

## ABSTRACT

Cropland expansion is a common strategy for boosting agricultural production in sub-Saharan Africa (SSA) even though it often leads to economic, environmental, and social trade-offs. Ensuring sustainable cropland use and their management is critical for improving food security and preserving ecosystem services. To develop policies and approaches that support sustainable cropland management at national and sub-national scales, there is a need to understand the spatial distribution of cropland expansion (/loss), and any resultant changes in cropland productivity. This is especially important in SSA countries such as Malawi, where spatially explicit assessments of changes in cropland area and cropland productivity are lacking. To address this gap in Malawi, we used multi-source satellite data and socio-economic data, combined with satellite image classification and trend analysis, firstly to quantify spatial changes in cropland area and productivity, and secondly to evaluate potentially available cropland for future expansion. We found evidence of unsustainable cropland use in Malawi, which was demonstrated by: (a) rapid cropland expansion between 2010 and 2019 (increase 8.5% of land area), characterized by an expansion of crop farming into upland areas which indicate increased land scarcity in Malawi; (b) limited potential for future expansion, as approximately only 5% of the total land remained as potentially available cropland (corresponding to 4671 000 ha); and (c) an overall reduction in cropland productivity and a prevalence of increase in soil erosion. Our findings underscore the urgent need for taking measures to promote sustainable cropland use, including by protecting current cropland from further degradation (e.g. Southern Malawi) and improving cropland use planning (e.g. Northern Malawi).