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Evaluating Communal Grazing Reserve Efficacy for Rangeland Biomass Restoration in Afar, Ethiopia

An Integrated Remote Sensing and Field Assessment

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ABSTRACT

Background: Communal grazing reserves are a key rangeland management strategy in arid and semi-arid pastoral systems of the Horn of Africa, yet empirical evidence of their efficacy for biomass restoration remains limited and contested.

Purpose and objectives: This study quantitatively assessed the effectiveness of community-enforced grazing reserves on rangeland biomass recovery in the Afar pastoral region. The primary objective was to determine if reserves significantly increased above-ground biomass compared to continuously grazed areas.

Keywords: *rangeland restoration, pastoralism, communal grazing reserves, remote sensing, Afar region, biomass recovery, Horn of Africa*

Article Highlights

- Integrated remote sensing and field assessment approach
- 34% higher biomass in reserves vs. open-grazed areas
- Sentinel-2 NDVI analysis reveals consistent greenness divergence
- Supports formal recognition of communal institutions in policy

Methodological Insight

Linear mixed-effects modelling with Sentinel-2 NDVI time-series and ground-truthed biomass measurements from paired reserve and open-grazed sites.

This study provides the first integrated evidence quantifying biomass recovery in Afar communal reserves.

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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