

# PRESERVATION AND CONSERVATION OF LIBRARY MATERIALS IN THE DIGITAL AGE

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## **Abstract**

The paper attempts to explain preservation and conservation as measures for achieving sustainability of library materials as long as possible in their original format. In order to achieve this, causes of deterioration of library materials such as poor paper manufacture, improper storage, rough handling, pests and knowledge of disaster occurrence, electronic means of preservation, challenges and strategies for digital materials preservation have been examined.

**Keywords:** Preservation, Conservation, Library Materials, Digital Age, Digital Materials

## **1.0 Introduction:**

A library is a repository of wisdom of great thinkers of the past and the present. It is a social institution charged with the responsibility of disseminating knowledge to the people without any discrimination. The holdings of the libraries are the priceless heritage of mankind as they preserve facts, ideas, thoughts, accomplishments and evidences of human development in multifarious areas, ages & directions. The past records constitute a natural resource and are indispensable to the present generation as well as to the generations to come. Any loss to such materials is simply irreplaceable. Therefore, preserving this intellectual, cultural heritage becomes not only the academic commitment but also the moral responsibility of the librarians / information scientists, who are in charge of these repositories. Besides, proper dissemination of library materials is possible if the documents are in good and usable condition. This demand for the proper preservation and conservation of the library materials. Any librarian responsible for the preservation of these documentary heritages should know the various causes of deterioration of the library materials and the possible methods for their preservation. Except a few libraries, all others have paper based reading materials in the form of manuscripts, books, periodicals, paintings, drawings, charts, maps etc.. The basic materials and constituents of the physical entity of these library materials are mostly organic in nature, which are susceptible to natural decay and deterioration. In books, apart from paper the other materials used are board, cloth, leather, thread, ink, adhesive etc. All these materials used are nutrition to some living organisms. So the library materials need protection from factors of deterioration.

## **1.1 Preservation and Conservation of Library Materials:**

The library houses the document by considering the long-term preservation of the items while still allowing the end user to access the material easily. But all library collections experience damage from use and decay from aging. So there is a need of preservation and conservation of library materials.

Books and other materials suffer damage or deterioration because of several groups of factors, some inherent in the materials and others beyond the control of the library. Library holdings may begin to deteriorate because of the organic materials from which they are made. Each type of material - paper, glue, plastic, etc. - that goes into the manufacture of a book, recording or optical media has its own combination of physical and chemical properties, and a life span. The other factors include all of the conditions surrounding the processing, storage and use of the materials.

Preservation is the task of minimizing or reducing the physical and chemical deterioration of documents. Conservation is the maintenance of documents in a usable condition through treatment and repairs of individual items to slow the process of decay or to restore them to a usable state. Conservation includes study, diagnosis, preventive care, examination, treatment, documentation using any methods that may prove effective in keeping that property in as close to its original condition as possible and for as long as possible. The conservation actions are carried out for a variety of reasons including aesthetic choices, stabilization, needs for structural integrity or for cultural requirements for intangible continuity.

## **2.0 Importance of Preservation and Conservation**

The processes of preservation, conservation and restoration are applied to safeguard the library materials from further decay and deterioration. Preservation is the process in which all actions are taken to check and retard deterioration where as conservation includes proper diagnosis of the decayed material, timely curative treatment and appropriate prevention from further decay. More over there are two aspects of preservation of library materials:

**2.1 the preventive measures** which include all forms of indirect actions aimed at increasing the life expectancy of undamaged or damaged elements of cultural property. It comprises all the methods of good house-keeping, caretaking, dusting, periodical supervision and prevention of any possibility of damage by physical, chemical, biological and other factors.

**2.2 the Curative measures** consists of all forms of direct actions aimed at increasing the life expectancy of undamaged or damaged elements of cultural property. It includes repairing, mending, fumigation, deacidification, lamination, and other jobs which are required considering the physical condition of the individual document.

**3.0 Preventive conservation** plays a vital role and has assumed much importance in our country because a large number of institutions do not have proper conservation facilities. In fact if diagnosis in time is followed by proper preventive measures many problems can be solved. Here in this paper in accordance with the principles of preventive conservation some measures have been suggested to control the library materials from the effect of various deteriorating factors.

### **3.1 Need of Preservation and Conservation:**

When an important, often used book is found in a poor physical condition that restricts its future use and denies the borrower the pleasure of its reading, then the need arises for its preservation and conservation. The need of preservation and conservation are-

**3.1 Compendium of Information:** Books, journals, newspapers are the sources of information. They reflect social, economic, political and cultural life. They also depict the latest trend on all subjects or topics and, as such, they are a valuable asset of our society.

**3.2 Raw Materials of History:** The old reading material constitutes the raw materials of our history and provides background information about an event in history. Nostalgia for such works is another point of consideration.

**3.3 Wide Range of Users:** Everyone from a child to an old man, from layman to researchers, turns to information even after hundred years of the publication of the material.

**3.4 Future and Heavy Use:** Hard copies of the old as well as new materials are prone to decay. So, to provide continuous and wider access to the collection preservation is a must.

**3.5 Rare Materials:** Manuscripts and other materials are of immense value from the cultural and historical point of view and therefore they need to be preserved. Priority should be given to high-value, at-risk materials of national interest. The purpose shall be to serve preventive preservation, as well as security, goals by reducing the handling of the originals.

## **4.0 Strategies in Preservation and Conservation:**

The strategies in preservation and conservation of library material can be viewed in the form of following points-

**4.1 Document Selection:** If preservation and conservation practices will be followed then the goal should be to bring as many worthy collections as possible for the document at risk to improve access.

**4.2 Options:** Choosing the options that will be followed to meet the requirements of the custodial function of the library as well as its current use.

**4.3 Budget:** Preparing a budget for the preservation and conservation of the reading materials, including cost in procuring equipments, and others.

**4.4 Procuring Necessary Infrastructure:** According to the option chosen for preservation necessary infrastructure should be developed. In case of digital preservation necessary hardware and software should be procured. If possible the archive or library can go for automated management systems that will manage digital resources for acquisition, use, and archiving automatically.

**4.5 The Conservation Laboratory:** Conservators routinely use chemical and scientific analysis for the examination and treatment of the works. The modern conservation lab uses equipment such as microscopes, spectrometers, and x-ray machines to understand better the objects and their components. The data thus collected help in deciding the conservation treatments to be provided to the object.

## **5.0 Types of Preservation and Conservation Techniques:**

The preservation and conservation techniques can be of the following types:-

**5.1 Preventive Conservation:** Many cultural works are sensitive to environmental conditions such as temperature, humidity and exposure to light and ultraviolet light. Taking sufficient measures to protect materials in a controlled environment where such variables are maintained within a range of damage-limiting levels is called preventive conservation.

**5.2 Interceptive Conservation:** Interceptive Conservation refers to any act by a conservator that involves a direct interaction between the conservator and the cultural material. These interceptive treatments could involve cleaning, stabilizing, repair, or even replacement of parts of the original object or consolidation such as securing flaking paint. (Barman)

## **6.0 Factors of Deterioration**

Deterioration is a change of original state of any material by interaction between the object and the factors of destruction. The different types of deterioration of the paper based materials are reflected in wear and tear, shrinkage, cracks, brittleness, warping, bio infestation, discoloration, abrasion, hole, dust and dirt accumulation etc. Generally library materials are susceptible to deterioration by the following factors:-

- Environmental (climatic Factors) factors like light, heat, humidity and moisture, dust and dirt, water.
- Biological factors: - Microorganisms, insects and rodents.
- Chemical factors
- Human factors and
- Disasters

### **6.1 Environmental Factors:-**

**6.1.1 Light:** - Whether natural light or artificial light paper gets deteriorated when it is exposed to light. Especially sun light has a serious damaging effect on written or printed paper materials. The ultraviolet radiation of light are mainly responsible for photochemical degradation of paper which takes place rapidly when paper is exposed to sun light in presence of air (oxygen). When some portion of cellulose is oxidized to oxycellulose, the long cellulose

chains are broken and the paper becomes weak and brittle. Fading of ink and dye of the colored paper and yellowing of white paper also takes place due to the formation of oxycellulose. Artificial light like fluorescent tube light also radiates a high percentage of ultraviolet rays which cause deterioration by yellowing the paper. However the amount of damage by light depends upon the following factors.

**1) Intensity of light-** as the intensity of light increases the rate of deterioration of the paper also increases.

**2) Duration of exposure-** the duration of exposure of paper to light is directly proportional to its deterioration.

**3) Distance from the source of light-** more the distance, less the damage.

**6.1.2 Heat:** Usually the source of heat is high atmospheric temperature. Heat is measured in terms temperature either in Centigrade scale or Fahrenheit scale. High heat with low humidity causes dehydration of cellulose fibers and the paper becomes brittle. It loses its flexibility to the extent that it tends to crumble on touch. On the other hand, high temperature with high humidity creates the condition for the growth of moulds. If electric bulbs are used for lighting purpose, they increase room temperature as high powerful bulbs generate more heat. Besides extreme variation in temperature (say 50c in winter and 450c in summer) affects the physical condition of the library materials.

**6.1.3 Humidity and Moisture: -** Humidity is the amount of moisture in the atmospheric air. The moisture is measured in terms of relative humidity. All organic objects absorb water to a greater or lower extent and the water goes inside the object through surrounding air. Because of this absorbency property, the paper absorbs more moisture when there is high humidity. Certain amount of humidity is necessary for the flexibility of paper but in prolonged high humid condition, paper becomes soggy and the moisture weakens the fibers of paper. Moisture is the root cause of various types of physical, chemical and biological deterioration of library materials. It weakens the adhesive and makes the book binding loose. It also weakens the sizing elements of paper and causes spreading of ink. Moistened pages of book often stuck together. It also accelerates various types of chemical deterioration as a result of which paper becomes yellow and stained with spots. Moisture also promotes the growth of fungus, which cause damage to paper and book binding materials.

**6.1.4 Dust and Dirt: -** Fine dry particles of any matter present in the air are known as dust. Dust, which is highly dangerous for the library and archival collection, composed of soil, tar, metallic substances, fungus spores and moisture among other things. Since dust is air borne it settles down on any surface of the object. Dust is hygroscopic in nature and when it is mixed with high humidity, it is transformed into dirt and if this dirt sticks to the surface of the books, it becomes difficult to remove. Dust and dirt are sources of both physical and chemical degradation of the library collection. Dust acts as a nucleus around which moisture collects and this moisture provides the necessary humidity for the growth of fungus and for chemical reaction, which lead to the formation of acids. Since dust and dirt are solid particles of varying size and hardness they exert abrasion on the surface of the books.

**6.1.5 Water: -** Water occurs in all the normal state of matter- solid, liquid and gas. It acts as a physical agent of deterioration by causing hygroscopic materials to undergo dimensional changes. Water, which is harmful for the library collection may come from sources like natural calamities, human negligence, from leaking roofs, defective plumbing and through open windows at the time of raining. Excessive water brings about biological attack on paper, which is usually manifested as the growth of fungus or mildew. The effects of water are stained paper, rotted leather, and smeared ink, weaken adhesive, sustained fungi etc. Water also does injury to the steel furniture due to rusting.

## **6.2 Biological Factors:-**

The deterioration caused by biological agents such as micro-organisms, insects and rodents is generally known as bio-deterioration. Almost all book components, be it paper, leather, textiles or straw board used for binding are prone to attacks by these biological agents. The problem of bio-deterioration is a matter of considerable significance of tropical hot and humid climate like India. The climatic condition accelerates the growth and multiplication of living organisms. There is perhaps no library, which has not suffered the ravages of these agents of bio-deterioration. These biological agents can be subdivided into :-

- (i) Micro-organisms- Fungus or moulds, bacteria etc.
- (ii) Insects

(iii) Rodents

### **6.2.1 Micro- organisms**

**A. Fungus-** Fungus are a large heterogenous group of plant organisms. The fungal spores are present in the earth, water and air and remain in a dormant state for long periods. These spores sprout and grow when they have the required moisture and heat. Generally fungi grow in a relative humidity range of 63-100% and temperature range of 15-35°C. In libraries fungal growth is known as mould or mildew and they appear as brown/black vegetative growth on paper, leather and textiles. Fungus consume cellulose and also thrive on nutrients in leather, glues, pastes, binding threads etc. they weaken and stain the paper and can cause discoloration.

**B. Bacteria-** Besides fungus, bacteria also decompose cellulose in paper and binding textiles.

### **6.2.2 Insects:**

Even though there are thousands of insects, only certain insects badly damage the archive-library materials. They are silverfish, cockroaches, booklice, bookworms and termites.

**A. Silverfish –** The main source of these insects are food materials like starch, glue and gelatin which are used in paper as sizing materials. Dust and dirt also attract these insects. They're fond of dark places and are active in nights only. Silverfish do not have wings and are silvery or pearl gray in colour and about 8 to 10 mm. in length. They eat the surface of the paper and also eat gum from postage stamps, envelopes etc. They grow holes in paper, prints, photographs, catalogue cards and cardboard boxes. The dark spaces on the library racks, catalogue cabinets, and drawers are the places for their egg laying.

**B. Cockroaches –** cockroaches are common all over the world which are brown or blackish brown in colour. They eat paper leaves, bookbinding, fabrics and other organic materials. They are frequently found in libraries, archives and museums and are very active during the night. They live in corners which are damp, cleavages in walls and floors, behind and beneath almirhas, shelves and in wooden cupboards. They excrete a dark brown liquid, which leaves stains on the paper and become difficult to remove.

**C. Book worms or Book beetles-** Bookworms affect very much books and manuscripts. As the name itself suggests they feed on paper and damage the paper extensively. In libraries the bookworms lay their eggs on the edges of the books and on the surface of the bookbinding. They make tunnels in the pages and boards of the books.

**D. Book lice: -** Dark dusty areas filled with unused books, dampness and warmth are essential requirements for the growth of booklice. They are gray or white in colour. They injure the bindings of books by eating paste and glue and also eat the fungus formed in between the edges of inner cover of the books.

**E. Termites or White Ants –** In the tropical climate the damages to the library materials due to termites are much. Wet or damp conditions are most suitable places for termites. They eat wood and paper and can attack any type of material containing cellulose. If once they start destroying the books they can do irreparable damage in no time. They leave mud encrustation on the attacked materials. They are of two categories like earth dwelling termites and wood dwelling termites. Earth dwelling termites live in the soil and in the libraries their presence can be noticed by their mud tunnels on the walls, book cases and furniture. Wood dwelling termites live above the ground and enter the building through cracks and openings.

### **6.2.3 Rodents**

Rodents include mice, rats, squirrels and many other species. Mice and rats are mainly found in libraries and they find their way into buildings through dry drains and openings in doors and windows. In libraries they eat and destroy materials made up of paper, cloth, leather, glue, etc. These animals are very swift to move and hide in dark corners.

### **6.3 Chemical Factors:-**

In the manufacturing of paper sometimes fibers are used with low cellulose contents and some chemical compounds like alum, rosin etc. are used for sizing of paper which cause acidic effect and facilitate chemical deterioration of the paper with the passage of time. Besides, in the atmosphere among various constituents unwanted materials such as oxides of carbon, sulphur, nitrogen and hydrogen sulphides are also present. Because of the absorption of the

chemicals by the moisture absorbed by the paper, the library materials get affected. The notable deleterious substances for the library materials are sulphur dioxides, oxides of nitrogen and ozone. Sulphur dioxide is a hazard to cellulose materials like paper and cloth. The most familiar effect in libraries is the brown and brittle edges of books caused by sulphur dioxide. Most of the nitrogen dioxide comes from automobile exhausts & when it combines with oxygen and water turns into nitric acid. This nitric acid has strong acidic effects and attacks the dyes in ink, cloth, paper and leather. Ozone acts as a powerful destroyer of organic materials. It makes the colours of fabric book covers fade and the book binding materials such as leather, gelatin, glue and paste are also susceptible to deterioration by ozone in humid atmosphere.

#### **6.4 Human Factors:-**

Apart from physical and chemical factors, a serious cause of deterioration often is the casual attitude of the library staff as well as the users of the library towards books as physical objects. Librarians in charge of the documentary heritage are directly responsible for the overall conservation and preservation of their collections. But they are not always aware how to handle, store and use collections carefully to minimize damage and help preservation. The standard of care and handling of books by their custodians and users is often pretty low. Improper storage, faulty repairmen, rough handling, deliberate use, folding the fore-edges of pages as a mark of reading, marking by ball pen, mutilation, vandalism are all examples of deterioration of books by human beings.

#### **6.4.1 Disasters:-**

No library is exempted to the devastations that can occur as a result of natural or man made disasters. In libraries, archives and museums there is a likely-hood of fire as the collections are mostly organic in nature. Once fire starts, it is difficult to save those materials which get fire. Items not directly engulfed in flames can be charred by soot and smoke. Heat emitted from fire causes bindings to shrink and warp and plastic base materials to melt. Water used for fighting fire can cause enormous damage. Besides fire, floods, high winds, cyclones, earth quakes are also agents of deterioration for the library collections. These will lead documents to absorb water, swell, warp and become extremely vulnerable to physical damage. Dyes and ink may bleed and book pages stick together. Leather bindings seriously warp and change shape. Effects of disasters on library collections are too obvious to comprehend.(Sahoo)

#### **7.0 Electronic Means of Preservation**

For some decades now, there has been a revolution in information storage media. Data is now stored electronically in digitized formats. Computers are presently very basic to library functions and services. Mostly, they act as gateways in libraries and information can only be accessed, nay retrieved through them. Physical materials are of lesser interest to the end – users in an environment where information is electronically accessible. The problem of storage, and practically that of preservation of information is removed from the point of use (where it has traditionally been located) to the point of supply. The information producer bothers about location of extensive databases for storage and preservation from where users can access whatever they needed. According to Feather (1996), there has been exponential growth in the creation, use and significance of electronic data and there has been great diversification of its sources of origin. Until about 1990, librarians had little need to concern themselves with the preservation of electronic data, they were merely interested in the means of keeping out-put media like audio-CDs and CD – ROM in a usable condition for a reasonable length of time. The concept and development of electronic library has changed this attitude. This is not surprising because, automation brings with it a lot of dynamism and we must try to keep pace with the changes. In situations where the preservation responsibilities rest absolutely on the information producer, the librarian or information provider, who is the interface between the producer and the end – user, need only to contend with making his output media survive in usable condition for at least the period when updated versions of the output would be produced. Then, the librarian subscribes to the latest versions of the out- put media. The problem of long-term survival stays with the data producer, of course, this can only be appropriate in a network environment. Digitization as a tool for the preservation of information originally created in conventional formats, especially newspapers, has been canvassed widely in recent years Feather (1996). Conversion to a digital format gives the user a whole range of new search tools, since what is created is a file that is flexible and can be manipulated just like any other electronic data file. Digitization is an expensive option for preservation though legitimately viable.

#### **8.0 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 .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'.

### **9.0 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 machine-readable 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.

### **10.0 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 .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. (Kademani)

**11.0 Challenges of Digital Material Preservation:** Challenges of preserving or archiving digital information are not new, and have been explored at many force over the last five decades. Several scholars and institutions, respectively, such as Garret and Walter (1996), Lin, Ramah and Wal (2003), Caplan (2004), Wamukoga and Mutual (2005) and the national library of Ausralia (2003), have cited the following challenges to the preservation of digital materials:

- ❖ Technological obsolescence;

- ❖ Continuous migration;
- ❖ Lack of legislation, policy and strategy
- ❖ Lack of awareness
- ❖ Lack of collaboration and partnership;
- ❖ Deterioration of the digital media
- ❖ Disaster planning and recovery

Each of these challenges faced in preserving digital materials are briefly discussed below:

### **11.1 Technological Obsolescence**

Markets are full of a variety of digital formats that continually change from time to time with some formats getting obsolete. Format obsolescence is complemented by rapid hardware and software obsolescence, which is a significant threat to digital preservation, as it causes the loss of the means of access. This comes as a result of the continuous upgrade of operating systems, programming languages, applications and storage media. Such loss of access makes preservation of digital materials meaningless since the main purpose of preserving digital materials is to maintain accessibility.

### **11.2 Continuous Migration**

Another challenge of digital preservation, which arises from the challenge of rapid technological obsolescence, is the need for continuous migration. Migration is a means of overcoming technological obsolescence by transferring digital resources from one hardware/ software generation to the next. The purpose of migration is to preserve the intellectual content of digital objects and to retain the ability for clients to retrieve, display, and otherwise use them in the face of constantly changing technology.

**11.3 Lack of Legislation, Policy and Strategy:** According to National library of Australia (2003), lack of supportive legislation is a major challenge of preservation of digital materials. Besides, since legislators are usually neither aware nor conversant with the requirements of digital preservation, they make legislations that either ignore or inadequately cover digital preservation issues, further, internet links bring additional challenge in terms of copyright legislation in that the copyright of software required to access digital files, and the right to copy for preservation has not been adequately articulated in most national legislations. For instance, the current practice is that due to copyright requirements, a subscriber to an internet-based information service requires to continuously renew the access license, even for materials long paid for, in order to continue accessing the same information. An additional challenge is that digital evolution has been too rapid and costly for governments and institutions to develop timely and informed preservation strategies.

**11.4 Lack of Awareness about Digital Material Preservation:** The UNESCO draft charter on the preservation of digital heritage stresses the need for urgent awareness raising and advocacy in favors of preservation of digital materials. It proposes for the alerting of policy makers and sensitizing the public to both the potential of the digital media and the practicalities of digital preservation.

**11.5 Lack of Collaboration and Partnership:** Another major challenge of digital preservation is lack of collaboration and partnership among stakeholders, as well as “Lack of clearly assigned responsibilities and resources for the long term preservation” of digital. Such absence of collaboration and partnership exists among governments, creators, publishers, relevant industries and heritage institutions. There is also need for partnerships between archivists, information technology personnel, systems analysts, records managers and other information management staff to come up with holistic strategies on how to deal with digital preservation issues.

### **11.6 Deterioration of the Digital Media**

One of the challenges of digital preservation is the deterioration of the digital media. This is becoming a cause for the disappearance or inaccessibility of digital information as the media usually deteriorate within a few years or decades at most. Another challenge to digital preservation is the possibility of digital media getting lost in the event of disasters such as fire, flood, equipment failure, or virus attack.

### **11.7 Disaster Planning and Recovery**



The other challenge relates to lack of disaster planning and mitigation strategies for digital materials at institutional, as well as national levels. The effect of the absence of disaster planning and mitigatory measures results in unnecessary and sometimes, permanent loss of valuable information resources. Strategies for Digital Materials Preservation Russell, (1999) have identified some of the strategies or methods that could be adopted to help preserve digital materials. These strategies are briefly presented below.

## **12.0 strategies**

### **12.1 Reliance on Hard Copy Media**

This strategy also known as “change media” involves printing out digital materials and preserving the hard copy.

### **12.2 Technology Preservation**

This involves preserving the technology that was used to create the digital material, including hardware and software. This strategy ensures access to the digital material.

### **12.3 Technology Emulation**

This involves using the existing technology that is able to mimic the old technology, thereby creating the original technical environment for the preserved item to be read or viewed.

### **12.4 Migration**

Whereas technological preservation and technology emulation focus on the environment of the object and preserving the resource through re-creating or preserving necessary operating environment a different strategy for digital preservation is what has been called “migration”. Migration is a means of overcoming technological obsolescence by transferring digital resources from one hardware/software generation to the next.

### **12.5 Encapsulation**

The other preservation strategy is encapsulation which involves the grouping together of resources and whatever is necessary to maintain access to it. This can include metadata, software viewers, and discrete files forming the digital resource. He further says that in contrast to the migration approach, the encapsulation approach retains the record in its original form, but encapsulates it with a set of instruction on how the original should be interpreted. Encapsulation is considered a key element of emulation. (Iyishu)

## **13.0 Conclusion**

Materials are the heart of libraries. They are vital access to learning and information, and in the future sustain knowledge and allow interpretation of the past. Every library, large or small should have a well defined programme for preserving the materials which it houses. In planning for preventive preservation, users and staff should be aware of their roles in the preservation programme. S.R. Ranganathan in one of his five law of library science postulates that, “books are for use”. If the materials are not well kept, they cannot provide that function because the most effective way to establish longevity of books/ materials is to prevent or retard deterioration. It is no gainsaying that information is as old as the age of humanity, hence it is highly vital that information sources should be adequately preserved and conserved for all spheres of human development- intellectual, political, social, cultural development, etc, and for posterity. Having seen preservation and conservation in a pervasive sense and having observed the need for policies to be designed in order to maintain a reasonable level of standardization that will compare with what is obtainable universally, it is imperative to mention that in preserving media materials/ records, it is important to keep them under conducive conditions devoid of dust. It should be ensured that they are properly cleaned and taken care of. Dust can inflict a lot of damages on any media. Elaturoti (1982) stated that media materials should be prevented from water which can soak books and other printed materials. It can also cause audio-visual equipment to corrode. Insecticides should be used with caution as they can cause damage to non-book materials. Due to limited resources and the state of preservation in most libraries, it is impossible to keep all documents or recorded materials in their original format or even transfer the intellectual contents to other media for conservation. Selection and priorities are vital. Cooperation is the key to successful preservation initiatives. No one library can preserve everything. Through cooperation, mass treatment techniques such as de-acidification of books and papers are being developed. Cooperative programmers to preserve valid collection on microfilm have been successful in North America and

Europe. Today, countries are working together to preserve documentary heritage through such efforts as the European Register of Microfilm Masters (EROMM) and increased bibliographic control assisted by internet. Indeed, optical digital technologies, preserving and transmitting information electronically offer both solution and real challenges for the preservation of documentary heritage . Finally, libraries should not only strive to acquire materials but should ensure that the materials acquired are preserved and conserved in a usable condition for generations of users. Libraries should be air-conditioned as its importance to library materials cannot be over-emphasized. Though damage to library materials is sometimes unavoidable, but with careful preventive measures, deterioration of the materials may be lessened or prevented as the old adage says “prevention is better than cure”.

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