



‘Foresting’ the grassland: Historical management legacies in forest-grassland mosaics in southern India, and lessons for the conservation of tropical grassy biomes

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ABSTRACT

Colonial encounters with tropical ecosystems were primarily driven by profit-oriented management practices; witness the extensive network of timber and forestry practices that were set up across colonial India. In contrast, the colonial engagement with the montane forest-grassland mosaics of the higher reaches of the Western Ghats in southern India was marked by intensive investment in vegetation management by colonial foresters that yielded no profits. In this archival study, we trace the history of extensive vegetation transformation in this landscape from the early nineteenth to the early twentieth century. We show how the misperception that the grasslands within this mosaic must have resulted from tree felling, fire-setting and buffalo grazing by indigenous communities led colonial foresters into a century-long effort at ‘foresting’ the grasslands, primarily through large-scale planting of exotic tree species. These efforts persisted despite economic losses and ecological evidence that native tree seedlings planted in the grasslands repeatedly failed to establish. These policies continued unabated into the late twentieth century in newly independent India. Today, the once picturesque landscapes of these ancient forest-grassland mosaics are diminished by large-scale plantations of exotic species. Some of these species have become invasive and pose significant threats to the remnant natural grasslands. While this historical narrative is set in the forest-grassland mosaics of southern India, it finds striking parallels in the current day, with grasslands and savannas globally threatened by the misperception that they are ‘degraded ecosystems’ that can be ‘forested’ or converted to other ‘productive’ land uses. We suggest that this case history portends the potential fates of many of earth’s threatened tropical grasslands and savannas.

1. Introduction

Colonial encounters with tropical ecosystems were mostly driven by economic considerations, prominent amongst which was timber production (Gadgil and Guha, 1993). Colonial forestry was also marked by attempts to regulate nature in the name of ‘scientific forestry’ and ‘conservation’ (Kumar et al., 2011). In this regard, the transformation of the tropical forest (locally known as *shola*) - grassland mosaics of the upper reaches of the India’s Western Ghats stands out as a unique example in the history of colonial forestry because, unlike other landscapes, there were initially no timber trees in these landscapes and thus no apparent economic benefits to be gained, but colonial foresters nevertheless strived to control the vegetation and indigenous people of these landscapes (Sutton, 2011). The huge ensuing effort to transform the native vegetation in this landscape, ostensibly to ‘restore’ it, appears

to have been rooted in the misperception that the grasslands of these mosaics were the outcome of deliberate fires and extensive cattle grazing by indigenous communities, and it was thus necessary to reforest these in order to restore their integrity and productivity. These beliefs are evident from the following excerpts from the first manual of the Nilgiri landscape, a section in the southern Western Ghats that harbours one of the largest areas of shola-grassland mosaics in the Western Ghats: “It is, however, to be remembered that the present park-like appearance of the higher plateau, with its downs and woodlands, is also, in a great measure, due to the annual recurrence of fires which sweep over the hills, burning the grass and outlying scrub and even the smaller sholas, and checking the larger woods in their persistent efforts to extend their domain further along the sides of the valleys...Periodical fires and the grazing of the buffaloes help to keep this line distinct, and if the trees are torn or cut for firewood, nature restores the injury done to her with a lavish hand, and

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throws a mantle of rich green drapery over the wound” (Grigg, 1880).

Today, it is well-established that the shola-grassland mosaics of southern India are naturally bi-phasic Pleistocene relics that have been in existence for more than 20,000 years (Sukumar et al., 1993, 1995). Climatically sensitive, the relative extents of shola and grassland within these mosaics have naturally contracted and expanded with past climatic changes with grasslands expanding during periods of high aridity, low temperature and low CO₂ levels (Meher-Homji, 1967; Sukumar et al., 1993, 1995). These unique ecosystems support a diverse array of plant and animal species, many of which are endemic to these landscapes. These include such examples as the Nilgiri tahr (*Nilgiritragus hylocrius*; the only mountain goat in peninsular India), the Rhododendron tree (*Rhododendron nilagiricum*), and the white-bellied short-wing bird (*Brachypteryx major*), the closest relatives of which appear again only in the temperate Himalayas, more than 2000 km to the north (Schaller, 1970; Robin and Sukumar, 2002; Thomas and Palmer, 2007; Mohandass and Davidar, 2009). Importantly, of 306 recorded plant species occurring in grasslands at one of these mosaics, 51 are endemic (Karunakaran et al., 1998), attesting to the ancient assembly of the grassland communities.

In the following sections, we recreate from historical records and the literature, the ecological management of these forest-grassland mosaics in the Nilgiri landscape during the colonial period, focusing on the drivers of vegetation transformation in the region through large-scale introductions of multiple exotic plant species and subsequent invasions. We trace how these plantation experiments, based on cultural perceptions rather than ecological understanding, have had dramatic and long-term negative consequences for these highly diverse ecosystems. We conclude by comparing this case history with current day scenarios of grassland management, where tropical savannas and grasslands are heavily threatened by land-use conversion and large-scale afforestation, and have attracted prominent attention in recent scientific literature (Bond and Parr, 2010; Veldman et al., 2015a, 2015b; Bond, 2016; Lehmann and Parr, 2016; Ratnam et al., 2016; Griffith et al., 2017).

2. Chronology of colonial management history of the Nilgiri mountain ranges, southern India

2.1. Early occupation and the fuel-wood crisis

“They [the hills] are as smooth as the lawns in an English park, and there is hardly one of them which has not a mass of dark wood terminating suddenly as if it had been planted...”

This is how Sir Thomas Munro, The Governor of Madras Presidency, described the newly discovered forest-grasslands mosaics in the Nilgiri mountain ranges of India's Western Ghats in 1826 (Fig. 1a; Price, 1908). These mosaics, which occur in the upper reaches (1200 m to 2650 m asl) of the Western Ghats (8° to 21°N, 73° to 78°E; Das et al., 2015), are characterized by stunted evergreen tree forest patches, locally known as sholas, interspersed within grasslands, with abrupt boundaries between the two vegetation types (Fig. 1b). These cool, scenic landscapes of the upper reaches of the Western Ghats were more reminiscent to the British of their homeland than the hot, dusty plains of southern India.

Mr. Sullivan, the Collector of the Coimbatore district in the Madras Presidency in the 1820s, was particularly taken with the montane landscapes of the Nilgiris and strongly recommended that the Madras Government develop these areas as a sanitarium for injured British soldiers. He began by building roads and few houses on the Nilgiri plateau with government grants, and other British officials soon followed suit and built a few more houses (Sutton, 2011; Baikie, 1857).

Prior to European settlement, the Nilgiri plateau was sparsely populated by indigenous communities. Prominent amongst these were the *Badagas*, then numbering 3778, who cultivated subsistence crops such as ragi and barley, whereas the *Todas*, with a population of merely 222,



Fig. 1. a. A shola-grassland landscape in the Nilgiris in 1830s before colonial settlements (image source: reproduced from Baikie, 1857). b. A real view of a shola-grassland mosaic (image credit: Chengappa SK).

were buffalo herders. The *Kotas*, numbering about 317 were artisans who provided tools and implements to other indigenous groups. Finally, the *Irulas* and *Kurumbas*, with smaller populations of around 300 each practiced hunting-gathering and shifting cultivation for subsistence (Grigg, 1880). These communities, each with distinct ways of resource use, were living harmoniously with each other (Grigg, 1880; Prabhakar, 1994). Notably though, despite their low population densities, it was assumed that they had transformed the landscape through felling and fire.

As the European settlements in the region increased, the demand for fuelwood also increased, leading to large-scale felling of shola forests around the new colonial settlements: Udthagamandalam, abbreviated as Ooty (then known as Ootacamund) and Wellington. This in turn led to legislation by the Madras Government in 1836 to prevent such indiscriminate felling in the Nilgiri plateau, to protect the springs that provided water to the lower country (Grigg, 1880). Woodcutting without the permission of the Collector was prohibited, and brick manufacturing, which required high amounts of fuelwood, was completely banned (Grigg, 1880; Sutton, 2011). These were amongst the first attempts by the colonial government to exert control over the land and its indigenous people, most of who were completely dependent on these forests and grasslands for their living. Subsequently, in 1841, a contractual system was established for the commercial supply of fuelwood to Ooty and Wellington, where a contractor had to bid for the right to fell from a shola selected by local authorities and sell the fuelwood to the settlements (Sutton, 2011).

Despite these legislations, the steady felling of shola forests continued through the 1850s, and the Forest Department set guidelines to restrict forest destruction in 1857. The protection of springs, conservation of timber, as also the aesthetic appearance formed the basis

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