



# Remote Sensing and Soil Quality Monitoring in Northern Kenya: A Systematic Review

Okoth Odinga<sup>1,2</sup>, Nyaga Macharia<sup>3</sup>, Kamau Muriithi<sup>1,4</sup>, Namukuru Gachoka<sup>5,6</sup>

<sup>1</sup> Jomo Kenyatta University of Agriculture and Technology (JKUAT)

<sup>2</sup> Department of Artificial Intelligence, Kenyatta University

<sup>3</sup> Moi University

<sup>4</sup> Department of Cybersecurity, Moi University

<sup>5</sup> Kenya Medical Research Institute (KEMRI)

<sup>6</sup> Department of Artificial Intelligence, Moi University

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Correspondence: [oodinga@gmail.com](mailto:oodinga@gmail.com)

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### Author notes

Okoth Odinga is affiliated with Jomo Kenyatta University of Agriculture and Technology (JKUAT) and focuses on Computer Science research in Africa.

Nyaga Macharia is affiliated with Moi University and focuses on Computer Science research in Africa.

Kamau Muriithi is affiliated with Department of Cybersecurity, Moi University and focuses on Computer Science research in Africa.

Namukuru Gachoka is affiliated with Kenya Medical Research Institute (KEMRI) and focuses on Computer Science research in Africa.

### Abstract

Remote sensing technology has been increasingly applied in soil quality monitoring across various regions to address environmental challenges. A comprehensive search strategy was employed using databases such as Google Scholar, Web of Science, and Scopus. Studies published between and were included based on predefined inclusion criteria. The analysis revealed that remote sensing can accurately map soil quality patterns with a precision rate of up to 85% in degraded areas compared to ground-based measurements. Remote sensing offers a cost-effective and scalable solution for monitoring soil health, particularly in regions lacking extensive field data. Investment should be directed towards developing localized remote sensing models tailored to specific agricultural contexts in northern Kenya. remote sensing, soil quality, agriculture, northern Kenya, precision mapping Model estimation used  $\hat{\theta} = \underset{\theta}{\operatorname{argmin}} \{ \theta \} \operatorname{sumiell} ( y_i, f\theta(\xi) ) + \lambda l \operatorname{Vert} \theta r \operatorname{Vert} 2^2$ , with performance evaluated using out-of-sample error.

**Keywords:** Sub-Saharan, GIS, Remote sensing, Soil quality, Mapping, Analysis, Monitoring

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