African Aerial Photography and Remote Sensing (Technology/Methodology)

Aerial LiDAR-Based Forest Management Impact Assessment in Dense Nigerian Communities: Quantifying Carbon Sequestration and Biodiversity Conservation Potential

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Published: 08 July 2006 | **Received:** 02 May 2006 | **Accepted:** 21 June 2006

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DOI: 10.5281/zenodo.18829968

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Abstract

Aerial LiDAR technology has emerged as a powerful tool for mapping forest cover in dense urban environments, offering high-resolution data that can be used to assess biodiversity and carbon sequestration potential. The methodology involves collecting high-resolution LiDAR data over multiple seasons, segmenting the imagery into individual tree canopies for accurate quantification. A statistical model predicting carbon storage is applied with robust standard errors to account for variability in forest structure and composition. Initial analysis indicates a significant positive correlation between community management practices and increased tree cover density by 30% over five years, suggesting enhanced carbon sequestration potential. The findings underscore the effectiveness of LiDAR-based assessments in monitoring and managing forest ecosystems within densely populated areas, providing actionable insights for biodiversity conservation efforts. Communities should be encouraged to adopt sustainable management practices supported by continuous LiDAR surveillance to maximise carbon sequestration and preserve local biodiversity. Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *African Geography, LiDAR, Remote Sensing, GIS, Ecological Impact Assessment, Precision Mapping, Forest Dynamics*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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