



Remote Sensing and GIS for Environmental Monitoring in Ethiopia: An Intervention Study

Ayene Berhanu¹, Fikadu Assefa¹, Abiy Desta², Weyni Gebreab^{1,2}

¹ Haramaya University

² Ethiopian Public Health Institute (EPHI)

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Correspondence: aberhanu@aol.com

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Author notes

Ayene Berhanu is affiliated with Haramaya University and focuses on Environmental Science research in Africa.

Fikadu Assefa is affiliated with Haramaya University and focuses on Environmental Science research in Africa.

Abiy Desta is affiliated with Ethiopian Public Health Institute (EPHI) and focuses on Environmental Science research in Africa.

Weyni Gebreab is affiliated with Ethiopian Public Health Institute (EPHI) and focuses on Environmental Science research in Africa.

Abstract

Remote sensing and geographic information systems (GIS) have been increasingly utilised for environmental monitoring in various regions around the world. The study employed high-resolution satellite images from multiple sources, including Landsat and Sentinel missions, to monitor land cover changes over time. These images were processed using standard remote sensing techniques such as image classification and spectral analysis. The spatial data was then integrated into a GIS platform where layers of environmental variables (e.g., vegetation types, water bodies) were overlaid for detailed mapping. The findings reveal that the integration of satellite imagery with GIS significantly improved the detection of land cover changes, especially in areas previously obscured by cloud cover. A notable proportion—approximately 85%—of newly detected changes could not be identified using traditional field surveys alone. This study demonstrates the utility of remote sensing and GIS for environmental monitoring, particularly in regions with limited ground data coverage. The results suggest that continuous satellite monitoring should be complemented by periodic on-ground verification to ensure accuracy. Additionally, further research into cost-effective sensor systems is recommended to extend this approach to more resource-constrained areas. Remote Sensing, GIS, Environmental Monitoring, Ethiopia, Land Cover Changes The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: African Geography, Remote Sensing, GIS, Landscape Monitoring, Ecological Mapping, Spatial Analysis, Conservation Ecology

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