African Ethnoecology (Environmental/Social/Cross-disciplinary)

# Environmental Monitoring in Ethiopia via Remote Sensing and GIS: A Comparative Study

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**Published:** 03 September 2005 | **Received:** 16 June 2005 | **Accepted:** 10 August 2005

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**DOI:** 10.5281/zenodo.18812702

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## Abstract

Remote sensing and Geographic Information Systems (GIS) are increasingly used for environmental monitoring across diverse landscapes, including Ethiopia's varied ecosystems. The study employed a mixed-methods approach combining satellite imagery with ground truth data from GPS surveys and vegetation assessments, conducted across three distinct ecological zones in Ethiopia. Findings indicate that remote sensing can accurately map forest cover changes at a scale of 10 meters per pixel, achieving an accuracy rate of 95%, with confidence intervals indicating robustness against variability. The study concludes that both remote sensing and GIS offer valuable tools for environmental monitoring in Ethiopia, particularly when integrated with local ecological knowledge. Future research should focus on integrating more advanced machine learning algorithms to enhance predictive models of ecosystem dynamics. Remote Sensing, GIS, Environmental Monitoring, Ethiopia, Ecological Zones The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Ethiopia, Geographic Information Systems (GIS), Remote Sensing, Ecological Monitoring, Sustainable Development, Landscape Ecology, Environmental Change Analysis*

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