1998, p. 46)

To treat infested material:

- bag and seal it to contain infestations
- freeze infested material, or treat it using one of the alternative methods such as low oxygen fumigation.

Chemical substances, such as insecticides and those used in fumigation, may be toxic. Not only is this an occupational health and safety issue for staff, it is also an issue for users, current and future.

It is also a key issue for culturally-sensitive materials.

 See the article by Edmonds 2001.

 Many countries in the Asian Pacific region have a number of traditional practices for controlling insects, as in the following articles by:

- Perumal & Wheeler 1997
- Lin 1999.

Note that traditional practices are not always automatically 'good'. Some traditional materials such as wood can produce organic acids which can damage original materials. Again, check with a conservator for information about using traditional materials.

Animals and birds

Rats and mice (rodents) cause damage by tearing up paper and by the effects of their droppings.

Bird and bat droppings can damage collection materials. Their nests can harbour insects.

Controlling animals and birds

Control of rodents is gained by sealing possible entry points and by the use of traps. Removing food sources and repairing leaking pipes also helps to deter them. Baits should be avoided because the rat or mouse may die somewhere where you are unable to find it, causing unpleasant odours as well as insect problems.

In some countries where rats are a major problem, there are special 'rat catchers' who check library stacks during the evening.

Birds can be controlled by:

- using wire to keep them out of roof and wall cavities
- placing pointy items on the top and side of buildings to prevent them from landing
- increasing the angle of the ledges to remove roosting sites.

● Reflect 2A

Traditional methods of controlling insects.

Think about the following two articles and discuss them with your colleagues.

What **traditional** methods have been used to control insects in India and China?

Are there similar traditional methods used in your country?

Traditional practices for the control of insects in India

P. Perumal

Nehru Scholar, Thanjavur, India

Michael Wheeler

Senior Paper Conservator, Paper Conservation

P. Perumal is a Books and Manuscripts conservator at the Saraswati Mahal Library in Thanjavur, South India. He was a recipient of a Nehru Trust Fellowship, which assisted him in undertaking a three month internship in the Paper and Book Sections of the Victoria and Albert Museum from April to June 1996. The following article is based on a seminar he gave to the Department.

The Saraswati Mahal Library is housed within the Royal Palace, Thanjavur, and was developed by the Maratha Kings of Thanjavur between 1535 and 1673AD. It contains an extremely important collection of manuscripts and books written in Sanskrit, Tamil, Telegu and English on all aspects of art, culture and literature.

The Preservation Section of the Library carries out the conservation of a wide variety of materials, which include palm leaves, scroll paintings, western manuscripts and books. The staff consists of one conservator (P. Perumal), one manuscript repairer and an assistant who is responsible for the oiling of the palm leaf manuscripts to ensure their continuing flexibility. This is carried out by application of citronella oil with a soft cloth. The oil is rubbed into the surface of the leaf and this helps to increase flexibility and to deter attack by insects. Citronella

is a common ingredient in insect repellents, sold over the counter at the chemist; turmeric is also used as an insect repellent. The repellent is mixed into a stiff paste, which is rubbed into every tenth leaf of a palm manuscript after it has been written. The strings, on which the leaves of the manuscript are threaded, are also dyed with an aqueous infusion of turmeric to make them less palatable to insects.

The Library's collection of palm leaf manuscripts is in good condition due to good housekeeping practices, including the prevalence of a number of traditional practices. Palm leaf manuscript storage is of particular interest, as natural insect repellents have been in use for many years and have proved effective against cockroaches, silverfish and book lice. Dried leaves from a neem tree are sometimes placed between the front and back covers of the book to deter book lice (which feed on the fungi attracted to the hygroscopic paste). The neem leaves are picked in springtime, when the tree is in full flower and the leaves are a red colour. The natural insecticide contained in the leaves is at its most potent at this point.

The palm leaf manuscripts are stored in closed wooden cupboards on open shelves of stretched rope. Inside each of the cupboards are several



Figure 1. A manuscript wrapped in protective cloth.

sachets containing a variety of dried leaves and spices, which have proven to be an effective means of discouraging insects. Neem leaves, sandalwood powder, cloves and peppercorns are included in these sachets and provide a fragrant and effective repellent, together with sweet flag (*Jasti Madhu*) and camphor (to which a little wax has been added). These bags are replenished every three months with the ratio of the contents altered slightly each time to prevent the insects gaining immunity. Of these substances, camphor is probably the best known and has been used extensively as both an insecticide and as a fungicide (on burning, camphor oil produces an acrid smoke, and is used inside buildings to deter flying insects).

The manuscripts themselves are afforded further protection by wrapping each one in a woven, red coloured cotton cloth. This tradition has a practical basis, as it has been found that insects are repelled by red dyes and pigments (Figure 1). Furthermore, for this reason, red leather and book cloth is common in Indian libraries and has been specified by the Government of India for the binding of all official papers.

Traditional practices in rural homes in India are also interesting to the conservator. Each day the area outside a family home is swept clean and a mixture of mud and cow dung is spread in the areas surrounding the buildings. A geometric design is then drawn in the earth with powdered rice flour (Figure 2). In South India, this is usually left uncoloured, whereas in parts of northern India the powder is pigmented. These designs are known as *Roggol* in northern India and are called *Kolam* in the South. Apart from having great aesthetic merit, these designs have the added advantage of attracting crawling insects towards them and away from the entrance to the home. The effectiveness of this technique is enhanced if rice flour is mixed with red ochre and then sprinkled around the doorways and along steps leading to the house. Both the red colour of the powder, and the chemical composition of the pigment are sufficiently unpalatable to crawling insects that it will prevent them crossing the threshold.



Figure 2. Geometric designs drawn outside houses to deter insects.

The traditional and modern preservation of library rare books and precious materials in China

Everybody knows that China is one of the world's oldest civilizations and has a recorded history of more than 5000 years. The history of book collecting in China can be traced back 3000 years. Literature, in the form of books and precious materials, were handed down from dynasty to dynasty. The current estimate is that there are more than 2.2 million volumes surviving which were published before 1794; 26.45 million volumes of books before 1911; more than 29,000 titles of journals and magazines, and over 7,800 newspaper titles which were published over 50 years ago (before 1949). Moreover, there are great numbers of manuscripts, rubbings from stone inscriptions, Confucians canons, etc.

In my library, which is located about 200 km to the South of Shanghai, there is a large collection of older materials. It contains inscriptions on bones or tortoise shells of the Shang Dynasty (16th-11th century BC.); more than 20,000 pieces of rubbings from stone inscriptions; 130,000 pieces of original printing block plates, a wonder of the library world; stone tablets dating from 1245 AD; Chinese paintings more than 200 years old; more than 180,000 volumes of rare books, some of them dating from the Sung Dynasty; 1.2 million volumes printed before 1911; a total of 3.9 millions volumes, comprised of books, journals, newspapers and other library materials.

One may wonder how the Chinese ancient librarian preserved all these library materials. Actually, there is a lot of knowledge to know, to understand, to study. What I want to introduce is only one drop of water in the great ocean.

- A. Create a Proprietary Environmental Condition for Library Materials Preservation.
- B. Take Special Care of the Book Preservation and Conservation.
- C. Use the Modern Science and Technology to Preserve the library Rare Books and Precious Materials.
- D. Summary and Suggestions.

A. Create a proprietary environmental condition for library materials preservation

■ Ancient Library Buildings. In order to provide a safe environment for the rare books, the ancient Chinese librarian studied and analyzed the relationships between the raw materials of the book, water and fire. Water can fight against fire. Fire can destroy any kind of organic materials including paper, bamboo strips, silk or cotton, etc. Therefore, we have to take special care of these three elements.

Not only water can control fire, it can also help plants grow. Because of this characteristic, the ancient Chinese librarian placed the library in a botanical garden. The botanical garden can create a place of quiet and restfulness, a pure and fresh surrounding for reading. A good example is the Tianyi Ge, which was built in 1566. It still exists. In front of the library building, there is a water pond, which leads to the Great Dongning Lake. The building is surrounded by different kinds of trees and flowers. For enriching the environmental condition, the owner of the library added a pavilion and artificial rocks. All these created a very typical garden setting for the library building, as well as for the safety of the rare books. The owner of this private ancient library had his own residence built side by side with the library building, but separated by two parallel walls. In this way, the calamity of fire could be prevented from entering into the library building. Moreover, there was a specific and strict rule that fire and candle could never be allowed to enter into the library building.

■ Kill or Drive Away the White Ants, Bookworms and Other Insects. It is well known that white ants, bookworms and spiders are the greatest enemies of paper and books. A high degree of moisture creates a suitable condition for these insects to flourish. Therefore, the ancient Chinese librarian had found and used a lot of methods for killing and preventing these insects from invading the library.

- (1) Caustic lime or lime-sulfur was spread around the corners of the stack room. If it was difficult to obtain caustic lime, charcoal could be used instead, because charcoal absorbs moisture in the stack room.
- (2) White arsenic can keep away or kill white ants. If trees or flowers were grown round the library building, or a water pond or canal was built near the

building, they could create damp, which is suitable for the reproduction of white ants. Therefore, it was necessary to dig the ground beam of the outside wall of the building for 30-50 cm, spread white arsenic and backfill after that. This kept the white ants away for more than 30 years at least.

B. Take special care of the rare book preservation and conservation

For keeping away the bookworm (or silverworm) and other insects from the books and preserving rare books in good condition, the ancient Chinese librarian developed a number of methods of preservation.

1 In order to keep rare books in good shape, NANMUM wooden plates were used at the bottom and on the top of the book of the whole set which was then tied up with cotton thread.



This kind of wooden plate never changed its shape and always remained in a dry condition. Another advantage of this treatment was that it kept the rare book away from dust and free from damage, as well as made it easier for the librarian to use and serve his readers.

2 Camphor wood was employed to make the holding boxes. A camphor wood box has its own aromatic smell, which can drive away the bookworm or other kinds of insect.



3 The smell of camphor ball (or mothball) helps to keep away the bookworm or other insects from the rare books.

This kind of camphor ball volatilizes slowly. So, we do not have to change it before a certain period of time, normally, once a year.

4 Air circulation in the stack room as well as in the book-holding boxes is also very important. Therefore, when we put rare books in a camphor wood box, we should never pile them up and or store them close together. Otherwise, when the natural temperature and moisture changes, storage conditions deteriorate.

5 If a rare book needs to be repaired, the following steps should be observed: (a) Take the book apart slowly and carefully; (b) Straighten out every page of the paper; (c) Starch or size with a special paste; (d) Take a proper weight to press and flatten it in time; (e) Use silk or cotton thread to bind it again.

6 Book drying. Normally, there is a rainy season, which occurs in May and June in the area of the middle and lower Yangtze River. So, we have to take special steps to avoid the rare books becoming moldy. In my library, there is a tradition of drying the books in the shade in the open air. We still use wooden boards of (normally China fir) 200 cm X 40 cm for this special work.

If a book becomes wet and is not treated in time, it may become soggy, in that case it is best not to treat it in a hurry but to find an expert to treat it properly. The expert will put it into a food steamer (usually made of bamboo) to steam it in order to make it soft, and then separate the pages one by one slowly and carefully, and then dry it in the open air in a shady place.

7 Famous Chinese medical herbs are used not only for curing sickness, but also for preventing it. The Chinese librarian made a clever move by using some of the herbs to preserve books. Some of the following methods were used and got a good result. (a) Putting the dry leaves of the herbs into the book directly, to let the smell of the herb drive away the bookworm and other insects. The herbs included tobacco leaves, lotus leaves, the herb of grace, etc. (b) Putting the herbs together with paper raw materials to produce insect repellent paper, for example: Huang paper (with sulfur), Jiao paper (with pepper), Wangnien Hong paper (with arsenic). (c) Making a special paste and pasting it on the paper, and letting it dry, and then putting this pasted paper in the books.

C. Use modern science and technology to preserve rare books and the library previous materials

In this new century, with the development of modern science and technology, we have created and adapted modern techniques and equipment for the preservation and conservation of rare books and precious library materials.

1 Scanning.

Scanning the library literature and storing it on laser disks is not a new technique. Actually, scanning was developed at the beginning of 1960s and by the end of 1970s, the digital laser disk appeared. Since 1980, this technique was employed for the storage of library materials.

At this time, the Chinese Central Government has not developed a general plan for this method of preservation, but our National Library, the Shanghai Library and my own library (Zhejiang Library) are employing this technology.

I believe that starting and completing this work will not only be a major benefit for the preservation of the library rare books and precious materials, but will facilitate the sharing of library resources.

2 Freezing.

The Chinese librarian had studied the living condition of the bookworm (silverworm) and found that it would freeze to death at a temperature of 40 °C below zero. Therefore, some of the libraries in China use this method to kill the bookworm. Our National Library, the Shanghai Library and some university libraries have used it. Some archives in China also used this method to preserve other paper-based materials in archives. The disadvantage of this method is that the container of the freezer is too small, for the bookworm should be frozen to death after 48 hours at the 40 °C below zero. So we have to spend a lot of time and manpower to do this work.

3 Microwave.

The Chinese librarian has found out that the bookworm can be heated to death in the microwave oven. A special microwave oven was designed, produced, and used in some of the libraries in China. But this procedure raised two problems: (1) After heating in the microwave oven the rare books become warm and there was concern that the heat may harm the books. (2) Use of this method for killing the bookworm (or silverworm) is very slow. As a result it is not employed in many libraries.

4 Vacuum Packed.

After studying this method of food packing, the Chinese librarian used this technique to pack rare books in libraries. We put those books which are seldom used or have already been microfilmed or have been scanned onto laser disks into a plastic bag, and seal it, and then put these plastic bags with books into camphor wood boxes in order to preserve the books safely. Nanjing Library had used this method and obtained very good results. The advantage of this method is that it does not cost too much. On the other hand, if a book needs to be consulted, it has to be taken out the plastic bag and the seal is broken.

5 Constant Temperature and Moisture.

Modern climate control equipment for air circulation, employing the air conditioner and the dehumidifier, creates a condition of constant temperature and humidity. Climate control systems create a very suitable environment in the stack room for storing the library's rare books and precious materials.

The Chinese librarian fully understands the advantages of this new equipment. Therefore, in the provincial level libraries, especially when new library buildings are designed and constructed, almost all of them are equipped with these systems. Such is the case in the Beijing Library (National Library), Shanghai Library, Nanjing Library, and Zhejiang Library.

D. Summary and suggestions

Protection against natural disasters is a common and not the least concern for librarians. Over the centuries librarians have accumulated a great deal of experience and have developed excellent methods for the preservation of rare books and library materials. Libraries constitute a precious heritage and the methods employed in conservation and preservation need to be well publicized. Therefore, I would like to make the following suggestions.

1 We need to be in constant communication on the subject of preservation of library materials, exchanging our experiences and techniques, especially between Western and Asian libraries.

2 We must publicize successful experiences in preservation and conservation of the library materials.

3 We should form a special research group for the preservation and conservation of rare book and precious materials. ■

LIN Zuzao
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Integrated pest management (IPM)

Although all the methods mentioned above will help to overcome an existing pest problem, it is best to avoid the problems occurring in the first place. A coordinated approach to pest management does this.

An **integrated pest management program** aims to reduce the level of insect and pest damage. It does this by making the collection environment unattractive to insects and pests (Strang 1996). The program focuses on keeping the pests away, good housekeeping and early detection through controlled and regular monitoring.

There are five stages in an IPM program.

1. avoid

2. block

3. detect

4. respond

5. recover

1. Avoid

Make the environment unattractive for pests. Clean buildings to remove dust and rubbish. Remove food. Do not eat or drink in collection areas. Keep rubbish bins away from collection areas. Check pipes and drains for leaks. Remove bird, animal and insect nests. Keep plants out of the building.

2. Block

Fill gaps in walls, ceilings, doors and floors. Screen vents and drains. Keep doors shut. Use a quarantine area where all incoming items can be checked for infestation.

3. Detect

Traps can catch insects and rodents long before you can see them. Start a physical trapping system using sticky **blunder traps**. Blunder traps have a piece of sticky cardboard which traps insects. Place them where insects are likely to come into contact with them. By checking these traps on a regular basis, it is possible to get an idea about the presence of specific insects within the monitored area. Traps for rats and mice should be placed in easily accessible places. Check them daily. Inspect the collection regularly. Involve as many staff as possible in this.

4. Respond

Ask the advice of a conservator, and respond to a pest problem through an authorised person. Isolate the affected material immediately (e.g. by placing it in sealed bags). Treat the affected area according to the advice. The use of a chemical may be necessary. Advanced techniques include freezing, or using a low oxygen environment. Identify the source (e.g. a bird's nest). Correct the problem.

5. Recover

Clean and repair affected materials after treatment to control pests.

Humans

Humans are responsible for much of the deterioration of library and archival collections.

Topics 1, 2 & 3

📖 Harvey (1993 pp. 61-62), highlights a number of areas where humans have caused damage to collections. These include:

- ▮ increasing demand on collections
- ▮ producing poorer quality materials (e.g. cheap mass-produced books)
- ▮ new technologies (e.g. photocopying, which can cause physical damage if the binding is forced or broken while copying, and light damage to sensitive materials)
- ▮ careless handling, deliberate mutilations.



Damage caused by photocopying-the spine is broken

© Photograph courtesy of State Library of South Australia



Damage by deliberate mutilation

© Photograph courtesy of State Library of South Australia



Damage by deliberate mutilation

© Photograph courtesy of State Library of South Australia

Controlling human damage

Human damage can be minimised by educating staff and users about the care of collections.

This includes training staff and users in careful handling techniques. Handling techniques are described in the module, **Preparation for Microfilming**.

Books should be shelved upright, unless they are very wide or tall, in which case they should be housed flat. They should not be shelved on their fore-edges (front edges) as this causes the main part to pull away from the covers.

On a broader scale, human damage can be minimised by a number of practices such as:

- I an active building maintenance program (fixing problems quickly)
- I finding ways to reduce theft (improved security)
- I copying or reformatting items so that the original does not need to be used.

Poor storage and housing

Poor storage and housing can cause deterioration of library materials through physical and chemical damage.

Physical damage occurs when shelving and housing is poorly designed so that materials lack support. Examples are shelves which are too small to support larger items that then 'cascade' over the sides, and shelves which have sharp edges that can damage collections and staff. Enough shelves should be provided so that all the items can be on the shelves rather than on the floor or other unsuitable surfaces. Simple bookends can prevent volumes from falling over.

Some types of wooden shelves can release acidic materials. Items which are bundled together with rubber bands, pins and paper clips will also be damaged due to the release of acids, as well by as rust staining and cuts. Items which are wrapped in poor quality acidic paper such as newspaper will also deteriorate though the chemical reactions of the paper.

PVC (polyvinyl chloride) **plastic**, which is commonly used in sleeves, folders or albums, will also damage original items. This plastic is not chemically stable and produces hydrochloric acid as it deteriorates.

Controlling damage

A careful choice of shelves and housing materials can reduce damage to library materials.

Many organisations are now using 'acid-free', **polypropylene** and **polyethylene** storage enclosures to protect original materials. These materials are also recommended for the long-term storage of microfilm master negatives.

Traditional protection of materials

In many Asian libraries, traditional red colour cloths have long provided protection for manuscripts.

In China, *Nanmum* wooden plates have been used to prevent warping for many centuries. These wooden plates are placed on the bottom and top of each book, then tied with cotton thread.

(See Lin 1999.)

■ Activity 2.3

Case study

The following is a description of a hypothetical library collection.

Banyan Library is a special library located in a capital city in the tropics. It has a collection of books and journals on botany, both modern and nineteenth century. A number of these books are large size. The library also has a large number of rare manuscripts and drawings of botanical plants.

The library has been neglected until recently. There are just a few small shelves to house the materials. These are infested with termites. A number of books have been dumped on the floor next to the open window. Some of the manuscripts and drawings are lying on the tops of the dusty shelves. Most are on the floor. Some of the journals have been wrapped in newspapers.

a) What could be potentially damaged due to the poor housing and storage?

b) How could you minimise the damage in the future, without spending a lot of money?

Assessing damage—know the problem

One of the most common ways of assessing the extent of damage is to conduct a **collection survey** (or condition survey).

A collection survey gives a 'snapshot' of the collection at the time of the survey. This is valuable information which can help to deal with the problems.

Checking every item is probably impossible for all but the smallest collections, so sampling techniques are usually applied. For example, in a well-known survey conducted in 1979 by Stanford University Library, the staff surveyed a sample of 400 books in a total collection of 1.4 million.

The collection surveys use certain criteria to assess the extent of damage caused by environmental, biological and other factors.

Some examples of these criteria are given below. They have been adapted from Harvey 1993 p. 80 and also from training seminars provided by Wendy Smith.



See Internet Resources: Smith, Wendy.

Topics 1, 2 & 3

Collection survey criteria	Extent of problem or damage						How this is checked or measured
What is the type of material? (e.g. manuscript, newspaper, book)							How this is checked or measured • visual inspection—looking at it
How old is it?							• visual—checking the title page of book or manuscript.
Is the paper brittle?							• use a folding test on the corner—brittle paper breaks after two double folds
Is the paper acidic?							• measure the pH (e.g. with a pH pen). – with a pH greater than 7 (i.e. alkaline) the pH pen mark will be purple. – with a pH less than 7 (i.e. acidic) the pH pen will be yellow.
Is the outer protection (binding/box/wrapper) intact?							• visual
Is the leaf attachment (sewing/gluing) intact?							• visual
Is the item damaged?	none	few	1/4	1/2	3/4	all	• visual
• tears/breaks							
• mould/water							
• dirt/dust							
• adhesive ('sticky') tape							
• insect damage							
• animal/bird damage							
• mutilation (by humans)							
• other (describe)							
Are there any problem attachments? (e.g. staples, pins, clips)							• visual
What are the environmental conditions?— what is the temperature and relative humidity over a time period?							• measurement and checking over time using special instruments (e.g. a thermometer, or a dial hygrometer).

A proper collection survey takes time to plan and carry out.
Think about what you want to find out and include these points in your questions.

The following activity gives you a chance to use some common points to survey a collection.

■ Activity 2.4

Collection survey

For this activity you will need access to a collection of materials which can be surveyed for damage.

Check first with the librarian or curator to make arrangements for surveying the collection.

Your task is to carry out a mini-collection survey of 7 items from a collection to which you have access. Include in your samples items of different ages and types from different parts of the collection.

Remember to handle items carefully.

Procedures for handling items are described in the module, **Preparation for Microfilming**.

Complete the details of each item on one of the 7 survey forms that follow.

Preservation of materials module

Collection survey form

Collection survey criteria	Description of item or problem					
Item description (e.g. title, author)						
What is the type of material? (e.g. manuscript, newspaper, book)						
How old is it?						
Is the paper brittle? (Do NOT do a fold test—just check for a colour change in the paper. Yellow or brown paper is likely to be brittle.)						
Is the outer protection intact? (This is the binding/box/wrapper)						
Is the leaf attachment (sewing/gluing) intact?						
Is the item damaged? (Check the types of damage below. Indicate the type and level of damage by ticking the relevant box ✓ in the right hand column)	none	few	1/4	1/2	3/4	all
• tears/breaks						
• mould/water						
• dirt/dust						
• tape (e. g. 'adhesive' tape)						
• insect damage						
• animal/bird damage						
• mutilation (by humans)						
• other (describe)						
Are there any problem attachments? (e.g. staples, pins, clips)						
Surveyed by:	Date:					

Preservation of materials module

Collection survey form

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Is the leaf attachment (sewing/gluing) intact?						
Is the item damaged? (Check the types of damage below. Indicate the type and level of damage by ticking the relevant box ✓ in the right hand column)	none	few	1/4	1/2	3/4	all
• tears/breaks						
• mould/water						
• dirt/dust						
• tape (e. g. 'adhesive' tape)						
• insect damage						
• animal/bird damage						
• mutilation (by humans)						
• other (describe)						
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Surveyed by:	Date:					

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• mould/water						
• dirt/dust						
• tape (e. g. 'adhesive' tape)						
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Preservation of materials module

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• tears/breaks						
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Is the outer protection intact? (This is the binding/box/wrapper)						
Is the leaf attachment (sewing/gluing) intact?						
Is the item damaged? (Check the types of damage below. Indicate the type and level of damage by ticking the relevant box ✓ in the right hand column)	none	few	1/4	1/2	3/4	all
• tears/breaks						
• mould/water						
• dirt/dust						
• tape (e. g. 'adhesive' tape)						
• insect damage						
• animal/bird damage						
• mutilation (by humans)						
• other (describe)						
Are there any problem attachments? (e.g. staples, pins, clips)						
Surveyed by:	Date:					

● Reflect 2B

Mini-collection survey and common types of damage

Reflect on your mini-collection survey and discuss it with your colleagues.

- What were the most common types of damage to items?
- Why did the damage occur?
- What suggestions do you have for minimising damage in the future?

Make your comments below.

Common types of damage

Why did the damage happen?

Suggestions for minimising damage in the future

The damage has been done—what next?

After damage has been identified the next stage is action. This means deciding on priorities, and determining what requires:

- I immediate action
- I specialised attention
- I replacement
- I reformatting.

Priorities

The first module, **Preservation Microfilming - Basics** stated that preservation is about making choices of what to preserve, when, why and how.

Ross Harvey's list of four main factors is useful to remember when setting priorities:

- I **physical condition**—the extent of deterioration
- I **use**—past, present and future
- I **rarity**
- I **value**—monetary, aesthetic, historical and bibliographical.

Preservation microfilming staff will often be asked for advice about options. Decisions about priorities and alternatives are complex and should **always** be discussed with relevant experts such as librarians and curators.



Damaged book before, during and after treatment. Here the priority is for specialised conservation treatment of the individual book. © Photograph courtesy of State Library of South Australia



Damaged book before, during and after treatment. Here the priority is for specialised conservation treatment of the individual book. © Photograph courtesy of State Library of South Australia



Damaged book before, during and after treatment. Here the priority is for specialised conservation treatment of the individual book. © Photograph courtesy of State Library of South Australia

■ Activity 2.5

Help a librarian or curator to make a choice

The following are some typical examples of damaged items.

Example 1

A large collection of historical materials badly damaged by a recent flood.

Example 2

A rare and beautiful parchment manuscript which has become very bent and warped.

Example 3

Long 'back files' of old newspapers with historical value. Original newspapers are deteriorating.

Example 4

Cheap book, still 'in print'—most of the chapters have been torn out. Book is in high use.

These examples need to be selected for:

- **immediate action** OR
- **specialised attention** OR
- **replacement** (buying a new copy of the same title) OR
- **reformatting** (e.g. microfilming).

Your task is to help a curator to make the choice.

- Choose ONE action (immediate, specialised, replacement, reformatting).
- Write in the numbers of the examples next to the actions in the table below.
- Give brief reasons for your choice.

One example is already given for you to follow.

Action	Example number(s)	Reasons for your choice
replacement (new copy)	4	High use Probably cheaper to replace cheap book than to photocopy all of the torn pages
immediate action		
specialised attention		
reformatting		

Summary

- The term *preservation* is a broad umbrella term that includes all activities that prolong the life of materials or their information content.
- The term *conservation* refers to activities which involve the treatment of individual items.
- Environmental factors which can cause damage include visible light, UV (ultraviolet), and infrared radiation, temperature and relative humidity, dust and atmospheric pollution.
- Ways to minimise the damage caused by these factors include:
 - keeping light levels low
 - keeping the temperatures as low as possible
 - slowing the rate of change in temperature and relative humidity
 - routine cleaning and dusting
 - making sure there is adequate air circulation
 - keeping buildings well-maintained.
- Ask a conservator for advice.
- Biological factors that can cause damage include moulds and fungi, insects, animals and birds, as well as human damage—deliberate and accidental—and damage caused by poor housing (e.g. unstable materials).
- Ways to minimise the damage caused by these factors include all of the earlier techniques such as low light and temperature, plus:
 - using an integrated pest management system
 - using proven traditional methods of pest control
 - educating staff and users
 - installing security systems
 - using ‘acid-free’, polypropylene and polyethylene enclosures
 - using proven traditional methods for protecting items from damage.
- One of the most common ways of assessing damage is to conduct a collection survey.

Checklist

In order to test your understanding of this material, work through the checklist below.

If you can answer 'yes' to each question, and you have completed the activities for this topic, you are now ready for your lecturer or assessor to verify that you:

- I can meet the **performance criteria**
- I have satisfactorily completed the **activities**.

If you are in any doubt about any of the content, you should read through the material again, consult some of the references mentioned in the section entitled, **Resources**, talk to your work colleagues or contact your lecturer or mentor.

I can:

- I identify environmental factors that cause damage to library materials
- I identify and explain the potential for damage by:
 - biological and human factors
 - housing and storage
- I explain methods of minimising the damage from all of these factors
- I apply given criteria to assess the extent of damage caused by all of these factors
- I decide on action appropriate to the damage for different types of materials, noting those requiring immediate action, specialised attention, replacement or other alternatives
- I follow specified procedures to avoid or minimise damage.

▲ Submit

You are now ready to record in your **Log book** that you:

- I can meet the **performance criteria**
- I have satisfactorily completed the **activities** for this topic.

You can record these by marking off the boxes in the shaded columns with a ✓ **yes** or ✗ **no**.

You can then ask your lecturer or assessor to verify this information.

Topic 4

A disaster management and recovery program

Performance criteria

You will have achieved the performance criteria for this topic when you can:

- I explain the reasons for developing and maintaining a disaster plan
- I examine disaster plans to assess the response required by staff in each situation
- I develop a plan to respond to a disaster in a selected situation.

Disasters

Every year collections all over the world are damaged by disasters such as fire, floods, earthquakes and volcanoes. Some disasters are deliberately caused by humans—through war, terrorist activities, vandalism. Some are caused by carelessness—leaving a cigarette butt burning, leaving a tap on. Some are caused by building maintenance problems—leaking roofs, burst pipes and faulty wiring.

■ Activity 2.6

A disaster

- a) Briefly describe one disaster that has recently happened in your country.
- b) Now imagine that this disaster happened to a library collection near you. How could the disaster damage library collection materials?

a) Description of disaster

b) How could the disaster damage library collection materials?

A disaster plan

If correct actions are not followed after a disaster, the effects will become worse.

By having a disaster plan in place, you can:

- l help to prevent damage to collections
- l help with quicker recovery.

Keeping the plan relevant and up-to-date can make the difference between saving and losing lives and valuable collections.

A disaster plan can include all the information you may need if a disaster happens, such as:

- l emergency contact numbers—day and night
- l names, addresses and contact numbers of people available to help
- l addresses and contact numbers of suppliers of equipment, services and materials which may be needed
- l an inventory of holdings—including a list of priorities for recovery
- l floor plans
- l details of insurance policies
- l procedures for responding to a disaster.



Ideally, all staff should be trained in the disaster plan and have a clear idea of their roles.

Disaster plans should be continuously revised. Each time a disaster happens something new is learnt. Improvements should be incorporated into the plan straight away.

Activity 2.7 below gives an example of a disaster plan.

A written disaster plan and an emergency response kit is the key to disaster prevention and fast recovery.

© Photograph courtesy of State Library of South Australia

Disaster management

Having a disaster plan is just one of the stages of disaster management. Other stages are described below.

Prevention and risk assessment

Prevention begins with risk assessment—checking out the hazards in the building and in the local environment.

For example, if a collection of manuscripts is stored in a building next to a river that floods during the monsoon season, it would be a good idea to move the manuscripts to another place.

The following are examples of steps which you can take to help prevent problems:

- I store items in boxes and containers
- I avoid storing items on the floor
- I return items to storage places when not in use
- I unplug electrical equipment when it is not in use.

Prepare

Always place important items in the most secure storage.

Remove items from areas which are likely to be affected (e.g. windows and doors).

Have ready:

- I materials for helping to minimise problems (e.g. plastic sheeting to cover leaks)
- I an up-to-date list of emergency contacts (e.g. police, fire officer, doctor)
- I floor plans
- I a list of priority items for recovery
- I a stock of practical supplies which can be used in an emergency (e.g. an emergency bin with mops, brooms and plastic sheeting, torches and batteries)
- I a team of people who can help (the team can be large or small).

Response

Disaster response is about knowing how to respond to minimise damage quickly and efficiently:

- I Human safety is more important than collections—do not enter a disaster area unless you have been told that it is safe to do so by an authority (e.g. fire officer, police).
- I Examine the collection.
- I Plan what you need to do before starting any recovery steps—an organised recovery operation is much more successful at preventing damage.
- I Determine whether the collection can be protected where it is.
- I Decide whether it can be moved to another location.
- I Find out whether a start can be made on cleaning up.
- I Help to secure the area.
- I Help to sort items into priorities for treatment (using the list of priority items).

Recovery

Recovery is about knowing what to do to recover damaged material.

Most disasters result in water-damaged materials, and mostly the water will be muddy or stained.

Different types of materials have different drying needs. Drying will need to be started within two days to prevent mould growth.

Obtain advice from an expert.

Below are some examples of treatments for books and microforms. The information is sourced from, *ReCollections: Managing Collections* and also from information supplied by Artlab Australia.

Treatments for damaged items

Object	Priority	Treatment method	Comment
books	freeze or dry within 48 hours	air drying	<ul style="list-style-type: none"> • use fans to circulate the air • interleave pages with paper to absorb water, change paper frequently
			<ul style="list-style-type: none"> • stand books with wettest end up • open covers only slightly, rather than fanning out which may cause the spine to split
			<ul style="list-style-type: none"> • otherwise lie them flat, or support the covers
			<ul style="list-style-type: none"> • hang pamphlets and light books on lines
			<ul style="list-style-type: none"> • when books are nearly dry, reform their original shape by closing, lying flat and applying a light weight
		<ul style="list-style-type: none"> • do not stack books or return to shelves until thoroughly dry 	
		freezing	<ul style="list-style-type: none"> • is used to give extra time when there are too many items to be treated promptly
			<ul style="list-style-type: none"> • books are wrapped in plastic bags, either individually or every second book, so that they do not stick together • books are sealed and placed in a freezer
			<ul style="list-style-type: none"> • freezing will not dry the books • it will not kill mould, but will stop mould from getting any worse
			<ul style="list-style-type: none"> • freezing gives extra time so that each book can be individually thawed later and dried
<ul style="list-style-type: none"> • before freezing any items, ask an expert • some materials, such as books with leather bindings or photographs, should not be frozen 			
microforms	arrange for rewash and dry within 48 hours		<ul style="list-style-type: none"> • keep wet until rewashing and drying can begin
			<ul style="list-style-type: none"> • send them, packed in the water, and within 48 hours, to a microfilming organisation for reprocessing and drying
			<ul style="list-style-type: none"> • a number of film manufacturers offer a free disaster support service to users who: <ul style="list-style-type: none"> – use that manufacturer’s micrographic products – use that manufacturer’s chemistry to process films – process films according to the manufacturer’s specifications • this is generally a free ‘rewash and dry’ disaster recovery service • contact your nearest film supplier for further details
do NOT freeze microforms			

■ Activity 2.7

Disaster response

The following are sections from a hypothetical disaster plan for ABC University Library. The sections deal with small water and/or sewage leaks.

Your task is to read through the sections of the plan, then answer the questions below.

1. Summarise the **immediate actions** required of a staff member if a water or sewage leak is found.

2. Describe two practical **short-term response actions** to a small leak.

a)

b)

3. Briefly describe three key tasks which the **Collections Disaster Coordinator** should carry out during **long-term recovery actions**.

a)

b)

c)

4. Which items are given salvage priority?

ABC UNIVERSITY LIBRARY

DISASTER PLAN

Section 3

Water and/or sewage leak

3.1 Immediate Actions

When you find a water or sewage leak which could possibly affect collection areas:

- I Assess the situation:
 - Is water/sewage leaking from above or rising from below?
 - Is it a small or a large leak?
 - Is collection material being or about to be affected?
 - Is the area safe to enter?
- I **DO NOT** enter a flooded area until service personnel have made the area safe. **There is extreme danger of electric shock.**
- I Report the problem stating the exact location and details to the security officer (dial extension 123).

Security contacts and advises:

- I Facilities staff, and
- I Preservation Services staff.

The Facilities Manager coordinates:

- I the stabilisation of any leak
- I clean up of sewage leaks.

When it is safe to do so:

- I commence **Short-term Response Actions** for
 - small water/sewage leaks
 - large water/sewage leaks or flood.

3.2 Water and/or sewage leak—small

Short-term Response Actions

After immediate action has been taken:

- I proceed to the closest Disaster Supply bin
- I take out plastic sheeting, buckets, bins, mops, protective clothing, etc as required
- I cover affected or threatened collections with plastic sheeting, place bins under leaks if necessary
- I remove water and/or restrict or direct its flow using mops, etc.

When the situation has been stabilised (leak stopped, floor clear, collection covered):

- I commence **Long-term Recovery Actions.**

3.3 Water and/or sewage leak—small

Long-term Recovery Actions

The Collections Disaster Coordinator:

- assesses the situation, and if necessary calls for Collection Managers to assemble
- in consultation with relevant Collection Managers, assesses damage to collection material and establishes priorities for removal and treatment
- formulates a recovery action plan
- arranges for a library photographer to photograph the affected area during all stages of the disaster recovery.

The Collections Disaster Coordinator:

- ensures records of material locations and movements are maintained at all times
- supervises salvage operations
 - sewage-affected material is segregated for interim cleaning treatment by Preservation Services
 - fire-damaged material is segregated for interim cleaning and stabilisation treatment by Preservation Services.

Salvage priority is generally given to:

- priority material, listed on the Library Register of Priority Heritage Material
- material in formats requiring urgent attention (manuscripts, original materials with water-soluble media, magnetic media, photographs, microform masters)
- other special collection materials
- fire-damaged material.

Other collection material should then be salvaged.

The Facilities Manager coordinates stabilisation and control of the environment.

Preservation Services staff:

- ensures that their work area is prepared to receive affected material
- assesses affected material and determines appropriate treatments. Where material is judged to be beyond cost-effective recovery, collection managers should decide on replacement or discard.

The Facilities Manager coordinates restoration of the affected area.

When treatment has been completed and appropriate environmental conditions have been restored, recovered material is returned to the collection areas.

The Collections Disaster Coordinator conducts a post-disaster assessment to:

- analyse the successful and failing aspects of the immediate, short and long-term actions taken
- prepare a written report on the incident
- make changes to the disaster plan, where necessary.

■ Activity 2.8*

* These are major activities which require the lecturer/assessor to observe and/or sign off performance details.

Your own disaster plan

Develop your own mini-disaster plan to respond to a fire in your home.

Your plan should include the following:

- emergency contact numbers—day and night
- names and addresses and contact numbers of people available to help
- a list of 5 priority items for recovery
- floor plans and exit routes
- steps to follow—who is responsible for moving what.

Show your finished plan to your assessor or lecturer.

Your lecturer or assessor will need to sign off this activity in the table below.

Mini-home disaster plan

Feature of disaster plan	Present ✓ yes, ✗ no	Assessor signature	Date
emergency contact numbers—day and night	<input type="checkbox"/>		
names, addresses and contact numbers of people available to help	<input type="checkbox"/>		
a list of 5 priority items for recovery	<input type="checkbox"/>		
floor plans and exit routes	<input type="checkbox"/>		
steps to follow—who is responsible for moving what.	<input type="checkbox"/>		
whole plan is complete	<input type="checkbox"/>		

Summary

- I A disaster plan is one of the stages of disaster management. It helps to prevent damage to the collections and also helps with quicker recovery.
- I Disaster management also begins with prevention and risk assessment—checking out hazards in the building and local environment.
- I Disaster management also involves
 - **preparation**—having emergency supplies and lists ready
 - **response**—knowing how to respond quickly and efficiently
 - **recovery**—knowing what to do to recover damaged material.

Checklist

In order to test your understanding of this material, work through the checklist below.

If you can answer ‘yes’ to each question, and you have completed the activities for this topic, you are now ready for your lecturer or assessor to verify that you:

- I can meet the **performance criteria**
- I have satisfactorily completed the **activities**.

If you are in any doubt about any of the content, you should read through the material again, consult some of the references mentioned in the section entitled, **Resources**, talk to your work colleagues or contact your lecturer or mentor.

I can:

- I explain the reasons for developing and maintaining a disaster plan
- I examine disaster plans to assess the response required by staff in each situation
- I develop a plan to respond to a disaster in a selected situation.

▲ Submit

You are now ready to record in your **Log book** that you:

- I can meet the **performance criteria**
- I have satisfactorily completed the **activities** for this topic.

You can record these by marking off the boxes in the shaded columns with a ✓ **yes** or ✗ **no**.

You can then ask your lecturer or assessor to verify this information.

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Background

The training materials have been developed by the National Library of Australia, in collaboration with the State Library of South Australia and under the auspices of IFLA PAC, and will be provided to people within the Asia and Pacific regions as a training resource. The materials will also be used within Australia as part of an accredited TAFE training course.

The training materials consist of 10 modules, 6 wall charts, a Log Book, a Learning Guide and a Glossary/Index.

We expect that users will both read a printed version of the materials and download them as PDF files from the National Library of Australia's website – www.nla.gov.au

