

Mapping Cultivation Expansion in the Rangeland: Determinants and Implications on Pastoral land use Systems in Borana Southern Ethiopia.

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ABSTRACT

Changes in land use for cultivation expansion hold crucial concern on landscapes in rangelands. The study integrated global positioning system (GPS) data, geographical information system (GIS), interview information, and multiple linear regression model to analyse these changes at local scale landscape. The study aimed: (a) to map spatial-temporal patterns of cultivated fields acquired by farmers based on interviews with farmers from 1984 – 2014 and GPS mapping; (b) to analyse the associations between cultivation expansion and soil and rainfall, and (c) to model the influence of elevation, slope and distance from river valley on cultivation expansion. The study used surface and overlay analyses of ArcGIS 10.2 to link cultivation pattern and biophysical conditions, statistical test checked the significances, and multiple linear regression model for predictions. Cultivation has been increased at a magnitude of 6.9 ± 5.452 hectares (ha) per annual by 54 farmers from 1984 to 2014, and the average farm size per household was 2.01 ± 1.208 ha. Cultivation gravitates on 'chromic cambisols', at a slope of $< 5^\circ$ and rainfall of 900 to 1000 mm. Elevation and slope are significant predictors in explaining land suitability for cultivation extension. Cultivation into rangelands affected low-lying grasslands and dry-season grazing reserves. The results inform policy makers and rangeland managers in identifying landscape zones prone to degradation that should be considered to improve management. GPS/GIS applications and statistical model were robust in the analysing of land use changes at local scale landscapes. In future, integrating spatial information with other higher resolution data would increase the diagnostic strength of this combination of methods.

Keywords: Land Use Change, Landscape Changes; Mapping Cultivated Fields; Biophysical

Indicators.

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