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Nature and extent of degradation and deterioration of Medavela Rajamaha Vihara Palm Leaf Manuscript Collection

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Abstract

Palm Leaf Manuscripts faced the threat of deliberate as well as unintentional destruction since ancient times. Custodian individuals and personnel protected the collections from natural and manmade disasters by adhering to the traditional conservation and preservation methods that prevailed for generations. However, the advent of printing, absence of patronage, lack of know-how, less priority paid, and attitudinal changes led Palm Leaf Manuscript collections to deteriorate fast, especially after the beginning of colonial administration. Hence, this study is carried out to identify the condition of the Palm Leaf Manuscript available at the Medavela Rajamaha Vihara based on the nature and extent of the degradation and deterioration. To investigate the collection of qualitative data collection techniques such as survey method and observations was employed to draw data. Palm Leaves as a natural organic material, has been deteriorated owing to several factors. Chemical, physical, and biological degradation, caused by improper storage, incorrect climatic conditions, inappropriate handling, and damage instigated by pests are among the many circumstances that caused the condition of these manuscripts. Safeguarding the collection is suggested by adhering to both modern and traditional techniques. Future research avenues are open for documentation, conservation, and preservation of the collection.

Keywords: Medavela Rajamaha Vihara, Palm Leaf Manuscript Collection, Deterioration, decaying, environmental conditions and infestation

Introduction

Palm Leaf Manuscripts (PLMs) bear a prominent place among the Sri Lankan national documentary heritage. Until the advent of printed papers, PLMs served a primary function in the preservation of Sri Lankan written heritage. PLM collections were protected mainly in Buddhist temples under the benefaction of ancient rulers. Some collections were also under the custody of lay scholars. PLMs faced the threat of deliberate as well as unintentional destruction since ancient times. Despite their significance as informative material, they are more vulnerable to natural and manmade disasters. Hence, the life span of PLMs is rather shorter when compared to the other mediums chosen for writing. Therefore, the available manuscripts are rarely older than a few centuries. Both secular and ecclesiastical upholders protected the collections from natural and manmade disasters by adhering to the traditional conservation and preservation methods that prevailed for generations. However, due to the advent of printing, the absence of patronage, lack of know-how, less priority paid, and attitudinal changes led PLM collections to deteriorate fast, especially after the beginning of colonial administration. Despite the conservation and preservation endeavors initiated by some institutions such as the National Science Foundation, the University of Peradeniya, the University of Kelaniya, the National Library and Documentation Centre, and the University of Sri Jayewardenapura, in the recent past, the rest of the unattended PLM collections are scattered over the island in Buddhist temples and the custody of private owners. Preliminary studies depict that these collections face the danger of deterioration that is mainly caused by changes in the original form of material through interaction between the object and the agents of destruction (Bankole, 2010). It is a dire necessity to provide the correct temperature, maintain appropriate relative humidity levels, and proper maintenance to prevent the deterioration of this rare documentary heritage (Schito, 2019; Alegbeleye, 1993; Walker, 2013). Infestation, air contamination, incorrect relative humidity, poor handling, and poor ventilation are some of the causes of degradation and deterioration of information resources as quoted by scholars. (Harvey, 1993; Bankole, 2010; Madu and Adeniran, 2015).

Atmospheric factors, wear and tear, dust, biodeterioration due to insects and microorganisms, mishandling, stains and discoloration, and improper storage are among other factors identified in previous studies (Gupta, 1974; Harinarayan 1995).

Study Setting

PLMs took part in significant responsibility in the preservation of Buddhist scriptures and canonical literature as well as indigenous traditional knowledge that has been passed orally from generation to generation. Many Manuscripts were destroyed during foreign invasions from time to time. An attempt has been taken to rewrite the PLMs that were destroyed during invasions under the guidance of Buddhist monk, Welivita Sarankara Thero in the 19th century. Medavela Rajamaha Vihara PLM collection is one such collection. The collection contains newly written PLMs under the rejuvenation of ancient literature under Welivita Sarananka Thero. It also possesses a few PLMs inherited from its predecessors. Situated in Medavela village, 12kms from Kandy town, Medavela Rajamaha Vihara, is said to have been founded by King Walagambahu (A.D. 103-102 BC and 89-77 BC). However, no concrete evidence is furnished about the contributions made by rulers to the temple until the 14th century A.D. Its strategic location in the middle of the road to Kandy from Galagedara Pass made it face different invasions during the colonial period. Owing to the significance of the temple from ancient times, several donations and grants were made by ancient rulers to the temple. The temple was periodically renovated and new grants and donations were made by the different rulers since the 14th century. The significance of the temple is underscored not only by the legends associated with the temple and village, but also by the availability of inscriptions, religious edifices representing the typical Kandyan period, and historical records such as PLMs and copper plate charter and stone inscriptions available in the temple. Studies on the temple are mainly devoted to publications of *Tampita vihara* wall paintings and the historic importance of the temple (Godakumbura, 1964; Chutiwong, Silva, and Prematilleke, 1990); Urugodawatta, 2019). Regular maintenance of the temple has been undertaken by the Department of Archaeology paying attention to the old craftsmanship, paintings, architecture, and epigraphy.

Despite the historical value, it appears that the PLM collection at the temple was overlooked in the previous studies and conservation endeavors. Hence, this study is carried out to study the PLM available at the temple in terms of identifying the condition of the Medavela Rajamaha Vihara PLM collection based on the nature and extent of the degradation and deterioration. To investigate the collection qualitative data collection techniques such as survey method and observations was employed to draw data from the selected collection. The study was carried out from January to June 2018. The total collection of PLMs was 62 when initiating the study. No sampling method was followed since the whole collection was selected for the study. The status of the collection was investigated under the headings of storage, the extent of tear and wear, infestation by living organisms, and stains. Damages instigated by the extent of the tear and wear, storage conditions, infestation by living organisms and stains, incorrect relative humidity, temperature, and light were examined. Degradation of deterioration originating from oil patches, pigments, and remnants left by pests was also explored in detail. Discolouring, fading, and dust attacks were taken into consideration to determine the level of degradation and deterioration by studying the status of the collection. The study was conducted in two stages. While the first phase of the study was focused on studying the nature and extent of the deterioration of the collection, the latter was engrossed with the conservation, preservation, and documentation of the collection. This study is confined to the provision of results obtained from the first phase of the study.

Results & Discussion

Nature of the Collection

As mentioned before, the collection was twofold; some of its manuscripts have been donated by the benefactors while the rest was written in the temple itself in the 19th century. These manuscripts are stored on the upper floor *Dharma Sala* building of the temple in glass-fronted wall cupboards under lock and key. This set of the collection was named the Main Collection for study purposes. It contained 8612 leaves in 62 PLMs. One palm leaf folio measured around 45–55 cm in length and

4–5 cm in width. The collection has not been documented in detail; no catalog was available. Only a title list was prepared by the temple authorities. No conservation or preservation measures were followed since their acquisition of the temple. Temperature control was not taken into consideration when stowage manuscripts. Provisions of access to the manuscripts were rarely facilitated to protect the collection. If access was granted to refer to the collection, it was closely monitored by the Chief Incumbent of the temple. However, it was found that the PLM collection was badly handled. Some of the Manuscripts have been stolen a few weeks before the investigation was initiated. When the covers (*Kamba*) of the manuscripts of the Main Collection were damaged chiefly by infestation such as white ant attacks, leaves of certain manuscripts were placed in an adjacent room to stop the spread of harm to other manuscripts. No preventive conservation method was practiced other than that. PLMs that were found in the adjacent room were named Supplementary Collection during the course of the study. Although the study was initially intended to confine to the Main Collection that was stored in the glass-fronted walls cupboards, the supplementary collection was also taken into consideration after its subsequent discovery. As a result, both collections comprised 12600 manuscripts brought on 121 individual PLMs. The considerable number of manuscripts that were in the glass-fronted cupboards and hundreds of loose leaves kept in an adjacent room were found deteriorated due to several causes which will be discussed in the following sections.

Factors Behind Degradation and Deterioration

Relative humidity, temperature, and light

Located in the central part of the island and at a high elevation, Kandy has relatively wetter and cooler temperatures than the tropical climate of the rest of the country. From May through to July and October to December the region experiences its monsoon season. The temperature of the area fluctuates between from 18°C to 32°C while it experiences *extreme* cyclic variations in monthly rainfall. The average rainfall is about 1,582mm per annum with *some* periodic differences in the

perceived humidity (Dept. of Met, 2021). As a whole, Kandy weather is rough, unstable, and unpredictable; rains could be expected even during the driest months. Under such settings, as mentioned earlier there were no climate control mechanisms employed in the building. To understand the prevailing condition, temperature and humidity were measured by the hydrometer. Relative humidity in the storage area was between 70% to 79% and the temperature was 28°C to 30°C . Hence it appears that the collections were subjected to continuous dry and humid environments. Investigation of the two collections resulted in finding 2331 leaves damaged due to incorrect climatic conditions (figure 01). Leaves that were twisted (222), folded (198), warped (153), swollen (670), brittle (452), and fused (214) were the common characteristic of the collection. Horizontal breaks were visible in 422 leaves.

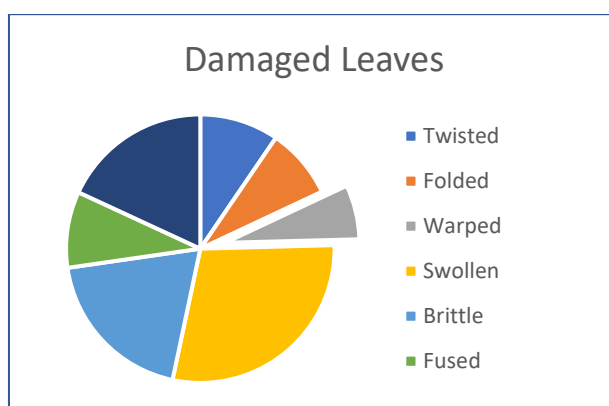


Figure 01

Brittleness and loss of flexibility are among the common problems in the collection, which paved the way to an increased potential for damage when leaves were subjected to inappropriate climatic conditions. Breaking down of the leaves that lead to loss of flexibility could be prevented by regular oil treatments. Studies also point out that physical damage is caused due to the loss of natural oil present in the leaves because of time factors and atmospheric conditions (Suryawanshi, Sinha, and Agrawal, 1994). As Van Dyke (2009) noted, "... aged PL can be very desiccated

and brittle, especially around the edges that have been most exposed to oxidation processes.” The swollen leaves faced the threat of breaking and ultimate crumbling under the prevailing fluctuating climatic conditions.

Harinarayan (1995) states that “high temperature accompanied by low humidity often causes dryness of the leaves as a result of which essential oil present in the leaves evaporates and the leaves become hard and brittle”. It is suggested that manuscripts must be kept in a dustless, pollution-free environment with an optimum temperature of 23°C and a humidity range of 50-60 % (Prajapati, 1995). Scholarly articles infer that PLMs, being a natural, organic product in nature, should not be stored in very dry conditions “as they are susceptible to degradation and deterioration instigated by changes in climatic conditions i.e., temperature, relative humidity, light as Fluctuations in temperature and humidity contribute to deterioration by causing material deformations” (Agrawal, 1984; Joshi, 1995).

Tear and wear

25% percent of the total collection was found damaged due to tear and wear with stains, broken leaves, and parts damaged due to mishandling of the Manuscripts. It was found that 3123 leaves were damaged and broken into pieces, while some parts are already missing irreplaceably due to mishandling. Broken along edges (352 leaves), and folios with faded scripts/letters (1981 leaves) respectively physical damage could be seen in the collections. Improper and mishandling of manuscripts is one reason among many that caused stains in the leaves. Stray marks caused by codes (162 leaves) that were used to tie the manuscripts and clothes that were wrapped around the manuscripts (11 manuscripts) paved the way to another damage. There are two holes in the PLMs that are used to pass the cord through its wooden cover and leaves that gathers folios of the document. With continuous and frequent use of the manuscript without proper care, the size of the hole becomes large leading to breaking the leaves around the hole. PLMs that have no wooden covers

(Kamba) face the threat largely. This type of damage can be seen on 628 folios of the collection.



Figure 02

Although the collection was treasured under close supervision, no mention of the visitors or scholars who have used the collection for scholarly purposes. Hence, custodians of the collection have no clue about how and when the damages were caused. Also, they were not aware that the manuscripts were damaged due to incorrect handling. It was also found that codes (*huya*) were not properly placed which led leaves to scattering and damage eventually. PLM turns out to be fragile and brittle with the age. Lack of regular treatments to increase the softness and flexibility of the leaves also caused easily damaged when handling is not taken care of and at the slightest touch.

Infestation and microorganisms

Major challenges to the longevity of PLMs that have been identified in the tropics include insect attacks by termites, silverfish, bookworms, and cockroaches (Sah, 2002; Sharma, 2015; Cabral, Ravikumar & Ramanan, 2018). Insect larvae can perforate and destroy manuscripts rapidly (Sharma, 2015). Similarly, the Medavala Rajamaha Vihaara PLM collection had 6370 affected folios by insect and fungus attacks making 51% damaged by an infestation. Termite's attack was the most prevalent bio deterioration which was irreparable. Chemicals were applied in fumigation chambers as a treatment for the extensive damages caused by white ants in Tamil manuscripts selected for Samuel's (1994) study.

Cigarette Beetles (*Lasiodermaserricorne*), silverfish, weevils, booklice, ants, and cockroaches damage were also visible in the collection. A similar study conducted by the PLM collection of the National Library of Sri Lanka revealed that insect attacks were the major threat to the collection. (Cabral, Ravikumar & Ramanan, 2018). Evidence of infestation in the Medawala Rajamaha Vihara PLM collections includes the presence of neat, pinhead-sized holes, irregularly eaten edges, [or] the presence of larvae which eat the leafy matter... as visible in the study carried out by Sah, 2002. It is proposed that the source of the insects that damage the leaves may be from the surrounding environment as well as the wooden covers of the manuscripts (ibid). Impurities from ants and cockroaches had led the manuscripts to suffer from stains and discolorations. Damages by rodents such as rats were also present.



Figure 03. Leaves Damaged by Rats



Figure 04. Leaves Damaged by White Ants

Fungus replication which is the most injurious was also noticed. The presence of fungi was identified on more than 440 folios of the collections. The humid climate

of the storage area has provided an ideal environment for the growth of the fungus leading folios to fuse. It is pointed out that besides “dust, an indirect source of fungus is the adhesive used in the Palm leaf manuscripts” (Sharma, 2015).

Faded leaves

344 folios were found undecipherable since they were faded and becoming brown and yellowish owing to the oxidation of lignin. Palm leaves have become bleached and or darkened under UV light, and are composed of cellulose and lignin. As pointed out by Nair (1981) these factors pave the way to mechanical impacts such as splits, breaks, folds, and scratches. It was found that no regular black polishing and oiling employed since the acquisition of the collection to the temple. Hence, lack of proper maintenance and negligence led to the manuscripts being illegible. Black polishing followed by oiling will reassure the readability as well as the flexibility of the leaves that endure the lifetime of the materials.

Stains

Fungal growth and wound areas are the main cause of stains visible on the surface of manuscripts. Most of the stains, smears, and spots are bluish, greenish, blackish, and brownish in color. Dust particles and insect remnants also caused stains on the PLMs. Improper and inadequate manual handling (4%) also caused stains. The code used for tying the folios and cloth used to protect PLs also left marks that contribute to stains. Dust accumulation, remnants of insects and *larvae*, lamp shoots, or any other pigments, or paste that is used in the process of PLM making, are resulted in damages (Gupta, 1974; Krist & Nair, 2020). A recent study carried out in the National Library of Sri Lanka finds that 75% of the collection was stained due to fungal activities out of the 47,250 leaves. Similarly, 7560 folios or 61% were stained due to the presence of Mold in the collections at Medavela Rajamaha Vihara. Hence it can be suggested that Mold is a very common factor that plays a vital role in contributing to stains in PLMs located in warm and humid tropical environments.

Conclusions and suggestions

The collections were mostly damaged by the termites. While the considerable attack was done by silverfish, weevils, booklice, ants, and cockroaches, some folios have been damaged by rodents such as rats. Molds and fungi are also largely visible in the collections.

Being a natural organic material, among the many circumstances that can promote deterioration, incorrect climatic conditions; fluctuating humidity, and high temperature, have become the major threat to the protection of the collection. Leaves are found to be stuck together while the damp condition is responsible for the growth of living organisms. As a result, PLs deteriorated. This was noticed in the both main and supplementary collections. Hence controlled environment is of dire necessity to conserve and preserve PLM collections. In addition to the incorrect environment, inappropriate temperature, incorrect humidity, improper storage constant handling, as well as lack of supervision, have caused the manuscripts to deteriorate largely.

Biological and microbiological damages that were present in the collection led to physical and chemical damages eventually in the PLMs, making the causes of deteriorating factors interrelated. Hence, the extent of deterioration and degradation of Medavela Rajamaha Vihara PLM collection shows that factors that contributed in damaging are linked to each other and instigated chemical, physical, and biological degradation. For example, incorrect environmental conditions catalyze the growth of fungus, etc. while that promotes the fragility of the leaves. Therefore, when adhering to conservation and preservation measures. It is suggested to store the collection in a friendly environment to safeguard and protect the collection in long run.

Considering the value of the collection, systematic documentation measures are suggested. Manuscript folios that are mixed due to loss of wooden cover required to be sorted out. Future research may be carried out to conserve and preservation of

the collection. This collection's intangible knowledge could be immense and therefore, further studies should be carried out for the benefit of future generations interested in conducting studies and research on this written heritage and sharing and disseminating newly found knowledge among themselves and others.

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