VERIFICATION OF BALIKPAPAN CITY DEVELOPMENT USING LAND COVER CLASSIFICATION AND NIGHTTIME LIGHT DATA

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ABSTRACT

The rapid development of Balikpapan City as a national activity center has triggered significant changes in land cover, particularly the expansion of built-up areas and the reduction of vegetation. This study aims to verify the urban development of Balikpapan City through the integration of land cover classification data and Nighttime Light (NTL) intensity, to assess their consistency in representing the spatial dynamics of urban growth. The research applies a quantitative-descriptive approach by analyzing Landsat 8 satellite imagery using supervised classification with the Random Forest algorithm, and VIIRS/DNB data to identify changes in nighttime light intensity using the Jenks Natural Breaks threshold. Both datasets were then verified using the Chi-Square test and Cramer's V to determine the spatial relationship between built-up areas and NTL intensity. The results show a significant increase in built-up areas and a decrease in vegetation across Balikpapan City over the study period. The rise in NTL intensity was mainly observed in South, East, and North Balikpapan, indicating the expansion of urbanized zones and higher human activity density. The Cramer's V value indicates a strong correlation between NTL data and the land cover classification results. In conclusion, Nighttime Light data effectively validates urban development spatially, with the city's growth direction predominantly expanding toward the northeast. This integrated approach provides an efficient and sustainable alternative for monitoring urban development.

Keywords*: Urban development, Land cover, Nighttime Light, Spatial verification, Balikpapan City.*