Preservation of Information Resources in Libraries : New Challenges

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ABSTRACT

This paper discusses the importance and need of preservation of information resources in libraries, factors that affect degradation and deterioration of library materials and methods of tackling them. It also discusses the preservation problems that are associated with the digital information and the challenges faced by the librarians in preserving the intellectual content contained in the digital media.

0. Introduction

Modern libraries maintain collections that include not only printed materials such as, books, periodicals, newspapers, and magazines, but also art reproductions, films, sound and video recordings, maps, photographs, microfiches, microfilms, CD-ROMs, computer software, online databases, and other media. In addition to maintaining collections within library buildings, modern libraries often feature telecommunications links that provide users with access to information at remote sites.

The basic objective of a library is to collect, organize, preserve, and provide access to knowledge and information. In fulfilling this objective, libraries preserve a valuable record of culture that can be passed down to succeeding generations. Libraries are an essential link in this communication between the past, present, and future. Whether the cultural record is contained in books or in electronic formats, libraries ensure that the record is preserved and made available for later use.

0.1 Preservation of Library Materials

Libraries have always struggled against the physical destruction of their collections. Fires, floods, earthquakes, and wars have damaged the holdings of countless libraries, destroying forever much of the recorded history of human civilization. But library materials also fall victim to slow decay caused by acid content in paper, insect infestation, improper storage or handling, and excessive heat, mildew, humidity, and **air** pollution. The slow decomposition of library materials is a universal problem. To ensure that library materials remain

available to present and future generations of library users, libraries engage in a variety of preservation efforts. These efforts include the conservation of original materials and the transfer of information from original materials to more durable formats.

Preservation does not simply happen on its own, a well thought out plan must be drawn and managed. According to fifth Law of Library Science "Library is a growing organism". Libraries acquire materials of all kinds continuously, and promote the use of these acquired materials. Hence more and more number of users want to access these materials. As more and more number of users use these materials, they are more likely to be damaged. To prevent this deterioration of materials which may affect the further retrieval of the contents, we need to adopt an array of appropriate management strategies.

Environmental conditions and methods of storage have a great influence on the preservation of documents. Control of the environmental conditions and the provision of good storage conditions constitute the best preventive measures.

0.2 What is preservation?

Preservation is the generic term, and includes all activities associated with the maintenance of resources and the preservation of information content. This is in contrast with conservation, which refers to the physical items themselves in order to extend their usable life (and restoration, which refers to treating damaged material to bring to its near original condition) [1].

1. Causes of deterioration

Causes of deterioration may be external or internal. External causes [2] are physical, chemical, biological, improper storage, unauthorized exposure, risky handling, theft, natural calamities. Internal causes are : poor quality of paper or materials used, the chemicals used for printing and binding.

In this context the external factors and the measures to counter the effects are discussed here.

1.1 Physical Agents

- Temperature
- Relative Humidity
- Light
- Sound (Vibration)
- Magnetism

Temperature is important especially in a tropical country like India, where the temperature fluctuates from one extreme to another during the year and even during a single day, shows at times extreme variations. This drastic fluctuations in temperature forces the documents adopt themselves to the changing conditions too frequently, and the strain of these variations will have an impact on the strength of the materials.

In a humid atmosphere, the danger to library materials comes from microorganisms which thrive best under such conditions. Moreover paper is a hygroscopic material and absorbs moisture from a moist air. Such moisture can weaken the strength of paper documents, spreading of inks used for printing. If high humidity is combined with bad ventilation and improper lighting , the resulting harm to library materials is indescribable.

In a tropical countries like India, the abundance sunlight poses a great problem. Because sunlight contains quite a high proportion of ultra-violet radiation which is so powerful as to induce degenerative chemical changes in organic material on which it is incident. Paper is mainly made up of cellulose which constitutes long chains of molecules made of carbon, hydrogen, and oxygen. Ultra-violet radiation breaks up the links in the long molecular chains and thus brings about structural decay of paper. The strength of paper decreases and it gets discoloured. Inks fade and printing becomes faint. The leather of bookbindings tends to get hard and brittle. Ultra-violet rays of wavelength shorter than 300 millimicrons are particularly detrimental to the cellulose of paper. It is desirable to prevent sunlight from falling directly on books and other library materials.

1.1.1 Physical Agents and their Preventive Measures

- Maintain constant temperature(22-23 °C) and Relative Humidity (45-50%)
- Proper ventilation should be maintained
- Air-conditioning is the best solution
- To control excess humidity install dehumidifiers, or placement of silica gel in appropriate places.
- Use sun filters, lead bulbs, acetate foils etc. to control the powerful radiant light energy
- The levels of light (should not exceed 50 Lux) should be decided based on the stack area and the user area
- Handle carefully the documents in the library while transporting from one floor to another
- Avoid using mobile storage system which may create friction and damage documents

- Libraries should be located away from subways, trains, automobiles, etc. to avoid the effect of vibration from outside sources
- Stray magnetic fields are the natural enemy of magnetically recorded information. Avoid using magnets, magnetic notice boards, etc.

1.2. Chemical Agents

- Dust and Dirt
- Internal Acidity of Paper and Ink
- Air Pollution and Atmospheric Gases

The environment in industrial cities like Mumbai is highly polluted. It contains pollutants like dust, smoke, coke dust, fly ash, salt particles, calcium, ammonium sulphate, nitrates, chlorides, solid oxides, soot tars, and gases like carbon monoxide, nitric oxide, nitrous oxide, sulphur dioxide, ozone, olefins, aromatic hydrocarbons, aldehydes, ketones, paraffins, hydrogen sulphide, halogen compounds and ammonia. All these factors lead to increase the acidity of the documents. Deacidification [3-4] methods can be used to remove the acid content and increase the longevity of documents. The Library of Congress estimates that deacidification can prolong the life span of paper-based library materials by 250 to 300 years.

1.3. Biological Agents

Biological agents thrive on the organic matter they find in library materials. Absence of proper ventilation, darkness, high temperature and relative humidity encourage their spread. The biological agents can be grouped into **macro** organisms and **micro organisms**.

1. 3.1 Macro organisms

- Silver fish
- Book lice
- Book worm
- Cockroaches
- White ants (Termites)
- Rodents
- Man

There are many pesticides like (DDT; Pyrethrum; Para dichloro benzene etc.) available in the market. These pesticides may be sprayed periodically. There are agencies specialized in this area that may be consulted incase one has any specific problems.

The control of termites requires specialised attention in libraries. As termite infestation starts from the soil, creation of chemical barrier around the building using crude creosote in kerosene (1:1) or Dieldrex in water (1:60) is recommended. Wooden stuctures are to be coated with creoste oil and solignum. Constant vigil against termite infestation is to be maintained.

Care should be taken that books and other documents on the shelves are not directly sprayed upon. Problem of rodents can be controlled by trapping, stomach poisoning (zinc phosphide and arsenic oxide) and sealing of crevices, cracks, and entry points.

Markings on the documents by pencil or pen by users and using the book as a pillow for protecting their heads during monsoon also contributes to the deterioration process of documents. It is a very difficult and delicate issue. This can be prevented by educating the users and displaying notices explaining the importance of books at prominent places in the library.

1.3.2 Micro organisms

- Fungus
- Mildew and Mould

A fungus attack can be easily identified by fuzzy growths, mostly coloured, which seem to spread out from a point. About 100 different species of fungi have been found one time or another to infest organic materials in libraries. Some important fungi which attack library material, espcially paper are *Pencillium*, *Fusarium*, *Trichoderma*, *Alternaria*, *Citromyces*, *Aspergillus* and *Monilia*. The proper identification of fungi is done under microscope.

There are fungicides like Mercuric chloride in spirit or alcohol or in water ; Para nitro phenol 3% in water ; Thymol + Sodium chloride ; Sodium silicate + Sodium penta chloride ; Chloro phenol ; Hydroxy quiniline, etc. may be sprayed periodically. Care should be taken that books and other documents on the shelves are not directly sprayed upon. Fumigation methods (vaccume and ordinary) are the most effective ways of sterilising of documents from fungus, mould and mildew.

In vaccume fumigation method, following chemicals are used.

- i. Ethylene oxide + CO_2 1:9 by weight for $10m^3$ i.e. about 4.5 kg for four hours
- ii. Ethylene chloride $+ CO_2$

- iii. Methyle formate $+ CO_2$
- iv. Carbon tetra chloride
- v. Hyadrocynic gas
- vi. Formaldehyde (250 gms/cubic area) at 30 °C constant temperature for 48 hrs.
- vii. Killopetra (Ethylene dichloride + Carbon tetra chloride (3:1)i.e. 1/2litre $/2m^3$ at 23.85°C for 36 hrs.
- viii. Para dichloro benzene , $1 \text{ kg} = 1\text{m}^3$ for 72 hrs.

In ordinary fumigation method, following chemicals are used.

- i. Thymol (120 gms = $1m^2$ for seven days)
- ii. Fomaldehyde

1. 4. Materials Handling

- Storage system
- Exhibition
- Transportation
- Photocopying

Libraries should have proper storage system [5] depending upon the type of documents such as books, periodicals, microfilms, micrifiches, CD-ROMs etc. and size of documents such as maps, atlases, globes, etc. When documents are removed for exhibition, care should be taken to avoid direct exposure to ultraviolet radiation and minimise the transportation. Indiscriminate photocopying should be avoided.

1. 5. Theft and Vandalism

- Tag materials with magnetic strips. These strips will trigger alarms if users try to carry the materials through electronic gates at library exits without properly checking out the items at the circulation desk
- Install closed circuit TV to monitor the users movements
- Use wire mesh to cover windows
- Deploy security guards at the library entrance

1.6 Fire

- Install fire or smoke alarm system
- Keep fire fighting equipments in designated places in the library

• Provide fire fighting training to all employees in the library

1.7 Natural Disasters

- Flood
- Cyclone
- Earthquackes

It is very difficult to predict the natural disasters. There should be a contingency plan which should form part of the preservation policy aimed to minimize the loss and rescue the materials to safer places when disasters strike. For that it is vital to know which procedures to follow, to test them and include them in periodic security exercises involving all of the library staff. An up-to-date address list must be kept indicating whom to call in case of disaster (vital installations such as security, hospital, fire fighting unit, etc.).

2. Digital Preservation

Many libraries and archives are in the process of 'going digital'. The advantages of digital technology are well known and its adoption by libraries and archives seems inevitable, inexorable and well-motivated. Yet the fact remains that several key issues concerning the long term preservation of digital technologies remain unsolved. Two key problems are the fragility of digital media (its 'shelf life' compared with, say, non-acidic paper is extremely short) and, perhaps even more intractable, is the rate at which computer hardware and software become obsolete. Many cases have been cited in which valuable data has already been lost because of obsolescence. Moreover, as of today no one knows how to ensure the long-term preservation of multimedia documents nor how to ensure the integrity of documents that may have many links to other documents that may be anywhere in the world. For a brief overview of some digital preservation issues see [6-8] These problems have, of course, been exercising the library and archive communities for some time but as yet no one solution or set of solutions has been reached. Solutions need to be found urgently if we are not to sink in what Rothenberg [9] calls 'technological quicksand'.

2.1 Audio and Visual Materials

Not only paper-based materials risk deterioration on library shelves. Similar dangers confront audio and visual library materials, such as sound recordings, photographs, films, and videotapes. For example, nitrate-based film stock was the only available format for motion-picture production until 1951, but the nitrate in this type of film causes it to decay very quickly, even in controlled settings. Many have been lost or destroyed, but a vast number have simply

decomposed beyond repair. Libraries and archives preserve nitrate-based films by transferring the images to a more resilient, acetate-based film stock. They preserve other audio and visual materials in similar ways. For example, original sound recordings are preserved by transferring them from delicate and unstable wax cylinders or magnetic tapes to newer digital formats such as CD-ROMs.

In addition to preserving their materials from deterioration, libraries must guard against the obsolescence of machine-readable materials—materials that are read and interpreted by machines. Many valuable documents in machinereadable materials were first recorded in formats that have now become obsolete. Machines able to play back the recordings either no longer exist or are so rare that they are not practical for use in libraries or even for storage in archives.

2.2 Computer Data

Computer software and hardware pose an additional complex problems and challenge to the preservation efforts of libraries. Because common standards for computer software and hardware change so quickly, vast amounts of information stored in obsolete computers can no longer be accessed using modern equipment. As a result, libraries risk forever losing access to valuable computer documents such as government statistical data and geological surveys. To ensure that original computer data remain accessible using contemporary equipment, libraries and archives must continually transfer these data to new formats, which is extremely costly and time-consuming process. Most library conservators and archivists can transfer and preserve only those materials that they determine are of enduring value. As the quantity of computer-based records increases each year, the task of identifying which electronic materials warrant preservation becomes increasingly difficult. The major challenge before the librarians is how to archive the online versions of print journals and one has to work out a strategy as how to make this possible [10]. The digital media like computers, hardware, software, floppies, CD-ROMs, databases etc. are affected not only by environmental factors and biological viruses but also by various types of computer viruses (programs) that affect and corrupt systems, files, floppies, CDs etc. New problems like cyber crimes, hacking etc. have become order of the day. Therefore, librarians have to be more vigilant by evolving appropriate, effective and efficient tools like firewalls, passwords, periodical backups etc. to protect the information available in network and non network environments.

3. Preservation Program in BARC Library

BARC library has a well planned preservation program which includes the following:

- The library is centrally air conditioned and monitored regularly,
- Cleaning of library shelves is done on regular basis using modern gadgets,
- Periodic (monthly) spraying of pesticides by Landscape and Cosmetic Section,
- Smoke detectors have been installed to prevent any damage to library collection,
- Regular training in fire fighting is given to all staff members,
- User education is provided on how to handle library materials,
- Regularly inspect the water supply joints to find out water leakage,
- Security personnel at the entrance screens the checked out library items, and
- Telephone numbers of all the vital installations such as security, hospital, fire fighting unit have been printed in the yearly pocket calendars and supplied to all employees.

4. Conclusions

Preservation aspects are given a least priority in many libraries. The modern librarian is faced with a complex problem as he has to deal not only with the traditional media but also with modern media such as video recordings, photographs, microfiches, microfilms, CD - ROMs, computer software, online databases and their quick obsolescence of associated technologies. It is the duty of the librarian to preserve and conserve the intellectual content of the documents for the generations to come irrespective of media and technological changes. Librarians should learn quickly to adopt themselves to the changing scenario.

5. References

- 1. Clayton, P. and Gorman, G.E. Managing information resources in libraries : Collection management in theory and practice. Library Association Publishing, London, 2001.
- 2. Harinarayna, N. The science of archives keeping. The State Archives, Hyderabad,1967.
- 3. Barrow, W. J. The Barrow two bath deacidification method. *American Archivist*, Vol. 39, pp. 161 164 ,1976.
- 4. Kelley, J. B. Mass deacidification. **In** : Preservation of library materials. Ed. By J. E. Russel , Special Libraries Association, 1979.
- 5. Johnson, E.V. and Horgan J. C. Museum collection storage. UNESCO, Paris, 1979.

- 6. Eaton, F. Electronic media and preservation. *IASSIST Quarterly*, Spring / Summer, pp.14 17, 1994.
- Preserving Digital Information: Report of the Task Force on Archiving of Digital Information, Commission on Preservation and Access and The Research Libraries Group, Inc., May 1, 1996, <<u>http://www.rlg.org/ArchTF/</u>>
- Digital Collections: A Strategic policy Framework for creating and preserving digital resources, Arts and Humanities Data Service, N.Beagrie & Greenstein, 1998. Available at: <<u>http://www.ahds.ac.uk%20/manage/framework.htm</u>>
- 9. Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation, Jeff Rothenberg, 1999. Available at: <<u>http://www.clir.org/pubs/reports/rothenberg/contents.html</u>>
- Jange, S. and Kademani, B. S. Metamorphosis of the scientific journal : Past, present and future. *Malaysian Journal of Library & Information Science*. Vol. 4 (1), pp. 61 – 69, 1999.