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# THE DOCTORAL RESEARCH ABSTRACTS

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**Title :** ASSESSING GREEN SPACE COOLING EFFECTS ON THE TROPICAL URBAN MICROCLIMATE

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Urban Heat Island (UHI) is a phenomenon where the temperature distribution in the urban areas is significantly warmer than the surrounding suburban areas. One of the main causes of UHI is the replacement of natural surfaces by built surfaces through urbanisation. Trees and vegetation play vital roles to mitigate the UHI effects, especially by regulating high temperature in saturated urban areas and their surroundings. This study evaluated the effects of land use/land cover on the surface temperature of an urban area, especially in a hot and humid tropical climate like Malaysia. The objectives were to determine the surface temperature distribution within the different land covers, to analyse the vegetation growth impact on land surface temperature, to determine the temperature distribution within parks, to quantify the green space cooling effect intensity, and to analyse the surface temperature distribution of different land covers within 24 hours. The study areas were mainly located within the Petaling Districts, Selangor Darul Ehsan. For a more detailed study to quantify the green spaces cooling effects, Shah Alam Lake Garden (Shah Alam), Bandaran Kelana Park (Kelana Jaya) and Subang Ria Recreational Park (Subang Jaya) were selected as the test sites. Land use/land cover, vegetation, and surface temperature distribution maps were derived from Landsat 5 Thematic Mapper (TM) image of 1991, 1999 and 2009. Other satellite data used in this study were Landsat 8 Operational Land Imager (OLI) and Landsat 8 OLI/Thermal Infrared Sensor (OLI/TIRS) images of 2013 and 2014. Mono-window algorithm was used to generate temperature distribution maps

of the study areas. Land cover classification and land cover profile of the selected study areas were generated in the digital image processing software. Geographical Information System (GIS) was used to generate the land surface temperature (LST) map, measure the LST of selected points within specified buffer zones, perform overlay, and buffer operations. The green space cooling effect intensity and the relationship between intensity and proximity from green space boundary were later determined. Major findings of this research indicated surface temperature within built-up areas was highest, followed by cleared land, mixed vegetation, water bodies, and vegetated areas. Within a park, the temperature can be significantly different, depending on the park profile (land cover). Vegetated areas, especially areas with matured trees, help to reduce the surface temperature of the surrounding. Findings from this research had also found that the cooling effect intensity of the surrounding urban areas largely depends on the green space density profile and the distance from the park boundary. Parks can influence the temperature of the surrounding area up to 350m from the park boundary. The introduction of green areas or parks in urban areas can be considered as a good initiative to replace the loss of natural greenery and can potentially reduce the effects of UHI. In future, a more detailed study should be carried out to identify which tree species can significantly reduce the surface temperature within an urban area.