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Palaeobotanical heritage of India: Historical aspects, plant fossil, geological landscapes, geoconservation and geotourism

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ABSTRACT

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India possesses one of the richest fossil-plant records in the world from Palaeozoic Gondwana coal, Mesozoic Upper Gondwana, Deccan intertrappeans and Cenozoic floras. Yet this record is rarely recognized as a heritage asset in its own right, despite its invaluable scientific importance. This paper discusses palaeobotanical heritage as part of geoheritage, considering both in-situ fossil localities and ex-situ collections, and their scientific, historical, educational and cultural importance. We review the history of Indian palaeobotany, from the colonial surveys of Feistmantel, Seward and Birbal Sahni to the establishment of the Palaeobotanical Society and the Birbal Sahni Institute of Palaeosciences. We then summarise the major palaeobotanical heritage areas viz. the Pre-Gondwana flora, the Permian 'Glossopteris Flora' of the Lower Gondwana basins, the Mesozoic 'Ptilophyllum Flora', the Early Cretaceous Rajmahal and Kachchh floras, the Deccan intertrappean floras and the Cenozoic floras of Gujarat, Rajasthan, Tamil Nadu, the Siwaliks, Kashmir and the northeastern region. Well-preserved and interpreted fossilised wood sites like Rajmahal, Akal, Dholavira and Tiruvakkarai are in-situ heritage. Ex-situ heritage is the heritage of collections like those found in museums, archives of palynological slides and records of coal mining. These collections conserve the fossil remains from places which might otherwise be destroyed. Erosion, exploitation, construction, illegal harvesting and uncontrolled tourism threaten many locations. The mere act of a National Geological Monument recognition does not itself confer protection at the site level. We propose that the fossil plant record of India should be recognised as a distinct component of the geoheritage of the country. It should be managed by integrating in-situ and ex-situ conservation and geotourism should be developed only after taking protective measures.

Keywords: Palaeobotanical heritage, macroflora, geoheritage, geoconservation, Gondwana, fossil wood, geotourism, India.

INTRODUCTION

Geoheritage refers to geodiversity that holds considerable scientific, educational, cultural, aesthetic, or inherent value. The components are divided into in-situ locations (including geosites, geomorphosites and geoparks) and ex-situ collections (such as rock, mineral or fossil assemblages stored in museums) (Reynard & Brilha 2026). Geoconservation involves policies, management approaches, and actions to protect geodiversity and geoheritage elements. The goal is to safeguard important geological sites, formations and specimens from manmade or ecological degradation, while promoting sustainable research, public education and geotourism (Góis-Marques et al. 2019).

Palaeontological heritage as a broad concept includes not only the physical fossil remains (fossil heritage) but also the scientific, palaeoenvironmental, historical and cultural values derived from studying ancient life and Earth's evolutionary history. It prioritises the scientific framework of fossil findings and its pedagogical importance to understand evolutionary history (Henriques & Pena dos Reis 2015). Globally,

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