World Academy of Science, Engineering and Technology
International Journal of Urban and Civil Engineering
Vol:17, No:08, 2023

# Investigating the Effect of Urban Expansion on the Urban Heat Island and Land Use Land Cover Changes: The Case Study of Lahore, Pakistan

**Authors :** Shah Fahad

**Abstract :** Managing the Urban Heat Island (UHI) effects is a pressing concern for achieving sustainable urban development and ensuring thermal comfort in major cities of developing nations, such as Lahore, Pakistan. The current UHI effect is mostly triggered by climate change and rapid urbanization. This study explored UHI over the Lahore district and its adjoining urban and rural-urban fringe areas. Landsat satellite data was utilized to investigate spatiotemporal patterns of Land Use and Land Cover changes (LULC), Land Surface Temperature (LST), UHI, Normalized Difference Built-up Index (NDBI), Normalized Difference Vegetation Index (NDVI), and Urban Thermal Field Variance Index (UTFVI). The built-up area increased very fast, with a coverage of 22.99% in 2000, 36.06% in 2010, and 47.17% in 2020, while vegetation covered 53.21 % in 2000 and 46.16 % in 2020. It also revealed a significant increase in the mean LST, from 33°C in 2000 to 34.8°C in 2020. The results indicated a significantly positive correlation between LST and NDBI, a weak correlation was also observed between LST and NDVI. The study used scatterplots to show the correlation between NDBI and NDVI with LST, results revealed that the NDBI and LST had an $R^2$ value of 0.6831 in 2000 and 0.06541 in 2022, while NDVI and LST had an $R^2$ value of 0.0235 in 1998 and 0.0295 in 2022. Proper environmental planning is vital in specific locations to enhance quality of life, protect the ecosystem, and mitigate climate change impacts.

**Keywords :** land use land cover, spatio-temporal analysis, remote sensing, land surface temperature, urban heat island, lahore pakistan
**Conference Title :** ICEUP 2023 : International Conference on Environment and Urban Planning
**Conference Location :** Budapest, Hungary
**Conference Dates :** August 17-18, 2023