Floristic composition and structural analysis of mid-elevation shola forests in the Munnar territorial division, southern Western Ghats, India

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Shola forests, the tropical montane ecosystems of the southern Western Ghats, India, play a critical role in biodiversity conservation and hydrological regulation. The present study examines the floristic composition and structural diversity of mid-elevation sholas in the Munnar territorial division, Kerala (south of the Palghat Gap), a region known for high levels of endemism yet under-represented in existing literature. Using systematic quadrat sampling across 65 forest plots, we documented 62 tree species, 26 shrub species, and 16 herbaceous species. Lauraceae emerged as the dominant tree family, while Acanthaceae and Poaceae dominated the shrub and herb layers, respectively. Several endemic and threatened species were recorded, underscoring the conservation value of these fragmented montane habitats. The presence of invasive species such as *Ageratina adenophora* (Spreng.) R. M. King and H. Rob. and *Lantana camara* L. further signals ecological stress within these systems. The present study provides critical baseline data for mid-elevation forest zones and highlights the urgent need for targeted conservation strategies to mitigate habitat fragmentation, invasive spread, and climate-induced pressures.

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vegetation complex, where forest expansion is constrained by factors such as frost and the specific edaphic properties of the surrounding grasslands. Two distinct types of evergreen vegetation are observed in these landscapes: one extending from lower altitudes and the other occurring as patches interspersed within grasslands. Shola forests are characterised by their unique physiognomy, consisting of stunted, high-elevation evergreen trees that generally attain heights of 25–30 ft (ref. 3). Elevation plays a significant role in determining their structural attributes, with increasing altitude leading to reduced tree height, thicker leaves, and greater architectural complexity. These forests are predominantly located at the headwaters of streams, within converging slopes, and in depressions formed by landslides on hilly terrains[2]. A distinctive feature of shola forests is the abundant presence of epiphytes, which create microhabitats for various invertebrates and amphibians, enhance water storage capacity, and contribute to nutrient cycling[4]. Compared to other forest formations in the Western Ghats, shola forests exhibit higher floristic richness and species diversity[5]. The Western Ghats are known for their exceptional levels of endemism, and shola forests, in particular, represent highly specialised ecosystems often confined to the southern Western Ghats. Many of these forested regions fall within protected areas and are often referred to as 'living fossils' due to their inability to expand under prevailing climatic and edaphic constraints[6]. The composi-