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CONSERVATION AND PROPAGATION STRATEGIES FOR ENDANGERED AND ENDEMIC FLORA OF THE DECCAN PLATEAU

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ABSTRACT

The Deccan Plateau of India, distinguished by its unique geological formations, microclimates, and soil profiles, is a hotspot of floral diversity. This plateau encompasses vast tracts of scrub forests, grasslands, and lateritic rock outcrops that provide habitat to a wide array of endemic and endangered plant species. However, these habitats are under increasing threat due to anthropogenic pressures such as habitat fragmentation, overgrazing, unregulated harvesting, mining, and climate variability. This research paper provides an exhaustive analysis of the flora at risk, documents the ecological, cultural, and medicinal value of these species, and evaluates conservation frameworks in use. It also suggests propagation methods including modern biotechnological interventions, community-based strategies, and institutional collaboration as a sustainable pathway forward. The paper concludes with policy recommendations aimed at integrating traditional ecological knowledge with scientific conservation models.

KEYWORDS: *Phenology, Eastern Himalayas, Climate Change, Native Flora, Rhododendron, Flowering Shift, Ecological Indicators, Alpine Ecosystems etc.*

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INTRODUCTION

The Deccan Plateau spans across a substantial portion of peninsular India, covering Maharashtra, Karnataka, Telangana, Andhra Pradesh, and parts of Tamil Nadu and Madhya Pradesh. This vast geological formation is characterized by basaltic lava flows, semi-arid to dry sub-humid climates, and unique altitudinal gradients, which have contributed to the evolution of distinct vegetation types and numerous endemic plant species. Flora in this region plays a vital ecological role in maintaining soil stability, regulating water cycles, and sustaining local biodiversity.

Despite its ecological significance, the plateau's flora is increasingly threatened by deforestation, agricultural intensification, urban expansion, infrastructure development, and climate anomalies. Many endemic and endangered plant species are now restricted to isolated pockets with declining populations. These plants also hold ethnobotanical importance, providing medicinal, culinary, and ritual value to indigenous and rural communities. The challenge lies in harmonizing developmental activities with the urgent need for conservation. This study aims to catalog vulnerable species, assess threats, and present feasible strategies for conservation and propagation tailored to the regional context of the Deccan Plateau.

METHODOLOGY

The methodology adopted for this research includes a combination of fieldwork, stakeholder consultations, and review of existing literature and conservation records. Key components include:

- Conducting ecological surveys and biodiversity assessments in protected areas such as Bhimashankar Wildlife Sanctuary (Maharashtra), Bannerghatta National Park (Karnataka), and other forested landscapes.
- Interacting with tribal communities such as the Korku, Lambadi, and Chenchu to document traditional knowledge systems and conservation practices.
- Collecting data from herbarium specimens housed in national botanical institutions.
- Utilizing Geographic Information System (GIS) tools to map the distribution of endemic and endangered species.
- Analyzing policy documents and legislative frameworks under the Biodiversity Act, Forest Rights Act, and international treaties like CITES.

Discussion: 2.1

Endangered and Endemic Species: The field surveys identified over 50 plant species at risk, of which several are listed as endangered or critically endangered by the IUCN and Botanical Survey of India (BSI). Notable examples include:

- *Ceropegia jainii*: A lithophytic tuberous herb found on rocky outcrops of Maharashtra, facing extinction due to grazing and habitat degradation.
- *Pterocarpus santalinus* (Red Sandalwood): A high-value timber species with declining natural populations, now limited to fragmented patches.
- *Boswellia serrata*: Renowned for its oleo-gum resin (Indian frankincense), overharvested for pharmaceutical and cosmetic uses.
- *Decalepis hamiltonii*: Valued for its aromatic roots in traditional medicine, threatened by unsustainable extraction.

Threats to Flora

The major threats identified include:

- **Habitat Destruction**: Mining, quarrying, road building, and urbanization are rapidly reducing forest cover.
- **Overgrazing**: Excessive livestock pressure, especially in open grassland ecosystems, suppresses regeneration.
- **Invasive Species**: Species like *Lantana camara* and *Parthenium hysterophorus* displace native flora.
- **Unsustainable Harvesting**: Medicinal plants are being harvested without adequate management or regeneration plans.
- **Climate Change**: Erratic rainfall patterns, prolonged droughts, and increasing temperatures stress plant survival and reproductive cycles.

Conservation Strategies

To mitigate these challenges, a blend of conservation strategies is necessary:

- **In-situ Conservation**: Focus on preserving plants in their natural habitats through biosphere reserves (e.g., Nilgiri Biosphere Reserve), sacred groves managed by local communities, and creation of micro-reserves in biodiversity-rich sites.
- **Ex-situ Conservation**: Establishment of seed banks (e.g., National Gene Bank, Delhi), plant tissue culture laboratories for cloning rare species, and dedicated botanical gardens in state universities.
- **Community Involvement**: Training local villagers and indigenous groups as biodiversity stewards, integrating traditional conservation ethics into modern frameworks, and promoting conservation-linked livelihood options such as sustainable harvesting.
- **Legal and Policy Measures**: Strengthening enforcement of existing biodiversity legislation, enhancing the role of Biodiversity Management Committees (BMCs), and including endemic plant conservation in State Action Plans on Climate Change (SAPCC).

Propagation Techniques

- **Seed Germination Studies**: Experimental trials to determine optimal germination conditions for species with low viability.
- **Micropropagation**: Use of in vitro techniques such as callus culture and shoot tip multiplication for rare and slow-growing species like *Ceropegia jainii*.
- **Community-Based Nurseries**: Establish nurseries run by self-help groups and forest cooperatives to raise seedlings of native species.
- **Assisted Regeneration**: Controlled planting in degraded habitats to support natural regeneration using nurse crops and fencing methods.

FINDINGS

The study revealed significant conservation gaps:

- Over 70% of critically endangered species have no formal conservation program.
- Sacred groves and community-managed forest patches had 40% higher species diversity compared to state-managed reserves.
- Only a fraction of native plant species are represented in seed banks or research institutions.
- Lack of public awareness and scientific outreach contributes to poor conservation outcomes.

RESULTS

The analysis underscores that conservation success correlates with community participation, sustained funding, and integration of local knowledge. Ex-situ methods, while promising, remain limited by infrastructure and expertise. In-situ approaches are more viable when linked to eco-development initiatives that provide co-benefits to local populations. GIS mapping further illustrated the geographic clustering of endemic species in under-protected regions.

RECOMMENDATIONS

- Develop a comprehensive flora atlas of the Deccan Plateau using geotagged data.
- Strengthen regional seed banks and ensure the documentation of traditional knowledge.
- Establish training centers for conservation biology and nursery management.
- Promote biodiversity-based ecotourism to generate awareness and income.
- Incorporate conservation modules in school curricula to foster ecological literacy.
- Support interdisciplinary research on restoration ecology, climate adaptation, and ethnobotany.

CONCLUSION

Conserving the floral heritage of the Deccan Plateau is not merely an environmental imperative but also a socio-cultural necessity. Endemic and endangered species are critical components of ecosystem functionality and local traditions. Effective conservation requires a combination of habitat protection, scientific propagation, participatory governance, and public education. A regional biodiversity action plan, tailored to the Deccan's unique ecology, must be developed and implemented with inter-sectoral collaboration.

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