

# Local Wood Demand, Land Cover Change and the State of Albany Thicket on an Urban Commonage in the Eastern Cape, South Africa

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**Abstract** Understanding the rates and causes of land-use change is crucial in identifying solutions, especially in sensitive landscapes and ecosystems, as well as in places undergoing rapid political, socioeconomic or ecological change. Despite considerable concern at the rate of transformation and degradation of the biodiversity-rich Albany Thicket biome in South Africa, most knowledge is gleaned from private commercial lands and state conservation areas. In comparison, there is limited work in communal areas where land uses include biomass extraction, especially for firewood and construction timber. We used aerial photographs to analyze land use and cover change in the high- and low-use zones of an urban commonage and an adjacent protected area over almost six decades, which included a major political transition. Field sampling was undertaken to characterize the current state of the vegetation and soils of the commonage and protected area and to determine the supply and demand for firewood and construction timber. Between the 1950s and 1980s, there was a clear increase in woody vegetation cover, which was reversed after the political transition in the mid-1990s. However, current woody plant standing stocks and sustainable annual production rates are well above current firewood demand, suggesting other probable causes for the decline in woody plant cover. The fragmentation of woody plant cover is paralleled by increases in grassy areas and

bare ground, an increase in soil compaction, and decreases in soil moisture, carbon, and nutrients.

**Keywords** Biomass · Carbon · Land cover change · Deforestation · Firewood · Soils · Thicket · Woody plants

## Introduction

The Albany Thicket Biome falls within the core of one of the world's 34 biodiversity hotspots which are defined on the basis of high levels of plant endemism and significant rates of transformation or species loss (Mittermeier et al. 2004). Being a relatively understudied biome, the precise levels of endemism are unknown but have been approximated as 10–20 % of plant species (Powell 2008). At a biome level, rates of transformation have been acute, with 63 % of the biome regarded as severely transformed and degraded and 29 % moderately transformed (Lloyd et al. 2002), leading to loss of species (Lechmere-Oertel et al. 2005a) and changes in the structure and function, with degraded thicket resembling a pseudo-savanna (Mills et al. 2005). Only 6 % of the biome is in formally declared protected areas (Mucina and Rutherford 2006). This transformation from a dense, closed canopy system with a limited grassy herbaceous layer into an open pseudo-savanna takes place within a matter of decades and sometimes within a single decade (Kerley et al. 1995; Lechmere-Oertel et al. 2005a, b; Mills et al. 2005). The bulk of the degradation is considered to have occurred prior to the 1990s (Powell 2008). At the biome scale, the primary driver of the degradation has been overstocking with domestic livestock, particularly goats, on private lands and intensive land transformation to commercial agriculture.

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