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Distribution and drivers of woody cover change in Southern African savannahs, 1984-2014.

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Savannah ecosystems cover 20% of the Earth's surface, and 65% of the African continent. These systems, comprised of a dynamic mosaic of open-canopy woody coverage and grasses, provide important ecosystem services and livelihoods to some of the poorest World's communities. Yet there is concern over the stability of many savannah regions. In particular, increases in the coverage and density of woody species at the expense of grasses poses a pronounced threat in southern Africa. Yet quantified estimates on the extent and drivers of this phenomenon remain elusive, inhibiting effective remediation efforts and incurring uncertainty in global carbon accounting systems. In this study, we use batch processing of the Landsat archive to map the fractional woody cover of a cross border section of the Limpopo catchment over 40 years. We quantified the change in woody coverage between 1984 and 2014, and used a series of Generalised Additive Models to ascertain the drivers of the observed change. Results show that woody encroachment is best explained by regional changes in rainfall, with land use or tenure playing only a minor role. Furthermore, the presence of large herbivores stabilises woody cover levels, helping to maintain national parks. These results contribute to understanding the drivers of poorly understood processes that have a widespread impact on ecosystem Carbon budgets, in southern Africa and beyond.