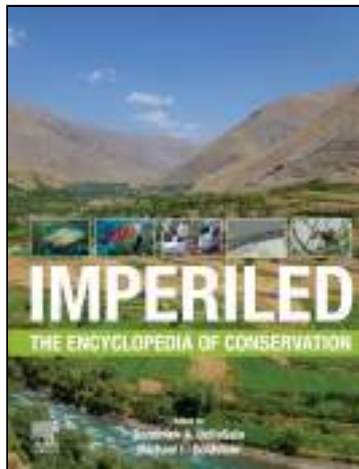


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# Niche Profiling and Niche Modelling of Endangered *Cryptocarya anamalayana* Endemic to Western Ghats for Conservation and Restoration

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## Abstract

The endangered tree *Cryptocarya anamalayana* Gamble, Southern Western Ghats was assessed in detail using multiple criteria incorporating population and other field data. The Ecological Niche profiling along with Niche modelling and incorporation of spatial threat factors has been introduced here as a new approach for the predicting suitable locations and more effective interpretation, considering the factors determining Eltonian niche, which lack in niche model-based prediction. This approach could contribute significantly to conservation planning and ecorestoration of the species and serve as a better possible model.

## Introduction

The tropical rainforest always embraces us with its great diversity of evergreen trees that have evolved to fit perfectly into different niches in the forest profile. Compared to the other forest types across the world, the structure of rainforest compactly encompasses five to six tree layers which range from very small trees of 3–7 m tall to more than 40 m, emerging intermittently above the closed canopy of large trees. All these tree forms have evolved to fill the vertical niches to most efficiently harness the abundant sunlight to energy in these tropical regions that also have no shortage of precipitation (1400–4000 mm rainfall *per annum*) and very short spans of dry weather, limited to 1–3 months in a year. Such forests cover less than 7% of the world's land area and are restricted to the rain fed areas of the tropics such as the neotropical rainforest of South America, Afrotropical rainforest in the Congo basin of South Africa and Indo Malayan rainforest of far East Asia including a small portion in the Australian continent. The Indo Malayan Forest has a very old evolutionary history and a high degree of endemism. It is also rich in diverse and endemic tree forms, of which those of the Western Ghats in Southern India are important. However, they are under immense pressure due to being located in fragile mountain landscapes, areas of high anthropogenic pressure and areas of colonial resource exploitation history. These factors along with high biodiversity distinguish these areas as biodiversity hotspots (Myers et al., 2000). India has four such biodiversity hotspots and the Western Ghats is important among them (Bawa et al., 2007).

Naturalists and ecologists have described the tropical forest as the greatest celebration of life on Earth. Earlier natural historians were also in awe of its high degree of endemism, diversity of flora and fauna, the abundance of liana, epiphytes, cauliflory and very close similarity of vegetative and floral morphology. Whitmore (1984) describes these forests as the world of Laurales and Myrtales due to their abundance as the characteristic tree forms of this forest. The members of Laurales, Myrtales and Meliales along with some characteristic members of families such as *Clusiaceae*, *Sapotaceae*, *Euphorbiaceae*, *Burseraceae* at higher elevations and the members of *Dipterocarpaceae* in lower elevations comprises 60–70% of the tree forms in tropical rainforests.

*Litsea*, *Actinodaphne*, *Beilschmiedia* and *Cryptocarya* are the important Laurales seen in India. Among the total 2978 species in the family *Lauraceae* the genus *Cryptocarya* comprises 368 species of which the majority are distributed in the tropics. Identification of tree forms up to species level is very important and difficult when we enumerate tropical rainforest regions. Members of the Laurale family are among the most difficult to distinguish due to their close similarities in vegetative and floral features (Van der Werff, 2001; Amitha Bachan et al., 2018). Many can be differentiated based on the nature of the fruits but these are very hard to spot since fruiting usually overlaps with the onset of monsoon rain in the Western Ghats. The species *Cryptocarya anamalayana* Gamble (*Lauraceae*) is one among the seven endemic tree species of the genus *Cryptocarya* and is restricted to two locations in the Western Ghats. It