



Changes to agricultural landscapes impact the quality of land: An African continent-wide assessment in gained and displaced agricultural lands

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Agricultural land area is increasing globally despite the loss of productive agricultural lands in some world regions. The knowledge about major agricultural land changes and the impacts on the quality of land in both cropland and grassland in Africa is still very limited. We conducted an African continent-wide assessment of the dynamics of agricultural landscapes (i.e., gains, losses, and net change). With pressure mounting to halt biodiversity loss and stem land degradation in agricultural areas across all world regions, promoting sustainable agriculture requires not only an understanding of agricultural land-use change but also the impacts of such changes on land quality.

We identify influencing factors and model the quality of land associated with agricultural land gains and losses between 2000 and 2018. Land quality in gained and displaced croplands and grasslands was established using spatially-explicit analysis of changes in Net Primary Productivity, soil organic carbon content, crop suitability and percent yield change for five major crops of global importance grown across Africa. These are maize, rice, soybean, wheat, and alfalfa.

Influencing factors in each agricultural land change area (i.e., areas of cropland and grassland gains and losses) were examined. In cropland loss and gain areas, settlement development, proximity to perennial rivers/water bodies, and access to a major road were important. For example, most land areas transitioning to cropland in Africa were associated with large distances away from major roads. The preceding finding suggests the remoteness of newly gained croplands. However, distances to a major road, waterbody, settlement, and elevation were important for explaining grassland dynamics. Land quality was better in gained croplands than in those lost, whereas gained grasslands were of lesser quality compared to areas of grassland loss.

Five typologies of African countries were developed based on net yield and amount of land cultivated per crop in cropland change areas. Type 1 typifies net yield increase and cultivated land decrease, while type 2 is characterized by yield increase consequent upon cropland expansion. Net yield and land remain unchanged in type 3, while in type 4, cultivated land increased, but yield decreased for maize in 40% of African countries, and in type 5, yield and land area decreased. This study thus provides evidence about the quality of land in gained and lost agricultural areas and

generalizable insights on their dynamics across Africa.