ABSTRACT

Nepal is rich in cultural heritage and diversity. Heritage sites and monuments of Nepal are recognised globally and are of immense importance to the local and worldwide audience. These sites support the cultural and traditional beliefs of local people and simultaneously entice people from all over the world to witness the magnificence, feel the spirit and the conservational perspectives behind these articulated edifices. Transformation in lifestyle, cultural practices, technology, and tourism demands the management and intervention of artificial lighting at heritage sites and monuments. Most of the historical monuments in Nepal were constructed during the 15^{th} to 18^{th} century and were designed to incorporate oil or fat-based wick lamps for lighting. The intervention of modern electric lighting in these structures should be carried out without conceding cultural values, visual perception, and traditional outlook. On the contrary, in most of the sites, there are no lighting or unscientific lighting interventions that are inappropriate, unsurpassed, exaggerated, and unpleasant. These practices have impeded the magnificence of these sites, tourism and the lifestyle of people residing in the vicinity.

This research first reviewed the status of lighting practices in heritage sites and temples to identify problem areas. In addition, the opinion of concerned stakeholders was studied through survey questionnaires to analyse prominence, need, and prospect. Laboratory experiments were then performed to characterise the photometric and colorimetric parameters of light sources and construction materials used in the heritage site of Nepal, taking reference to Tripureshwor Mahadev temple and Bhaktapur Durbar Square. Subjective preference and spectral reflectance of building materials were studied under different lighting conditions. The studies were based on RGB mixed light sources with CCT in the range of 1735 to 7669 K. For realistic performance evaluation, different lighting scenarios were simulated by creating a three-dimensional model of a typical Pagoda architecture in DIALux. Following the simulation, on-site validation was done by installing a lighting system at a section of Tripureshwor Mahadev temple.

Based on the survey, experiments, and simulation results, this dissertation makes recommendations for managing existing lighting systems and intervention of new lighting systems at Nepal's heritage sites and monuments. Recommendations are focused on the photometric and colorimetric parameters of a light source, luminaire type and luminaire placement plan. These recommendations are expected to enhance the appreciation of the artefacts, improve lighting scene, improve visual ambience, reduce adverse effects, preserve artefacts, and improve safety. In addition, several social, cultural, and economic benefits are anticipated. The outcome of this research is therefore expected to be highly effective in promoting appropriate modern lighting interventions in heritage sites and monuments on a scientific basis that considers local artefact properties as well as other contemporary issues such as conservation, restoration, visual-ambience, tourism, security, and economy. Although the dissertation considers the heritage sites or monuments in Nepal, many of which are undergoing restoration following the damage due to 2015 earthquakes, the methodology and results concerning the evaluation of existing lighting systems and designing or visualising better lighting interventions should be applicable in any general context.