SUMMARY

A CRITICAL STUDY ON CONSERVATION PRACTICES OF SHAWL COLLECTIONS IN INDIA

Introduction

The aim of conservation is to prolong the life of the object. Conservation is not only about the deteriorated object and to undertake remedial conservation. Remedial conservation is a later stage. First importance must be given to preventive conservation. Textiles being organic in nature, are subjected to decay. Lots of researches had already been done on the different artefacts of textiles but the minimum work was recorded considering the conservation practices of shawls collection in India. Many museums, as well as few private collectors in India, have the good collection of shawls. It was also not possible to study the collection of all museums and therefore, the researcher intended to study some museums in India which have collections of shawls. Researcher put in all efforts to study the shawl collections by understanding its methods of production, availability of raw materials and various techniques of preservation and conservation. Preservation of shawl collections has also been associated with the preservation of the beautiful traditional craft of weaving. This craft of shawls weaving has helped in providing the employment in many villages of our country and hence has been a major source of income to many. Therefore, this craft needs to the protected and preserved as to make it available to the larger audiences. This craft should be protected against fading away and leaving the people of villages in vein.

The primary aim is to preserve the original object or material. The museum staff must be trained enough to avoid major damage to the collection. Museum managers should understand that the job for the preservation of heritage is not a responsibility of a conservator but is a responsibility of all and it is the teamwork. Conservators come later in the picture. Several aspects have to be taken into account while choosing the right method of conservation. The methods chosen and the materials used for treatment should be reversible, i.e. they may be removed without damaging the object and whenever it is required to do so. Decision-making is most important in conservation. Understanding and studying various damaging factors of textile artefacts is a basic and essential step towards conservation management as well as conservation treatment. The researcher critically reviewed the given

literature and examined the lack of information on the conservation and preservation practices of shawl collections. Since, the researcher being interested in textiles conservation and preservation, undertook this study on shawl collections in India. Therefore, the following objectives were taken up for the study.

1 Specific Objectives

5.1.1 To study the profile of the artisans from Himachal Pradesh, Gujarat, Jammu & Kashmir, and Nagaland.

5.1.2 To study the different shawl weaving methods and preservation of the weaving technique.

5.1.3 To study the different types of shawls in museums, private collectors or individuals.

5.1.4 To understand and enumerate the preventive and remedial conservation methods adopted by museums in India, private collectors, and conservators in private practice.

5.1.5 To identify and analyze different kinds of damages that causes degradation of shawls.

5.1.6 To develop suitable method for conserving traditional shawls.

2 De-limitation

The study was limited to the preservation and conservation of woollen shawls only within a few selected museums in India, with private collectors, and conservators in private practice.

3 Methodology

The research work was designed by keeping in view the preservation and conservation practices of shawl collections in India. The methods used for the survey were by the mode of observations, interviews of the museum curators, conservators, private collectors and conservators in private practice. The interview methods were also employed for procuring the information on shawls weaving processes and problems faced by individual weavers, cooperative societies, master weavers, designers, and

NGOs. The case studies on woollen samples were also taken up to assess them on various parameters along with the remedial conservation treatment of the woollen shawl. The exploratory plus experimental research design was employed along with the multi-methodological approach for the present research.

The research study was formulated in four phases:

The first phase of the research study was carried out to understand the mechanism of shawl weaving. The researcher visited Himachal Pradesh, Jammu & Kashmir, Gujarat, and Nagaland. A semi-structured interview schedule was framed in order to get an insight into the demographic details, weaving process, looms used, the raw materials, yarns, colours, designs and motifs as well as the production and marketing details of the end product i.e. shawl. It was done on the basis of the chain-referral sampling method. The purposive sampling method was also used to record the data. The personal field visits were made to meet the artisans and organizations working in the area of shawl weaving. The sample size of the weavers was 45.

The second phase of the study involved the procurement of the data on the preservation and conservation practices from the museum curators, private collectors and private museums. In order to furnish the data, the structured interview schedules for the museum curators and private collectors were made separately. Private collectors were selected by using the snowball technique. The museums were selected from the states of Himachal Pradesh, Uttarakhand, Gujarat, Rajasthan, Delhi, Haryana and Punjab, Uttar Pradesh, Jammu and Kashmir, Hyderabad, Nagaland, West Bengal, and Maharashtra. The museum curators were selected purposively for the present study. The criteria being only textile curators and private shawl collectors were established for the research. The museum galleries were visited in each museum and empirical data was collected through observation method. The observation method was employed to understand the methods and materials used for display, handling, and storage in museums. The photographs were also taken wherever the administration allowed. The digital camera bearing the resolution of 8.0 megapixels was used for photography.

For museum curators the structured interview schedule was made to furnish information regarding the preventive measures taken in the museum. The data procured was analyzed under the following heads:

A. General Information about Museum

B. Textiles Collections and Documentation

C. Museum Exhibition and Display

D. Storage

E. Preventive Conservation

a. Light
b. Relative humidity
c. Biological growth and disinfection
d. Handling, storage and housekeeping
e. Display of textiles
f. Museum activities
g. Disasters

For the Private Collectors and Private Museums, the structured interview schedule was made to furnish information regarding the private collection of shawls. The information collected was analyzed under the following heads.

A. General Information about Organization
B. Textiles Collections and Documentation
C. Museum Exhibition and Display
D. Storage
E. Preventive Conservation
   a. Light
   b. Relative humidity
   c. Biological growth and disinfection
   d. Handling, storage and housekeeping
   e. Display of textiles
   f. Activities
   g. Disasters
   h. Conservation and Preservation

The third phase of the study was carried out to analyze the present conservation practices adopted for woollen shawls in India. In order to furnish the data, the structured interview schedules for the museum conservators and conservators in private practice were made separately. The museum conservators were selected purposively for

the present study. The criteria being only textile conservators were established for the research. The conservators in private practice were mainly selected from the metropolitan region and capital of India. The deliberate sampling method was used for the selection of conservators in private practice. The observation method was employed to understand the methods and materials used for shawls' conservation. The extent of deterioration of shawls was examined on the basis of their conditions, i.e. good condition, slightly damaged condition, and badly damaged condition.

The analysis of the conservation practices of shawl collections was done on the basis of the following parameters.

- Analysis of the conservation practices adopted by museum conservators was done in terms of staff availability, conservation documentation, deterioration of shawls/textiles, threats to shawls/textiles, bleaching method on shawls, conservation methods, scientific methods and examination techniques, preservation methods, materials used for conservation, code of ethics for conservation, dyes used for restoration and inspection of textile galleries and stores.

- Analysis of the conservation practices adopted by private conservators was done in terms of conservation documentation, deterioration in shawls/textiles, threats to shawls/textiles, bleaching method on shawls, conservation methods, scientific methods and examination techniques, preservation methods, materials used for conservation, code of ethics for conservation and dyes used for restoration.

The sample size of curators and conservators in museums was 40 and the sample size of private collectors and conservators in private practice was 15.

The fourth phase of the study dealt with the two experimental case studies. The first experiment was done on the woollen samples. The tests carried out on the woollen samples for the assessment as follows.

1. Assessment of the sample test fabric for tensile strength, colorfastness properties, and visual characteristics by using *Sapindus mukorossi* and Synperonic 91/6 as cleansing agents for woollen fabric. For the analysis of colorfastness, the dyed samples were tested. The dyes used for dyeing were an acid dye, reactive dye, and vat dye. The

experiment was done in order to evaluate the efficacy of cleansing agents for washing the woollen shawls.

2.Assessment of the sample test fabric for tensile strength, moisture regain, bending, stiffness and visual characteristics by using lanoline and glycerine as protective coatings over the woollen fabric. This test was performed in order to prescribe the efficient protective coating over the woollen shawl. It was done by treating the fabric sample with 1% lanoline, 1% glycerine, 2% lanoline and 2% glycerine, then comparison was done with the untreated sample of the woollen fabric.

The second case study dealt with the remedial conservation of the woollen shawl which was in a poor condition and it had to be treated urgently. The shawl's condition was determined on the basis of the types of damages it had and the condition rating codes i.e. good, fair and poor. The treatment priority codes were also used to ascertain its priority for treatment. Analysis and evaluation of the treatment to be carried out was done with the help of prior tests. Before carrying out the treatment, condition assessment report was made. The coloured shawl was checked for the colorfastness. The bleeding dye was fixed by the application of 0.5% solution of common salt. Mud stain was removed mechanically with the help of the scalpel. Solvent cleaning of the shawl was done by dabbing method. Reinforcing of the shawl was done by using the stitching technique. The single strand of cotton thread (of same strength and colour as shawl's fabric) was used for reinforcing the holes and losses. Flattening of the shawl was performed carefully by keeping the muslin cloth over it and providing the moisture by the spray bottle. The iron was set on wool in order to provide the required temperature. The protective coating of lanoline was given on the shawl. After the treatment, the shawl was kept by rolling technique.

4 Results and Discussions

This section unveils the major results and interpretations of the study and they have been presented under the following heads:

4.1 Weavers from Himachal Pradesh, Gujarat, Jammu & Kashmir, and Nagaland

To study the profile of the artisans from Himachal Pradesh, Gujarat, Jammu & Kashmir and Nagaland, the data was collected from the interview schedules made for the shawl

weavers. Shawl weaving came out to be the major source of income to all the four states. The data was coded sequentially and systematically as well as analysed statistically on the basis of the objectives of the study.

4.1.1 Major findings of the study are as under:

4.1.1.1 Findings obtained from the data analysis for the profile of the artisans from Himachal Pradesh, Gujarat, Jammu & Kashmir and Nagaland

- The age group of the maximum weavers interviewed was found between 41-50 years. It was also noticed that 50% weavers in Jammu and Kashmir were in the age group of 51-60 years which was found to be highest in all four States.

- The number of male and female weavers interviewed was in same number. It was observed that there was no gender biasness for doing any kind of work. Every kind of work related to weaving was done by both except some technical work like shearing. Carding, combing and embroidering work was done by more women as compared to men.

- Men were found more involved in weaving in the region of Jammu and Kashmir, followed by Gujarat and Himachal Pradesh. More women were found involved in shawl weaving in the state of Nagaland as compared to the other three states.

- Maximum weavers were Hindus in the state of Gujarat and Himachal Pradesh. Maximum weavers were Christians in the state of Nagaland and maximum Muslim weavers were from the state of Jammu and Kashmir. In the Kinnaur region of Himachal Pradesh and in the Nagaland state, Buddhists weavers were also found practicing this art form of shawl weaving. The motifs in the shawls of Kinnaur were found inspired by the Buddhists religion and culture.

- The majority of the respondents were married in all the four states.

- With regard to family type, more number of weavers belonged to the joint family as compared to the nuclear family.

- When size of the family was studied, it was found that maximum weavers were falling in the range of 4-6 members per family, whereas very less number of weavers family size was from 7-9 and above 9.

- Weaving was an inherited occupation at all the four states of the country as it was their family business with the major difference from the weavers who have acquired it as an occupation so as to serve their families.

- Weavers had the highest experience of up to 30 years in all the states except Nagaland where the maximum weaving experience was recorded to be ranging from 16-20 years. This may be attributed to the fact that due to the family and household work, the woman weavers might be not able to do the shawl weaving at the older stages of life.

- The majority of respondents in Jammu and Kashmir were residents of pucca houses and few of them were still staying in kutcha houses due to the lack of income. One family had both the constructions at their residence (semi-kutcha & pucca house). The majority of the respondents from all four regions were the residents of the pucca houses followed by the kutcha houses and least weavers were found to be the residents of the semi-kutcha and pucca houses.

4.1.1.2 Findings obtained from the analysis of the different shawl weaving methods and techniques from the states of Himachal Pradesh, Gujarat, Jammu & Kashmir and Nagaland.

The socio-economic life of the weavers and traditional craftsmen was studied as well an account on the location, raw materials, production techniques, and traditional looms was also made. The findings are as follows:

1. Himachal Pradesh

- This state is famous for weaving Kullu and Kinnauri shawls. The investigator visited Shamshi, Kullu, Mandi, and Kinnaur in Himachal Pradesh.

- Women weavers were found more involved in the preparation of warp threads, weaving and embroidering, whereas men were involved in weaving, warping and dyeing processes.

- Traditionally used raw materials were desi wool and raffal but at present cotton, pashmina, angora, raffal, desi wool, acrylic, polyester Australian wool/ merino wool and yak's wool were being used.

- The types of weaves used in shawls were 2/2 herringbone weave, design in dovetail tapestry technique in 2/2 basket weave. Weft rib weave and diamond weaves were being used for patterning.

- Traditional types of looms used were throw shuttle pit looms but now throw shuttle looms, fly shuttle frame looms and border looms were being used.

- Acrylic, wool and silk threads were being mostly used for embroidering.

- The stitches used were running stitch and chain stitch.

- The motifs being used in these shawls were angular, geometrical designs in horizontal borders in single motifs or combination. Other motifs were yashin, kyumso yongrong, yongrong, darje- setham, cchoktin, yaguma/ chholopanma, kulri design, floral motifs, akhrot, double chasham, round chasam, swastika, Ganesha and badam.

2. Gujarat

- The places visited in Gujarat were Ahmedabad, Kutch, and Surendranagar. Dhabla, luri shawls and tangaliya shawls were being woven in Gujarat.

- The work done by women was carding, spinning, dyeing, and warping. Men were mostly involved in spinning, dyeing of yarns and weaving over the loom.

- Traditionally used raw materials were desi wool, cotton, and camel wool but at present merino wool, acrylic, silk and rayon threads were being used.

- Weaves used in shawls were plain weave with extra weft technique, rib weave and knotting technique for making tangaliya shawls.

- The stitches used in shawls were knot stitch, running stitch, herringbone stitch, satin stitch, stem stitch, chain stitch and fish stitches.

- Traditionally pit looms (goda sar) were used but now flying shuttle frame loom (khada sar) were more found in the village.

- Threads being used for embroidering were wool, silk, acrylic and cotton.

- Motifs used in dhabla shawls were animal, diya, huts, four squares, female form, dhogla, phupti (full, half), harde, chaumukh, hathi, satkani, vakhiyo, dholak, hiragiriya and kacchchi motifs. For tangaliya, dots, geometrical patterns like circles, parabolic designs, straight lines, curvilinear shapes, contemporary motifs, peacock, tree, birds, bushes, button and airplane motifs were being made.

3. Jammu & Kashmir

- The places visited by the researcher in Jammu and Kashmir were Dal Lake, Nishat Garden, Gandhi Nagar, Kanihama village, Gander Bal and Budgam.

- Work done by women was mostly spinning, carding of wool, finishing of shawls and embroidering whereas work done by men was weaving on looms, embroidering and dyeing.

- Traditionally used raw materials were shahtoosh, pashmina, angora wool but raw materials being used nowadays were pashmina wool, local fine wool, raffal, cashmilon, cotton, silk and merino wool.

- Woven shawls in Kashmir were all types of Kashmir pashmina shawls, kani shawls, jamawars, plain shawls, reversible shawls, jacquard weave and space-dyed shawls.

- Embroidered shawls of Kashmir were pashmina sozni shawls, aari (crewel embroidery) shawls, zardozi, talibar (gold work) and qashidah (Kashmir embroidered shawls).

- The weaves used in shawls were twill tapestry weaves and stitches being used were the single stitch, stem stitch, herringbone stitch, knot stitch, chain stitch, satin stitch, button-hole stitch, slant-darning stitch and running stitch.

- Traditional types of looms used were running small looms and the looms being used nowadays were throw shuttle looms and jacquard looms.

- The threads being used for embroidering were found to be of silk, dyed cotton, wool and zari (metal threads).

- The motifs used on shawls were mangoes, ghobi, badam, panjdar, cheet misri, kev posh, chinar leaves, flowers of lilies, lotus, creepers, blossoms, snake forms, heart,

cypress tree, bushes, pinecones, date palms, paisley, buta flower vases, samovar and kashir- jaal (fine- embroidery over neck and sleeves) motifs.

4. Nagaland

- The places visited by the researcher in Nagaland were Dimapur, Kohima, Phek, Kigwema and Diezephe village.

- It was found that women did all the work of shawls weaving. These were spinning, weaving, dyeing and preparation of warp threads whereas men were only involved in making the bamboo wooden looms.

- Traditionally used raw materials were cotton and wool but nowadays acrylic (thai yarn), polyester, viscose rayon, wool and nylon blend (cashmilon) were being used.

- The weaves being used in shawl were plain weave with floats, rib weave, and twill weave.

- Traditionally used loom was loin loom (back strap loom) which was found at present also along with the fly shuttle looms.

- Nylon and rayon threads were being used for embroidering.

- The motifs used on tribal naga shawls were simple lines, stripes, squares, bands, formal arrangements of lozenge shapes and diamond motifs. The other motifs were of hornbill heads, bison heads, tigers, elephants, a spear, dao, cock, snakes, barbets, lizards, monkeys, mithun head or horns, sun, moon, and stars.

4.2.2 Findings obtained from the analysis of the problems faced by the weavers

The problems addressed by the weavers were different from each region but some of the problems were found quite common with most of the weavers. These are as follows:

- The shawls which were being made on the traditional handlooms were on the verge of being replaced by the power looms due to the quicker output. Where handloom was weaving single shawl in 4 days, on the other hand, power loom was weaving a number of shawls in a single day. The traditional shawl weaving was a time intensive

job and it involved a lot of labour. The labour cost decreased, for the one who was weaving it on the handlooms.

- It was found that since there was a difficulty in the availability of local wool, therefore they had to import it from the outside which caused a lot of prices and hence increased the cost of the shawls.

- Many problems were found in the handloom industry in relation to the shawl weaving from all the four states such as out-dated skills/methods, unformed fabrication network, low efficiency, insufficient funds, common selection of artefact in making, poor selling line, static output and overall competition from the power loom industries.

- The weavers had to face a lot of difficulty in the marketing of the traditional shawls at reasonable prices. They were not being paid sometimes reasonably. Therefore, the wages earned by the local weavers was less and hence their economic condition wasn't satisfactory.

4.1.3. Findings obtained from the analysis for reviving and preserving the tradition

- The production and marketing of Himachali craft products were helping in preservation and upkeep of the age-old tradition of art, heritage and local culture interlaid with the latest technology, taste and needs whereas the handloom industry in Nagaland was found still underdeveloped.

- The problems of unavailability and the high cost of the raw material, as well as the higher production cost, were making it tough in the daily life of the weavers.

- The entry of famous brands such as Fab India, Nalli with designer shawls in the urban and modern markets left a negative mark in terms of demand for the traditional shawls.

- Modernization and industrialization had led to the changes in the socio-economic background of the crafts persons.

- Weavers in Gujarat used the vegetable dyes instead of the synthetic dyes. It was found that synthetic dyes and chemical dyes had an environmental impact and hence were

causing pollution and affecting the human health. It was found that due to the limitations in colours obtained from vegetable dyes, chemical dyes were being used. But this replacement was causing harm to the environment as synthetic dyes were more toxic as compared to the natural dyes.

4.2 Curators and Private Collectors

4.2.A Museum Curators

4.2.1 Findings obtained from analysis of the preservation practices adopted by museum curators

- It was found that most of the museums in India didn't have an adequate staff for the preservation of shawl collections. The posts for multitasking staff were found more as compared to the technical staff in government museums.

- Most of the shawls in museums were from Kashmir. The Shawls from Gujarat, Kullu, Bikaner, and Nagaland were found to be the area specified shawls and they were found only at the places of their origin.

- The museums which did the documentation of textiles were higher as compared to the museums where documentation was still under process.

- It was found that digitization of shawls still lacked in India. Only few museums observed that digitization doesn't affect the textiles in terms of degradation because of the damage caused by digital equipment is bare minimum i.e. 0.1 lux.

- Dust and dirt were the common problem amongst shawls even if it was stored and displayed in the pollution free environment.

- The shawls were stored mostly in shelving units, costume wardrobe cabinets and archival rolling tubes.

- Hair hygrometer, psychrometer, whirling hygrometer, thermo hygrograph or data loggers and digital climate meters were used for measuring R.H. and temperature in most of the museums. It was observed that the microclimate within the galleries could

be suffered by the irregular monitoring, inadequate HVAC's systems and a number of visitors within the galley.

- It was observed that termite attack and insect/microbiological attack were more common in museums as compared to the rat menace. Use of insect repellents was found in 12 museums followed by the fumigation methods for biological control which were being done by 11 museums out of the total 17 museums.

- It was also found that the use of eco-friendly materials was more in museums as compared to the other methods of housekeeping. It was recommended to remove the dust with the vacuum cleaner instead of dry mops.

- It was revealed that most of the museum did not change the collection on display and it was a permanent display.

- It was found that most of museums had remedial conservation facilities whereas the facilities were not present in some of museums. It was also found that few of the museums consulted the private conservators for remedial conservation treatment.

- The results for the lighting systems used in the museums revealed that most of the museums preferred fluorescent tubes.

- Results pertaining to the display method showed that showcases and rollers were the most preferred way for displaying shawls by the museum curators. But while displaying the shawl on the rollers only one museum was found wherein the falling part of shawl was stitched to the background to overcome the undue pressure on the shawl.

4.2.B. Private Collectors and Private Museums

4.2.2 Findings obtained from the preservation and conservation practices of shawls adopted by the private collectors and private museums

- Most of the museums had an insufficient staff for the preservation and conservation of artefacts. It reflected that shortage of staff and lack of recruitment is a major issue in the country.

- It was found that all the organizations had done the documentation of the collection.

- All the organizations agreed that digitization does not affect the textiles in terms of its degradation.

- Dust and dirt were found to be the common problem in the shawl collections of all the private museums and organizations.

- Extent of deterioration of shawls reflected that the major collection of shawls was in good condition owing to the fact that their degradation rate was slow as compared to other textile artefacts.

- All the organizations were using objects support trays, clean cotton, plastic gloves, tissues and fillers followed by 75% organizations which were found using padding materials. 25% of organizations were using only polyethylene tote pans and flatbeds for moving objects.

- All the organizations were using shelving units to store the collection followed by 80% organizations which were using dust covers. The flat files cabinets, costume wardrobe units and specialized containers were being used by 60% organizations. It reflected that organizations were getting more aware of the deteriorating agents present in the environment and therefore, the storage units and methods were more developed and were still developing.

- It was also found that all the private organizations had regular housekeeping followed by implementation of IPM which was only in 50% organizations. Fumigation and use of insect repellents was present in very few organizations.

- It was also revealed that majority (80%) of the organizations used the broom for cleaning the galleries whereas 60% organizations used wet mop. Only 20% of organizations were recorded to clean the galleries with a vacuum cleaner.

- Majority of the organizations inspected the collection on display daily as compared to the collection inspected in the store which was only in few organizations. Few organizations were found inspecting the collection on display monthly, in-store (once in a week), in-store (every month) and in-store (2-5 months). It reflected that there was not the standardised management for the inspection of the collection on display and store.

- Around 100% organizations agreed for using indigenous/ natural methods whereas only 50% of organizations agreed for using man-made procedures and both the methods of preservation. Traditional fumigants and repellents used were kapur, cloves powder, sarifa seeds or custard apple seeds, sweet flag powder and black cumin seeds. In both the preservation methods, the repellents have to be wrapped in the muslin cloth and kept near the collection for about 3 months. These are required to be changed when these become inactive. Natural methods were used more as compared to the chemical methods or man-made methods of preservation.

- The data on the artificial lighting system reflected that incandescent lighting was the most preferred by most organizations. Halogen lights and sensor lighting were least preferred by the organizations. Sensor lighting was found to be the new concept which still has to be introduced in the organizations.

- It was revealed that 50% organizations preferred darners for treating the damage. It showed that still there are lack of textiles conservators in our country. Museums were either dependent to get the conservation work done privately or they were hiring services from the other museums.

- It was found that maximum organizations preferred mannequins display whereas few organizations were recorded to be using the method of showcasing and folder type mounting technique as it is in Calico Museum of Ahmedabad, Gujarat.

4.3 Conservators in museums and in private practice

4.3.1 Findings obtained from the analysis of the conservation practices of shawls adopted by museum conservators

- It was found that there was a lack of conservation staff in the museums of the country

- The museums which think that documentation for conservation is important were 100%. This showed that at each and every museum was aware that documentation is an important part of conservation but it was found that only 40% of the museums created the database for the conservation documentation.

- Most of the museums agreed that the threats to shawls were improper lighting, fluctuating temperature, improper housekeeping, improper handling, display and storage, and biological growth. But very few museums mentioned about biological growth for damaging shawls.

- It was found that in order to add humidity in summer and to provide the cooling effect one of the museums used khus curtains, air coolers and ice cubes in the gallery and to decrease humidity in monsoon, dehumidifiers were installed inside the galleries. In some of the museums, $Ca(OH)_2$ lime lumps and silica gel were placed at the bottom of the showcases to reduce moisture.

- All the museums agreed that bleaching method is harmful for the shawl. However, two museums were found using bleaching method for stains removal on the shawls when asked about the conservation methods used for shawl collections.

- The most preferred conservation methods used for shawls was mechanical cleaning and dry cleaning done by 93.75% museums followed by the reinforcing and strengthening which was preferred by 87.50% museums. Wet cleaning treatment on shawls was done by 43.75% museums. 68.75% museums preferred stains removal and 56.25% museums preferred mounting technique on shawls.

- Microscopy was found out to be the most preferred method of investigation of shawls. Very few museums were found using infrared spectroscopy whereas some of the museums used no method for scientific investigation. XRF and U.V. fluorescence was used by only one museum as the method of scientific investigation. It reflected that proper scientific investigation is still a lacking feature in the museums of the country. Few museum conservators also revealed that lack of time, money and resources are some of the constraints for scientific methods and materials.

- Indigenous/natural methods have been used by 88.23% museums whereas man-made procedures (chemical repellents) were found used by 70.59% museums. It showed that museums preferred natural methods more as compared to the chemical methods to control biological attack.

- All the museums agreed on the usage of code of ethics while conserving any artefact i.e. they all agreed for the minimum intervention on the artefacts while conserving it and that they used a reversible treatment.

- Most of the museums were found using the natural dyes for the restoration as compared to the synthetic dyes.

- It was found that except a few laboratories in the country, most of the museums did not have well- equipped laboratory and trained staff. As far as the conservation of shawls is concerned, most of the museums do cleaning and restoration within their reach. No research is being done to improve and develop the conservation laboratories. Authorities have to sanction sufficient budget and also impart training to the staff. It was observed that one of the museums has purchased the conservation instrument for the cleaning of the museum collections named Artiny Laser but no training has been imparted on operating the equipment. It is high time to understand that conservation is a prime function of a museum and if it is neglected, the collection cannot survive for long.

4.3.2 Findings for the conservation practices of Shawls adopted by the conservators in private practice

- All the conservators agreed that conservation documentation is very important but only 50% of respondents created the database for conservation documentation.

- Dust, dirt, folds/creases, losses, fading, insect attack and splits were some of the problems found in the shawls collection by the conservators in private practice.

- It was found that 75% conservators agreed that improper lighting, inadequate R.H., fluctuating temperature, air pollution improper housekeeping, improper handling, display, storage and biological growth were harmful to the shawl collections. While 25% conservators agreed that only improper housekeeping, improper handling,

display, storage and biological growth were harmful to the shawl collections and not all of them. It reflected that though all of them were harmful but each conservator's point of consideration was different in view of the shawl collections.

- All the conservators opined that bleaching method was harmful to the shawls.

- It was found that all the conservators agreed with wet cleaning (aqueous and solvent), reinforcing and strengthening treatment used for shawls. Most of them also stated that they preferred stains removals and mounting technique whereas very few conservators stuck to dry and mechanical cleaning for the conservation of shawls. However, none of them disclosed the procedure/methods used to conserve the shawl collections in detail.

- It was found that microscopy was the most preferred way of scientific investigation by the textile conservators. 25% conservators preferred using burning tests and solubility tests for fiber identification (only if the broken fiber is available or only if the client/owner allows for same) along with testing by pH meters and infra-red spectroscopy. One of the conservators stated the usage of portable microscope which could be taken to area of conservation work.

- All the conservators agreed to use indigenous/natural methods as well as man-made procedures for the preservation of artefacts.

- It was found that 75% respondents considered the code of ethics for the conservation whereas 25% respondents did not consider the code of ethics for the conservation of artefacts.

- It was found that most of the conservators preferred natural dyes for restoration as compared to the synthetic dyes which were preferred by very few conservators.

4.4 Practical approach to conservation of woollen shawls

4.4.1 Woollen samples

4.4.1.A. Test 1: Assessment of the sample test fabric for tensile strength, colourfastness properties, and visual characteristics by using *Sapindus mukorossi* and Synperonic 91/6 as cleansing agents for woollen fabric

1. Washing of the fabric by using 5% *Reetha* solution and 5% Synperonic 91/6 (a non-ionic detergent)

   It was revealed that the dirt penetrated the aged samples more as compared to the un-aged samples. A very slight decrease in the strength of the fabric was found in the aged samples. It was observed that wool underwent least strength loss during ageing according to the values taken. On the basis of the further tests, it was revealed that *Reetha* solution could be best used by the warm process. It penetrated well into the fabric and less decrease in the tensile strength of the fabric was found in case of un-aged samples. Overall results revealed that washing the woollen fabric with *Reetha* solution did not cause any harm to the fabric thereby maintained the strength of the fabric as well. Washing the samples with non-ionic detergent did not further affect the tensile strength of the woollen fabric samples. The comparative results established that in both the cases, they were considered safe to use for washing.

2. Readings for the colourfastness to washing were taken. In case of washing the samples with *Reetha* solution not much difference in colour strength was found between the un-aged and aged samples. It was found that acid dyed samples showed poor rating as compared to the vat dyed samples which showed good rating codes. The reactive dyed samples were considered excellent while washing with *Reetha* solution. The vat dyed sample showed some loss of colour in the non-ionic detergent solution. Both the solutions were considered safe to use over the woollen fabric.

3. Scattered dust among the yarns of the weave was found while washing with the *Reetha* solution. The *Reetha* solution was found quite rough as compared with the Synperonic 91/6 solution as it was the very smooth solution and didn't hamper the woollen fabric during washing.

4.4.1.B. Test 2:Assessment of the sample test fabric for tensile strength, moisture regain, bending, stiffness and visual characteristics by using lanoline and glycerine as protective coatings over woollen fabric.

1. Assessment of the woollen fabric for tensile strength

Readings revealed that lanoline increased the tensile strength of the fabric as compared to the glycerine whereas glycerine helped in the formation of hydrogen bonds and the penetration of them into the fabric structure.

2. Assessment of the woollen fabric for moisture regains

It was found that the fabric samples treated with lanoline were lighter in weight as compared to the glycerine treated samples because the lanoline acted as the coating over the fabric i.e. the wax coating whereas the liquid glycerine penetrated the fabric completely thereby increasing the fabric weight. It was noted that wool absorbed around 35% of its weight in moisture without feeling dampness.

3. Assessment of the woollen fabric for bending and stiffness. This was done through visual analysis. The results revealed that the woollen fabric samples felt soft to touch and it strengthened the fabric. The fabric appeared smoother when treated with 1% lanoline.

4. Assessment of the wool fabric samples for visual analysis in terms of transparent and translucent properties.

Both the samples were compared for the transparency properties and it was found that the one treated with glycerine appeared darker as compared to the lanoline treated fabric.

4.4.2. Remedial conservation treatment of shawl:

Examination of the shawl was done prior to the treatment on the basis of the condition report along with the photographic documentation. The shawl had the holes, split-ups, fading and folds marks. Hence it was kept under the 'high' treatment priority. The overall condition of the shawl was 'poor' as per the condition rating code. The falling fibers and yarns were taken for the analysis. It was found that these fibers were very hairy in structure and revelations were made as the merino wool. As viewed under the microscope, there were no biological damages found in the fibers, however, it had physical and chemical damages. The shawl was fully covered with the dirt and debris in the depth of the yarns and fibers of the shawl. Yarns had become very frail from some of the edges and they were ready to get apart. On testing, the pH of the woollen

shawl was found 14 which should not be the case. It should range from 5-8. Spot tests were also done to check colorfastness. Solubility tests of dyes were also performed using: distilled water, ethanol, methanol and petroleum ether. Grey colour of the shawl was found bleeding which was fixed by application of the solution of 0.5% common salt.

The unwanted material such as dust, small particles of soiling and large contaminants were removed physically from the fabric by using tweezers, soft brushes and removed with a vacuum cleaner. On the basis of the tests performed on the woollen samples, it was revealed that washing of the fragile woollen fabric should be avoided in order to protect it from getting further damage. The vacuum cleaning was done from the back side by keeping the suction at low pressure and using the gauze cloth at the nozzle of the vacuum cleaner. The polyester netting was found suitable to cover the area which was under vacuum cleaning. This artefact was then dry cleaned by using petroleum ether. Dry cleaning not only removed the dust and small particles but also kept the shawls strength and its fibres intact. Vacuum suction table was used to reduce grease stain for which the suitable solvent was used. Suction table was found useful as it created the vacuum which kept the object stable and dried the solvent rapidly, thereby not causing the stain to spread more. Flattening of the shawl was done by keeping the muslin cloth over it and providing the moisture by using the spray bottle. The iron was set on wool in order to provide it the required temperature. Stabilization of a shawl was done through the stitching technique. The care was taken while stitching so that it won't hamper the other fibers of the shawl. After the whole conservation treatment, this shawl was carefully kept by rolling technique. For rolling of the shawl, the poly vinyl chloride pipe was taken with its length more than that of the shawl so that its ends should project beyond the shawls.