



Land change effects on ecosystem degradation across Nigerian agro-ecological zones from 1975 through 2020

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Land system change is implicated in many sustainability challenges as its alteration impacts ecosystems and exacerbate the vulnerability of communities, particularly where livelihoods are largely dependent on natural resources. The production of a land use-cover map for year 2020 extended the time-series for assessing land use-cover dynamics over a period of 45 years (1975-2020). The case of Nigeria is examined as the land area encompass several agro-ecological zones. The classification scheme countries utilise for estimating Land Degradation Neutrality baseline and monitoring of the Sustainable Development Goal 15.3.1 indicator (proportion of degraded land over total land area) was used, based on seven land use-cover classes (tree-covered area, grassland, cropland, wetland, artificial surface area, otherland, and waterbody). Severity of land degradation, computed as changes in vegetation productivity using the Enhanced Vegetation Index (EVI), as well as changes in ecosystem service values were examined across the different land use-cover types, in areas of change and persistence. Land degradation is most severe in settlement areas and wetlands with declining trends in 34% of settlement areas and 29% in wetlands respectively. About 19% of tree-covered areas experienced increasing trends. In some areas of land use-cover persistence, vegetation productivity declined despite no land change occurring. For example, vegetation productivity declined in about 35% and 9% of persistent wetlands and otherland respectively between 2000 and 2020, whereas there was improvement in 22% of persistent grasslands, 18% of persistent otherlands and 12% of persistent croplands. In land change areas, about 12% and 8% of wetlands and tree-covered areas had declining vegetation trends respectively, whereas it improved the most in croplands (20%), and grasslands (16%). With some wetland, cropland and otherland areas degrading the most, protecting these critical ecosystems is required to sustain their functions and services. The finding that vegetation productivity may decline in areas of persistence underscores the importance of intersecting land use-cover (in terms of persistence and change) with vegetation productivity to identify pathways for enhancing ecological sustainability.