ABSTRACT

India has a rich architectural heritage spanning 2000 years and there are numerous monuments spread across the length and breadth of the country. The geological diversity of the nation provided different materials for the construction of these monuments, stone being a prime building material from ancient times to date. Much of the architectural heritage in the country is religious in nature and most of the temples in the state of Tamilnadu are constructed out of granite. But the earliest temples which laid the basis for the South Indian/Dravidian style were built out of sandstone by the Pallava rulers during 674 A.D - 800 A.D.

The conservation of most monuments is under the purview of the Archaeological Survey of India (ASI), a central government organization and one of the premier institutions in protecting monuments in India. However, their work in this area is hampered because of the lack of a strong data base and research in the area of architectural conservation.

The area of this doctoral work is limited to the conservation of sandstone temples built between 674 A.D and 800 A.D in Kanchipuram town, (Kanchipuram district, Tamilnadu, India) with specific reference to material conservation. These sandstone temples are declared as protected monuments by the ASI because of their historical and aesthetic value and they are six in number. Out of these six monuments the Royal temples namely, the Kailasanatha temple, the Vaikuntha Perumal temple and the Iravataneswara temple are larger in scale and not taken for detailed study as large surfaces of
sandstone have been covered by the application of lime plaster as a protective measure, thereby falsifying the historic fabric. The other three monuments, the Matangeswara temple, the Mukteswara temple and the Piravataneswara temple are in a comparatively pristine state and therefore short listed for detailed study.

It was found that though photo-documentation of the temples, their general maintenance, annual cleaning, minor repair works, and landscaping the surroundings are taken care of by the ASI there is a total absence of primary data on the present status of the deterioration, and nature of the sandstone used in the monuments to enable conservation works. Hence this study has been an attempt to prepare primary data which would find application in the conservation and restoration of these temples.

It was also found during the field study, that the deterioration of the monuments was primarily due to the extensive weathering of sandstone surfaces. In addition, authentic records on the source of sandstone procured for the construction of the monuments is not available. Also the fact that the state of Tamilnadu is a granitic belt and there are no operational quarries of sandstone led to the investigation of the source of material.

The objectives of the study are 1) To characterize the sandstone used in the monuments 2) To investigate the present status of the deterioration of sandstone used in the monuments by decay mapping and 3) To identify the geographical locations in Tamilnadu which will provide geologically compatible fresh sandstone as replacement material for future conservation works.
To meet the objectives of the study investigation was conducted in three stages. In the first stage, to understand the nature of the sandstone used in the temples, three sandstone samples were collected to obtain mineralogical and petrological data. With the petrological analysis and chemical analysis, the sandstone used in the temples is classified according to the mineral composition as Calcareous sandstone. Further, the results of the petrological analysis form the comprehensive basis to help trace the geological source.

In the second stage, an investigation of the present status of deterioration of sandstone temples was done by the method of decay mapping. Documentation was done for three temples under detailed study to understand the architectural style and the construction methodology adopted. Plan, elevations and sections were constructed first hand, to form the base data for decay mapping of the monuments. Decay mapping of the temples provided the data on the level of the damage caused to the monuments. The results of decay mapping of the temples revealed that the sandstone surfaces in the temples have undergone a very severe damage indicating the need for preservation. Based on the results of decay mapping, conservation measures are suggested.

Replacement of sandstone is suggested as one of the conservation measures in places where the stone material is irretrievably lost contributing to the loss of historic, aesthetic and architectural value. However, the absence of sandstone quarries in Tamil Nadu is a constraint to procure fresh sandstone. Hence the third stage of investigation was carried out to locate the geographical locations from which compatible sandstone could be procured for future conservation works. An examination was done with the Geological
map of Tamilnadu, the Geological map of Kanchipuram and the lithological data of Kanchipuram district, to locate fresh sandstone. Fresh sandstone samples were collected from the field and characterized to find the compatibility. The petrographic and chemical analyses of fresh sandstone revealed that the sandstone collected from the field was compatible with the weathered sandstone samples collected from the temples. Fresh sandstone can therefore be procured from the geographical locations identified by the study for future conservation and restoration works.

The contribution of this doctoral work is threefold. It has provided a data base on the nature of sandstone used in temples. This gives the primary data for further weathering studies. Secondly, it has documented first hand, the three sandstone temples to enable decay mapping. Decay mapping applied to evaluate deterioration of the temples provides the method and base data, which can be utilized for similar conservation works undertaken by the ASI. Thirdly, it has located fresh sandstone for future conservation and restoration of these temples. This is a valuable data for the ASI to obtain fresh sandstone for future conservation works and this could be placed as an Archival record in the State Archives, Tamilnadu, India.