International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Impact Factor (2012): 3.358

Museum as a Savior of Cultural Heritage: Special Perspective on Deterioration and Conservation of Objects

Garima Bharti

Research Scholar, Department of Ancient Indian History and Archaeology, University of Lucknow, Lucknow, India

Abstract: ***Our incredible India is amalgamated with lots of Archaeological, Historical and Cultural heritages. It is our legacy from the past, what we live with today, and what we pass on to future generation. That makes the world heritage exceptional in its universal applications. Among all of them, which our ancestor left behind, nothing is more evocative and auspicious than their signature as a form of architecture, sculpture, coins, epigraphs, paleograph, treasure, artifacts. Which introduced the story of past. However, flourishment of our past is depend upon this thing that how do we conserve the artifacts of our nostalgia because these opulent heritages are the mirror of our precious history.***

Keywords: Deterioration of museum objects, scientific conservation of museum objects.

1. Introduction

Every culture represents a unique and irreplaceable body of value as tradition and form of expression are its most effective means of demonstrating its presence into the world and museum is an institution for the preservation of those object which best illustrate the phenomena of nature and the work of man for the utilization of these in the increase of knowledge and for the culture and enlightenment of the people.

The source of culture property is varied. The object may come in the museums through exploration, excavation, treasure trove findings, through purchase, gifts, transfer, loan etc. but most important thing who will do care of it. Because when they brought to museum, they are very fragile and brittle, so in this way museum takes preventive action to cure and conserve it.

It will not wrong and exaggerated if we say that museums are the savior of cultural heritage because the existence of any cultural object is depends upon how we conserve that object and museum played a very vital role in it. For better conservation of the cultural property, a systematic strategy is to be adopted by museum. Therefore, I would like to describe some important measure, which are using by museum to conserve cultural objects. There are several steps for the conservation measures point of view like:-

1. Know the collection
2. Categories and identify the aggressors
3. Avoid the aggressors
4. Block the aggressors
5. Check or monitor the aggressors
6. React against the aggressors
7. Communicate

Depending upon the type of treatment to be given to the objects they can be classified as follows:

1. Metals
2. Organic Objects
3. In-Organic Objects
4. Paintings

1. Metal

Metals and alloys from major portion of museum collection. They seem to be stronger but not durable. They are mostly archaeological collection, are exposed to air from ground, and are found to be corroded mostly. In the ancient times object made out of gold, silver, copper, lead, iron etc. the corrosion products either should be removed or stabilized to extend the life expectancy of the objects as well as to provide maximum message from the object.

2. Organic Objects

Material derived from living organism such as plants, animal etc, are called organic objects. Textiles, ropes, paper, palm, leaves, wooden objects, leather, feather, bone, ivory etc, are some of the example. Organic object are the weakest among all of museum objects.

3. In – Organic Objects

The objects which are not organic are called in-organic objects. Mostly they are earthen matters. They include stone objects, terracotta objects, glass beads, stone implements, etc. they are composite in nature and are durable when compared to the other types of objects. Due to the long burial in the earth most of them weathered, absorbed salts, crumbled, and many have survived the ages.

4. Paintings

Paintings are complex in nature. There are different types of paintings they are : cave paintings, wall paintings, oil paintings, miniatures etc. whatever may be medium, type and variety, the paintings are multi layered and therefore, they require special study.

But to save these cultural objects it is important to conserve these objects form deterioration process. There are lots of deterioration causes which are atmospheric, light heat, air pollution sound and vibration, bio deterioration and many others.

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2. Main Factors of Deterioration

2.1 Atmospheric Factors Affecting Museum Objects

Atmosphere plays a very impotent role in deterioration of museum objects. Atmosphere consists of light, heat, polluting, oxides of sulphur, nitrogen and carbon, ozone, etc.

2.1.1 Lights

Light is a form of energy which can change color and bring about deterioration on the surface of delicate objects such as paintings, drawing, textile, and other organic abject. Light bring down the strength of the objects. The light can divide into three divisions. They are ultra violet radiation (300-400 nm), visible radiation (400-700m) and infra red radiation (700nm and above). The light of wavelength up to (500nm) brings about degradation on material by photochemical reaction.

2.1.2 Heat

Heat is one of the factors, which affects the museum objects. Low temperature avoids the biological growth on museum objects. High temperature makes the objects to disfigure and increase the speed of chemical reaction. Textile paper, wood etc, very easily get charred due to high temperature. The ideal condition of temperature will be 20 to 22 degree c.

2.1.3 Humidity

Humidity is nothing but the moisture present in air. This is measured in terms of relative humidity (RH). The high relative humidity will make the organic objects to swell there by encouraging biological activity and inorganic object to absorb moisture into the pored present in the body along with salts and harmful salts. When the relative humidity is low, organic objects lose water and get shrunk. In the case of inorganic material, the absorbed salt get crystallized scaling takes place. In general for any type of museum objects the RH should be in between 45% to 60%.

2.1.4 Air Pollution

The pollution due to the pollutant present in the air is called air pollution. The various pollutants, which are dangerous for the museum and archaeological objects, are oxides of carbon, sulpur, nitrogen, ozone, salt spray and various organic gases, which affect the objects at large. The salt sprays are absorbed by the stones, which result in the breaking of the surface layer.

2.1.5 Sound and Vibration

In the case of very weak archaeological objects such as unbaked terracotta objects, highly mineralized metallic objects crumble due to the vibration, sound and vehicular traffic.

2.2 Bio Deterioration

The deterioration is brought out by biological agents such as fungi, moss, dry rot, liverworts, lichen, plants, bushes(botanical), insects, rodents, birds animals almost all types of museum objects and archaeological objects are affected by these agencies. Stains, discoloration, disfigurement, pitting, tunneling, fertilization, powder formation, development of odor, changes in the physical properties are some of the symptoms, which will be seen on the objects when they are affected by the organisms. General treatments for museum object to control deterioration by museum:-

2.3 Control Measures for Bio- Deterioration

All organic objects when brought to the museum should be fumigated in a fumigation chamber. Thymol, Par Dichlorobenzene, Carbon Di Sulphide, Carbon Tetra Choride, Methyl Bromide, Ethyl Bromide, Ethnocide are some of the common fumigants used.

2.3.1 General Treatments for Insects

There are two main methods of treatment for the insects in the museum they are

1. Fumigation with fumigants or insect repellents and
2. Dusting, spraying or fogging of the insecticides.

2.4 Fumigation

Fumigation is nothing but keeping the insect infested objects in an airtight chamber where volatile chemical like thymol, Para dichlorobenzene, carbon disulphide, methyl bromide, ethyl bromide, carbon tetrachloride or naphthalene is kept. In case the archival materials and textile, paper, insects etc affect leather, should be fumigated before the monsoon starts.

2.4.1 Application of Chemicals:-

When the application of insecticides either by spraying, dusting or brushing, care should be taken to avoid the health hazards.5%solution of DDT,BHS, 0.01% solution of paranitrophenol, mercuric chloride etc, is suitable for the eradication of insects.

2.4.2 General Treatment For Cryptogrammic Plants

Bacteria, fungi, algae, lichen, liverworts and mosses constitute the cryptogrammic plants, which affect museum materials. Among these only fungi generally pose very high threat to museum objects. Organic object like wood, paper, textile, leather pertinacious materials, paintings are damaged on account of mould growth. Since moisture is the very important requirement for the growth of bacteria and fungi , humidity control is the best preventive measure. Air conditioning will serve this purpose but it will be out the reach of most of the museum. Even if the air conditioning is done it should be throughout day and night.

2.4.3 Insect Trapping In Museum

Insects trapping are getting importance in the pest control in museum. Insect traps in general consist of the two components an attractant and the killing or retention part. There are various system available and all system cannot be used in the museum. The best system is sticky type of insect traps. There are two simple traps. One is the window type and the other is prism type. In both the system, the insects attracted to the traps are stuck to the sticky surface. Knowing t he type of the insect suitable insecticide or insect repellents or fumigants can be used.

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2.4.4 Non – Toxic Pest Control in Museum

The toxic of the chemicals used in the eradication of insects affects the persons who handle them and the visitor to the museum. Therefore, in the recent days non toxic methods of pest control have find place in the museums. Loe nitrogen atmosphere is created to the objects, which kills the insect and saves the objects of organic nature. Integrated pest control is very important in museums.

2.4.5 Freeze Drying

Freeze-drying is a very good method of treating the organic objects to save them from the biological agents. The organic objects are covered with polythene cover and deep-frozen at a temperature of about of organic nature. In the European countries this method is in vogue. The objects when treated in this way keep of the spores also from the objects. Once a year the objects can go for deep freezing.

2.5 Examination of Objects

In order to decide on the strategy of conservation, the objects, which are affected, should be examined visually, instrumentally and chemically. Using a magnifier the condition of the objects should be studied. The surface should be watched for the presence of deposit the alteration products may be studied by chemical analysis. If necessary instrumental analyses like x-ray diffraction and XRF studies may also be done. After finding out the nature of defeats, the type of conservation can be affected.

2.5.1 Metals

Conservation of excavated or once conserved object may be considered as one of the most important off shoots of archaeological chemistry. Metallic antiquities constitute a heterogeneous though well-defined group of materials; almost all is prone to corrosion of one type or the other. Unless one knows about the corrosion, principle it is not possible to control the conservator or the conservation chemist.

2.5.2 Gold Objects

Gold is a Nobel metal. If gold is pure, it does not corrode even if gold objects are found buried under the earth for a long time. Red gold (gold and copper), white gold (gold and silver) and electrum (silver and gold) are some of the important alloys of gold. When such alloyed objects are exposed to the corrosive atmosphere the base metals corrode first.

Gold objects, which are in contact with copper appears greenish blue because of the corrosion products of copper present in it. Gold objects, which are buried in the lime deposits, are found to be covered with calcareous materials. Such objects are immersed in a 1% solution of nitric acid, which removes the calcareous materials.

2.5.3 Silver Objects

Silver is a noble metal. It corrodes when it is buried or exposed to an unfavorable environment. Silver objects get tarnished in an environment of hydrogen Sulphide. Sometimes lavender colored deposits are formed in a chloride atmosphere. Silver objects are treated with a 10% solution of formic acid to remove the black deposits and then in dilute ammonia solution to remove the white deposits. Then the silver objects are washed well in distilled water and dried.

2.5.4 Lead Objects

Lead objects very easily corrode forming a thin film of lead oxide, which is a protective coating. In a very bad environment lead objects bulge out to form the lead carbonate. They are very fragile and care should be taken to clean them. Lead objects are treated with 5% solution of acetic acid and washed well to remove all the acid. Contrarily lead objects may be cleaned with the help of amberlite IR120, an ion exchange resin to clean the corrosion products without any damage to the objects.

2.5.5 Iron Objects

Iron object corrode easily, giving rise to unsightly rust that cause swelling and deformation of the decaying objects. Many iron objects buried under the ground are heavily mineralized leaving behind only a thin core of iron. Chlorides are very dangerous for the iron objects and therefore the chloride corrosion product should be removed completely.






3. General Principle of Conservation of Metallic Object

The corrosion products of the metallic objects can be removed in the following ways:

- **Removal of the corrosion products both physically and chemically**
- **Using electrolytic and electrochemical means**
- **Stabilization of the corrosion products**
- **Removal of corrosion products**
- **Physical method**

The corroded objects may be cleaned using tools, vibro-tools, ultra sonic cleaner and other methods like laser beam. This is a harmless method, as we do not include any chemical in to the metallic objects.

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3.1 Chemical Method

The corrosion products of the metallic object can be removed by dissolving them by some of the chemical solutions.

3.2 Stabilization Of Corrosion Products

The corrosion products of the metals can be stabilized with help of some chemicals. This procedure will not allow the corrosion process to proceed forward. By this, the bronze diseased object can be stabilized with the help of 2% of benzotriazole sprit.

3.3 Intensive Washing

Washing is a very important aspect in the conservation of metallic object. The metallic objects are immersed in distilled water and heated slowly and cooled. This process is repeated till all the chlorides are removed from the metallic objects.

4. Stone Objects

Rocks and minerals are in abundant and consist of silicate units. The main silicates are of sodium, calcium, magnesium and aluminum. There are various rocks in the earth's crust. Based on the formation of rock, they are classified as follows:

- **Igneous rocks**
- **Sedimentary rocks**
- **Metamorphic rock**

a) Igneous Rocks

Those rocks, which are formed by the cooling of the volcanic lava, are called igneous rocks. Granite, basalt are some of the example.

b) Sedimentary Rocks

Sedimentary rocks are those, which were formed by the gradual sedimentation of layers of sand and other inert materials brought by rivers and streams and deposited at the beds of lakes and bonds. Sandstone, limestone, shale are some of the example.

c) Metamorphic Rocks

Metamorphic rocks are those rocks by the metamorphosis of either the igneous or sedimentary rocks due to pressure or heat or some other geological change. Marble, schist, gneiss, quartz, slate are some of the example of the metamorphic rocks. Based on the chemical properties they can be classified as follows:

- **Siliceous rocks**
- **Argillaceous rocks**
- **Calcareous rocks**

Siliceous Rocks

Rocks, which contain maximum amount of silica, are called siliceous rocks. E.g. granite, quartzite

Argillaceous Rocks

Rocks, which contain argil or clay predominantly, are called argillaceous rock. E.g. late rites, Slates

Calcareous Rocks

Those rocks, which contain calcium carbonate predominantly, are called calcareous rocks. E.g. limestone, marble

4.1 Deterioration Of Stone Objects

Stone objects deteriorate continuously as a result of physical, chemical and biological processes. The durability of stones is mainly dependent on its internal structure and petro graphic composition and also to the environment to which they are exposed. The various types of deterioration are:

- **Decay due to quarrying: -** the decay in the stone objects can be due to the method of quarrying or dressing. The micro cracks developed will further deteriorate the stone objects.
- **Decay due to dampness**: - dampness is one of the agents of the decay in stones. The moisture absorbed will help the stone to take in the salts, which result in surface damage of the stone objects.
- **Decay due to soluble salts: -** the salt absorption by the stone objects creates crumbling of the objects due to the crystallization internally.
- **Decay due to temperature changes: -** rapid changes of heat due to sun and the sudden rain cause strain between the outer and inner portion of the rocks or stones, which result in breaking of the specimens.
- **Decay due to atmospheric pollution: -** atmosphere consists of pollutants such as carbon di oxide, nitrogen oxides, hydrogen chloride, hydrogen fluoride, hydrogen sulphide, aerosol, suspended particulate matter etc, which get dissolved in the moisture and are absorbed by stone objects once again resulting in the crystallization thereby in the surface crumbling.
- **Decay due to growth of moss and lichen**
- The decay due to moss and lichen etc is caused only in the case of stone objects exposed to rain. Acids generated by moss and lichens not only damage carbonaceous stones but will also attack silica and cause damage on the surface.
- **Decay due to growth of vegetation:-**the growth of vegetation causes only in the case of structures and exposed stone monuments. The vegetation growth withdraw water and retains the moisture inside the structure there by damage is created to the monuments.

4.2 Conservation of Stone Objects:-

Most of the deterioration on stone objects is due to water. This is aggravated due to the presence of dirt, salt etc. the unwanted damaging accretions should be removed and the surface should be protected from the entry of moisture into the stone objects.

a) Removal of dirt

Stone objects such as sculpture often accumulate dust, dirt; stain, grease, smoke, soot etc. are removed by the application of 1%solution of detergent solution followed by brushing and washing.

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b) Removal of soluble salt

The absorbed salt into the stone objects should be removed out of object. Soluble salt from the small stone object gets removed by immersing the objects in salt free water. A poultice like paper pulp, sepiolite can be remove the absorbed salt by applying it over the objects continuously.

c) Removal of biological accretions

Deposits of moss or lichen or algae not only make the stone surface to appear black but also produce pits in the surface of the stone objects, there by weakening the structure. Now days in the European countries the back deposits are removed by laser beam. Sand blasting is also done in Indian context but this removes the surface also.

d) Consolidation of stone objects

Whatever may the chemical treatment applied to remove the accretions and salts from the stone objects, the surface should be washed very well with distilled or deionised water. The surface should be protected with a 2% solution of poly vinyl acetone twice in two different directions. Consolidation of weak stone objects can be done with the help of acrylic resin like perspex, polyester, epoxy resins like poly vinyl acetate, poly vinyl chloride, araldite. They are some of the consolidations which are in use.

e) Restoration of stone objects

Restoration is often necessary for reason of safety of the stone object and is carried out using modern material in a manner sympathetic to the existing structure, but not necessarily identical with it.







5. Ceramics

Ceramics is the general term for an object made out of clay and burnt like pottery, porcelain and earthenware. They mainly consist of alumina and silica.

5.1 Deterioration of Ceramics

Most of the ceramic objects are excavated and are saturated with the salt of the soil, if they are unglazed and broken. Rough and unfired clay object as well as weathered objects easily get accumulated with dust and are difficult to remove the dust. They are vulnerable to abrasion and scratches.

5.2 Conservation Methods

Salt affect baked objects may be cleaned with salt free water. If they are very fragile they should be consolidated with the help of consolidation. For salt removal the methods that are used in the case of stone may also be used.

5.3 Mending of Ceramics

The broken ceramic pieces should be numbered and joined together. The broken edges should be cleaned with a soft brush and then with rectified sprit. The acrylic resin should be applied at the broken edge and joined. The joints should be filled with filler like acrylic resin and matched with acrylic colors.



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6. Glass and Glazes

Glass is super cooled liquid. Heating silica, soda and lime makes glass. Depending upon the constituents of the glass, they are differently called. Porous ceramics were glazes for providing smoothness to the objects. Depending upon the use of different colored chemical the glasses took different colors.

6.1 Deterioration in Glass

Dry climate is good for preservation of glass. Glass may lose its transparency and become cloudy or crizled, which is commonly called as glass diseases. Glass is affected by alkaline water on the glass. If the glass is not cleaned, the glass completely gets damaged.

6.2 Conservation of Glass

Avoiding contact of water with glass objects can stop the deterioration of glass. The soluble alkali salts are washed with water, dried with rectified, acetone or ether and stored in low humidity cases keeping silica gel.

7. Ethnographical Material

Ethnographical material are nothing but the material used by the mankind. Ethnographic objects include organic material like leather, textile, bark, wood, bamboo material, leaves, inorganic material like potteries, weapons, stone objects, beads, clay objects etc.

7.1 Decay of Ethnographic Material

Ethnographic materials are mostly organic in nature. They are affected mostly by climatic variations. They are fragile

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and mostly colored. They are affected by heat, moisture, light etc. the textile and the colored material fade and disintegrate. Objects undergo damage due to the biological action. The acids produced by the mould permanently disfigure the objects. Musical instruments, which are mostly organic in nature, are very badly affected during the rainy season.

7.2 Conservation Measures

Air-conditioning the gallery and the storage will protect the ethnographic objects. It is better to keep the light with low intensity, say about 50 lux. The temperature also can be maintained at 20 to 22 degree c. moisture should be avoided on any account. If the moisture is controlled we can avoid most of the drawbacks. The storage may be fumigated with thymol and par dichlorobenzene to avoid mould growth. Insecticides can be applied in the floor area to control the insects.

8. Wooden Objects

Wood is derived from trees. Wood contains two portions heartwood and sapwood. The heartwood is durable and contains some chemical, which avoid insects. The sapwood is very soft and vulnerable to the insect attack. In the museum wooden objects are in plenty. They include wood carving, drums, structures, implements, and household articles, folk and tribal objects.

8.1 Deterioration of Wooden Objects

As wooden objects are organic in nature, they deteriorate due to the environment condition both biologically and mechanically. Heat changes make the wood to warp or bend. Termite attack is very dangerous if not inspected often Soot. Dirt, oil accretions affect the wood carving very much.

8.2 Conservation Measures

Wooden objects should be segregated from the earth and wall if they are positioned so. Variation in the climatic condition should be avoided. Regular dusting should be done to avoid the dust becoming dirt. The wooden objects will not absorb moisture if coated with water repellent like poly vinyl acetate. Large number of objects can go for freeze drying to avoid the biological damage in the objects. Galleries, which are displayed with woodcarving, should be vacuum cleaner. The storage area should be treated for the insects and fungi.



9. Paper Based Objects

Paper is a word derived from the word papyrus. The major constituent of paper is cellulose. Paper is made out of rags, wood, plant fibers etc. paper is made for writing or drawing purposes by the application of sizing materials, which are proteinaceous in nature.

9.1 Deterioration of Paper

There are two factors acting for the deterioration of paper. They are the internal factors such as acidity, contents of paper etc. the other is the environment factors such as moisture, suspended particulate matter, oxides of carbon, sulpher and nitrogen, bio- deterioration mishandling etc.

9.2 Conservation Measures

Acidity in paper gained by the presence of moisture. This makes the paper brown and brittle in nature. Acidity can be removed but we cannot bring back the strength of the paper by the removal of acidity. Acidity in paper can be removed by keeping the paper in a chamber where ammonia vapor is present. On the contrary, acidity affected paper can be wet deacidified help of calcium bicarbonate solution. Some paper, which is very badly affected by acidity, can be bleached with the help of chloramines T in rectified spirit.

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10. Palm Leaf Manuscript

Palm tree grow more in the tropical countries and they were used for record purpose in the ancient times. Different types of leaves were in use for writing purpose in our country also. Tender palm leaves were cut, dried shade boiled with turmeric solution and cut to size and were used to write records. Palm leaves mainly consist of cellulose material.

10.1 Deterioration of palm leaf manuscripts

Since palm leaf manuscripts are organic in nature, they are to biological deterioration. Humidity, heats, insects, micro organism etc. affect this type of museum object. Acidity also affects them. Fungi, woodborer beetles affect seriously the palm leaf manuscripts.

10.2 Conservation Measures

Sometimes the palm leaf manuscripts are affected by insects and are stuck together. It will be very difficult to separate the leaves. When the affected palm leaves are boiled in steam bath the leaves get separated. Leaves are cleaned, dried and bundle together so that they will be plain. Normally the palm leaf manuscripts used to be covered with soot and dirt. The accretion should be cleaned with the help of rectified spirit. In order to make the incised matter legible citronella oil mixed with rectified sprit. In order to make the incised matter legible citronella oil mixed with rectified sprit and lampblack may be coated. This restores the flexibility to the palm leaves and the incised portions look legible. The bundles are protected by two teakwood planks and are arranged in the incised portion look legible. The bundles are protected by two teak wood planks and are arranged in the racks. It is always better to control the environment. Regular fumigation with thymol and par dichlorobenzene is carried out to avoid the bio deterioration of the palm leaves.





11. Textiles

Cloth is made out of natural and manmade fibers. Fibers form plants; animals, insects and synthetic material are some of the example. After dyes were invented the cloth was dyed. Thus manufactured textile is found large in number in museums.

11.1 Deterioration of Textiles

Textiles are mostly organic in nature. They get affected in excess moisture and heat. Biological agent affects much the textiles. Termites eat AWAY TEXTILE WHEN SUITABLE environment exists. Wool moth attacks woolen materials. Acidity affects the textiles very much. In certain cases the dye itself eats away the textile.

11.2 Conservation Measures

Highly acidic textile can be de-acidified by fumigating with ammonia. In case the stain is found along with acidity, the textile pieces is kept in between two chiffon cloths, rested over a glass plate and washed in salt free water 1 solution of labolene is applied and brushed. Then the textile is washed well in running water. This can be done only in the case of textiles with fast colored dyes. Providing a support to the textile may strengthen weak textiles. Darning can also do the strengthening. In case there is loss of textile similar cloth may be used to fix those affected spots with the help of 5%

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solution of poly vinyl acetate. It is advisable to maintain 45-60% RH and 20-22degree C throughout the day.





12. Leather Objects

Leather is defatted made non putrient and impervious to water. Skin is a net work of protein fibers chiefly collagen. Tanning is a method of processing skin to produce leather.

12.1 Deterioration of Leather

Leather is an organic material. High humidity low humidity and temperature affect very much leather objects. High humidity encourages growth another biological activities. low humidity dehydrated the leather objects there by leather gets hardened. Dust and pollutants make leather to receive acidity there by objects become brittle.

12.2 Conservation Measure

The environment should be controlled where the leather objects are displayed or stored. Leather objects should be fumigated with thymol or Para dichlorobenzene to avoid the biological activities in the objects. Hardened objects may be made flexible by the application of 2% castor oil in rectified sprit. Fungal affected leather objects are fumigated and cleaned with a vacuum cleaner and treated with 0.1-Para nitro phenol in rectified spirit. Light intensity should be low in the gallery. In the storage the leather objects should be kept covered to avoid dust.





13. Feather Objects

Feather is a part of bird and consists of protein. it is similar to hair but with a different molecular structure. Feather are not flexible like hair but will break if folded.

13.1 Deterioration of Feather

Feather is inherently quite stable, but gradually they become brittle over a period of years. They become brittle below 40% RH and mould develops when the RH is over 65%. Feather tarp dust and the dirt soils the appearance also provides an additional food source for insects and moulds. Insects attack feather at larval stage.

13.2 Conservation Measure

The dirt may be removed by brushing with soft brush using rectified sprit. They can be fumigated by with Para dichlorobenzene before they are added to the collection. Open storage should be avoided. Light up to 100 lux only should be allowed. Control of climate is essential for the protection of feather objects.



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14. Bone and Ivory Objects

Bone and ivory have the cellular structure. Ivory has a hard and dense tissue known as dentine, which results in striation, which may be seen radiating from the centre of the tusk. Bone and ivory are anisotropic having directional properties and for this reason they are easily warped upon exposure to heat and damp. They are decomposed by the prolonged action of water due to the hydrolysis of Ossian. Acids also disintegrate them. Being porous they easily go stained. They lose their natural color due to the long exposure to light.

14.1 Conservation of Bone and Ivory Objects

Accumulated dirt, oil and grease can be removed by brushing with 1% solution of labolene in rectified sprit. The washing are removed by blotting paper. The absorbed soluble salts may be removed by immersing the objects in distilled water for about 5 second and repeated a number of times with fresh distilled water. Then the objects are washed in 95% rectified spirit twice and dried in air. Weak objects may be strengthened by 2 % poly vinyl acetate in acetone. If the object is very fragile, it may be vaccum impregnated in 5% solution of poly vinyl acetate in acetone. In the case of restoration nitro cellulose adhesives may be used.





15. Lacquer Ware

Lacquering is a very good technique of finishing an art object. There are two types of laces. The resin after processing results in the lace of commerce i.e. shellac

15.1 Deterioration in Lacqureware

Moisture affects lacquer ware. The objects on contact with water become chalky or white or opaque. Very low humidity makes the lacqureware brittle and the lacquered portions may be chipped off. They are easily abraded.

15.2 Conservation Measure

Lacqureware should not be cleaned with cleaned with water or an aqueous solution as they become opaque or white with water. As they are fragile, shocks and abrasion should be avoided. Soft brushes should be used for cleaning. They should be wrapped in soft tissue paper and kept in padded boxes or shelves.

16. Paintings

Type of paintings

There are many type of paintings preserved in museums and galleries. Whatever may be the type of painting their structure is more or less similar. They have multi layered structure. They are the support, the ground, the pigment and the protective layer like varnish. Wall painting, canvas paintings, panel painting, painting on glass, ivory, cardboard, mica etc. are some to name.

16.1 Wall Paintings

The paintings executed on wall are called wall paintings or mural paintings (Muir =wall). If the painting is executed on wet wall it is called true (fresco, buono) painting. If it is executed on a dry wall it is termed as (fresco secco) painting. Flaking of paint layer, lifting up of the paint layer in the form of cups, blistering, cohesion, scroll formation, fading of the paint layer, abrasion, physical damage by mishandling and vandalism are the deterioration to the wall paintings. Dust, soot, moisture, heat, vibration, pollutants, cracks in the structure, salt action, biological agents, seepage and leakage of water are the various causes for the deterioration of wall paintings.

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16.1.1 Conservation of Wall Paintings

The accumulated dust may be gently brushed off. The cracks may be set right. Leakage and seepages may be provided in the monument or galleries to avoid people going near the painting and touching them.

16.2Paintings on Canvas

Cotton canvas or lichen canvas had been used as the supported for the canvas painting. The primed canvas is used for painting the subject on it. The pigment is in oil medium. After dying, the pigments are covered with varnish. The deterioration of painting may occur either in the canvas, ground, pigments or varnish layer. Canvas may be affected by acidity and get brown color and become dry and brittle. There may be separation between the support and the ground or ground and pigments. There may be tear of canvas, cracking of painted surface, loss of pigments etc. If the canvas is bad the painting may be relined with fresh canvas of comparable thickness using reversible adhesives like paraloid B72, WAX AND RESIN MIXTURE. THE LOSS OF PIGMENTS MAY BE REPLACED BY INPAINTING with acrylic colors. Dust, moisture, light etc, affect the painting. Therefore it is better to air condition the gallery or storage.

16.3 Glass Paintings

In this type painting only support and the ground is only glass. The painting is done in the reverse manner. After paining is done the painted surface is covered with a paint to avoid the scratching. The painting is mounted with the unpainted side foremost so that the painting is seen through the glass.

16.3.1 Conservation Measure

When the glass is broken, two supports both in the front and back are to be provided. The broken pieces are aligned together and pasted with a 5% solution of polyvinyl acetate. The retouching of the flecked off portion may be with tempera colors. The loose paper may be pasted with paraloid B72.

16.4 Panel Paintings

Panel painting have wooden support. Panel paintings have jack tree planks pasted with cloth and primed with sukkan paste.
Since this type of paintings is composite in nature, the problems are also multiple. The wooden joints get loosened, cohesion between the layer the added material get lost. Stain formation due to leakage, fading of paints etc.

16.5 Drawing , Prints and Painting On Paper

The drawing on paper, paper prints and the paintings on paper pose a lot of problems. Here paper is supported. In the case of paintings ground is also applied. Since paper is organic in nature, moisture and biological agents easily affect these types of art works. Acidity affects the paper and become brittle. They are easily mishandled. Acidity affect art work may be dry fumigated with ammonia. They may be fumigated regularly for the eradication of micro organism. The gallery to the storage may be environmentally controlled. Light density should be within 50 lux.







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17. Photographs

Photographs are also image on pear. The image is nothing but chemicals like silver halides. The negative are found on glass or celluloid, or cellulose nitrate or cellulose acetate or even polyester film.

Photographs is a very complex material , having several components like support, binding medium and photosensitive image forming chemical which may react in different ways to various factors of deterioration. The common deterioration noticed in photo graphs are yellowing, stains separation of emulsion, fungal attack, insect attack, finger prints, and folds.etc.

In the negative due to age the emulsion becomes brittle, cracks and falls off at the slightest shock or touch. They should never be touched. Humidity should be within 45-60% and the temperature also should be within 20-22degree C.



Fig. 74: Example of tarnished area on daguerreotype due to previous broken cover glass



Fig. 75: Close-up of tarnished area at lower left corner on the left stereo plate



So in this way we can say that museum is the real mother of cultural properties, it care its objects not because to save but also for care. It is also our responsibility to conserve these artifacts of past and help museums to preserve it. At last I would like to say prevention is better than cure.

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Author Profile

Garima Bharti, in present is a Research Scholar in Ancient Indian History and Archaeology Department, in University of Lucknow, Lucknow, Uttar Pradesh, India

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