Geospatial Assessment of Urban Blue and Green Spaces in Abuja Municipal Area Council

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SUMMARY

This study evaluates the role of urban blue and green spaces in mitigating Urban Heat Islands (UHIs) in Abuja Municipal Area Council (AMAC), Nigeria. Employing geospatial techniques, the study analyzes the spatial distribution and thermal effects of vegetation and water bodies using indices such as NDVI, MNDWI, and NDBI, alongside Land Surface Temperature (LST) derived from Landsat 8 and Sentinel-2 data. The results reveal that areas with dense vegetation, such as Tunga Jankua and Gwi, demonstrate significant cooling effects, while urbanized regions like Lugbe and Garki exhibit higher LST values, peaking at 49.5°C. A strong negative correlation between NDVI and LST (-0.57, $R^2 = 0.32$) underscores the cooling impact of green spaces, whereas a positive correlation with NDBI (0.53, $R^2 = 0.28$) highlights the thermal burden of urbanization.

The Urban Thermal Field Variance Index (UTFVI) and Urban Cooling Intensity (UCI) metrics illustrate the effectiveness of blue and green spaces in reducing thermal discomfort, with notable cooling zones around Jabi Lake and the National Arboretum. Buffer analyses further delineate the cooling gradients from these spaces, validating their role in urban temperature regulation. Despite these benefits, the study identifies hotspots in regions like Iddo and Kabusa, emphasizing the urgency for targeted interventions.

The research concludes that integrating green and blue spaces into urban planning strategies is vital for reducing UHI effects and enhancing ecological and thermal comfort. This study serves as a reference for sustainable urban development in Nigeria, advocating for the conservation and expansion of natural spaces to address urban climate challenges effectively.

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