Building Sustainable Green Cities: Spatial Insights into Urban Expansion and Its Prediction in Nigeria

Afolabi Olabamiji and Olayinka Ajala (Nigeria)

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SUMMARY

Achieving sustainable green cities has been a concern for many organizations in the face of various environmental challenges, including climate change and deforestation, among others. This conference paper analysed urban expansion from 2002 to 2024, and predicted expansion up to 2046, with the aim of providing spatial insights to build sustainable green cities in Nigeria. Satellite imagery from Landsat 7 ETM+ (2002), Landsat 8 OLI (2013), and Landsat 9 OLI (2024) were the datasets used. ERDAS IMAGINE, ArcMap, and QGIS Molusce were applied for supervised classification, urban expansion analysis, and future urban growth prediction, respectively. Results reveal that urban expansion from 2002 to 2013 consisted of 479.8 hectares edge expansion, 198.6 leapfrogging expansion and 1.5 infilling expansion. From 2013 to 2024, edge expansion became more dominant, while infilling and leapfrogging expansions decreased. The model predicted that by 2046, urban expansion will encroach approximately 1,864 hectares of the existing green lands, including farmlands and vegetation, raising concerns about the availability and sustainability of green spaces in cities. This study recommends effective zoning policies and strict control of the conversion of green lands into built-up areas. This will provide the residents, government authorities, policymakers, and urban planners with spatial insights on how to develop sustainable green cities.