

Assessing Costs, Benefits, and Feasibility of Restoring Natural Capital in Subtropical Thicket in South Africa

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South African subtropical thicket, a tall thorny shrubland, is the principal form of natural capital in the southwestern part of the Eastern Cape (ca. 33°S, 25°E). Numerous benefits accrue from this vegetation. It supports an exceptionally high natural diversity and abundance of large browsing mammals, such as black rhinoceros (*Diceros bicornis*), elephant (*Loxodonta africana*), and antelope (Skead 1987; Kerley et al. 1999); is often intensively harvested by local people for wood, fruit, and medicines (Cocks and Wiersum 2003); can sustain appropriately managed goat pastoralism (Aucamp 1976; Stuart-Hill and Aucamp 1993); is the center of a growing tourism industry (Kerley et al. 2002); and, for a semiarid region, stores an unusually large quantity of ecosystem carbon (Mills et al. 2005).

The subtropical thicket is composed of succulent (e.g., *Portulacaria afra*) and spinescent shrubs (e.g., *Azima tetraacantha*, *Gymnosporia polyacantha*, *Putterlickia pyracantha*, *Rhus longispina*), as well as small trees (<5 m) (e.g., *Pappaea capensis*, *Euclea undulata*, and *Schotia afra*). Despite a long association with large, indigenous herbivores (Midgley 1991; Kerley et al. 1995), the thicket is surprisingly sensitive to injudicious goat pastoralism (Stuart-Hill 1992). Heavy browsing by goats can transform the dense, closed-canopy shrubland into an open savanna-like system (figure 21.1); a process that can occur possibly within a decade (Hoffman and Cowling 1990b; Lechmere-Oertel et al. 2005a). Of the 16,942 km⁻² of solid (unbroken canopy) thicket (with a *P. afra* component), 46% has been heavily impacted and 36% moderately impacted by domestic herbivores; while only 1.8% and 0.5% have been transformed by cropping and urbanization, respectively (Lloyd et al. 2002).

Excessive goat browsing in this ecosystem depletes natural capital by reducing species diversity (Moolman and Cowling 1994; Johnson et al. 1999; Lechmere-Oertel et al. 2005a), above- and belowground carbon stocks (Mills et al. 2005), soil quality (Mills and Fey 2004) and plant productivity (and hence livestock stocking capacity) (Stuart-Hill and Aucamp 1993). Differences in plant productivity between transformed and intact thicket are especially apparent during drought years (Stuart-Hill and Aucamp 1993). Transformation also reduces the availability of wood, fruit, and medicines for local communities, with a potential financial loss of approximately US\$150 per annum per household (Cocks and Wiersum 2003). In this chapter, we discuss proposed methods for restoring the natural capital of subtropical thicket, the ecological thinking underlying these methods, and the economic viability of restoration at a landscape scale.