
WESTERN GHATS: A GLOBAL BIODIVERSITY TREASURE AND ECOLOGICAL HERITAGE OF INDIA – A REVIEW

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ABSTRACT

The Western Ghats, also known as the Sahyadri Hills, represent one of the most significant biodiversity hotspots in the world. Stretching approximately 1,600 km along the western coast of India, this mountain chain harbors exceptional levels of species richness, endemism, and ecosystem diversity. Recognized as a UNESCO World Heritage Site, the Western Ghats support thousands of plant and animal species, many of which are found nowhere else on Earth. The region plays a crucial role in climate regulation, watershed protection, carbon sequestration, and livelihood support for millions of people. However, rapid urbanization, deforestation, mining, infrastructure development, and climate change pose severe threats to its ecological integrity. This review explores the biodiversity significance of the Western Ghats, highlighting its floristic and faunal wealth, endemic species, ecosystem services, conservation initiatives, and future challenges. The review emphasizes the need for sustainable management and community participation to ensure long-term conservation of this invaluable natural heritage.

KEYWORDS: Endemism, conservation, ecosystem services, UNESCO World Heritage Site.

1. INTRODUCTION

Biodiversity encompasses the variety of life forms and ecological processes that sustain ecosystems. Regions with exceptional species richness and high levels of endemism are considered biodiversity hotspots. The Western Ghats of India are among the world's most

important biodiversity hotspots, containing remarkable biological diversity and unique evolutionary histories (Myers *et al.*, 2000).

The mountain range extends through the states of Gujarat, Maharashtra, Goa, Karnataka, Kerala, and Tamil Nadu. The Western Ghats significantly influence the Indian monsoon system and serve as the source of numerous perennial rivers (Gadgil *et al.*, 2011). Due to favorable climatic conditions, varied altitudes, and geographical isolation, the region has evolved into a center of speciation and endemism (UNESCO, 2025).

Recent studies indicate that the Western Ghats harbor over 7,400 flowering plant species, 139 mammalian species, 508 bird species, 181 amphibian species, and hundreds of fish and reptile species, many of which are endemic (World Atlas, 2025). These characteristics make the Western Ghats a priceless reservoir of biodiversity deserving global conservation attention.

2. Geographic Features of the Western Ghats

The Western Ghats extend from the Tapti River in Gujarat to Kanyakumari in Tamil Nadu, covering approximately 160,000 km² (Gadgil *et al.*, 2011). Elevations range from sea level to over 2,695 m at Anamudi Peak.

The region experiences heavy southwest monsoon rainfall, creating diverse habitats including:

- Tropical evergreen forests
- Semi-evergreen forests
- Moist deciduous forests
- Montane shola forests
- Grasslands
- Freshwater ecosystems

These varied habitats support high biological diversity and ecological complexity (Nair, 1991).

3. Western Ghats as a Global Biodiversity Hotspot

The concept of biodiversity hotspots was introduced by Myers *et al.* (2000), who identified regions possessing high species richness and endemism while facing significant habitat loss.

The Western Ghats satisfy these criteria due to:

- High levels of endemic flora and fauna
- Significant habitat diversity

- Presence of numerous threatened species
- Rapid anthropogenic pressures

According to UNESCO (2025), the region contains extraordinary levels of endemism, with approximately 54% of tree species, 65% of amphibians, and 62% of reptiles being endemic to the Western Ghats.

4. Floristic Diversity of the Western Ghats

The flora of the Western Ghats is exceptionally rich and diverse. More than 7,400 species of flowering plants have been recorded, with a large proportion being endemic (Nayar *et al.*, 2014).

Notable endemic plants include:

- *Strobilanthes kunthiana* (Neelakurinji)
- *Gymnacranchia canarica*
- *Myristica fatua*
- *Syzygium travancoricum*

The region also contains ancient *Myristica* swamps, which are relic ecosystems of great ecological significance (Pascal, 1988).

Shola forests occurring at higher elevations support unique plant communities adapted to cool and moist environments (Ramesh *et al.*, 1997).

5. Faunal Diversity and Endemism

The Western Ghats support remarkable faunal diversity.

Mammals

The region harbors numerous endemic and endangered mammals, including:

- Lion-tailed Macaque
- Nilgiri Tahr
- Nilgiri Langur

Amphibians

The Western Ghats are globally recognized for amphibian diversity. Species such as the Purple Frog are endemic and represent unique evolutionary lineages.

Birds

Important endemic birds include:

- Malabar Grey Hornbill
- Nilgiri Flycatcher

- White-bellied Blue Robin

Reptiles and Fish

Numerous endemic reptiles, freshwater fishes, and aquatic organisms occur in the region, reflecting long-term evolutionary isolation.

6. Freshwater Ecosystems and Aquatic Biodiversity

The Western Ghats form the origin of several major rivers including:

- Godavari River
- Krishna River
- Cauvery River
- Periyar River

These rivers support rich freshwater biodiversity and provide drinking water to nearly 400 million people (Molur *et al.*, 2011).

Many freshwater fish species are endemic, making the region a critical center for aquatic conservation.

7. Ecosystem Services Provided by the Western Ghats

The Western Ghats deliver numerous ecosystem services essential for human well-being.

Water Security

The mountain range acts as a water tower for peninsular India by sustaining river flow throughout the year.

Climate Regulation

Dense forests contribute significantly to carbon sequestration and climate stabilization (Gadgil *et al.*, 2011).

Soil Conservation

Forest vegetation reduces erosion and landslides, especially during monsoon seasons.

Livelihood Support

Millions depend on forest resources, agriculture, fisheries, and ecotourism associated with the Western Ghats.

8. Recent Discoveries and Scientific Importance

The Western Ghats continue to yield new species discoveries, highlighting their immense scientific value.

Recent surveys in the southern Western Ghats documented several previously unknown species of spiders, damselflies, insects, and other organisms, emphasizing that much of the biodiversity remains unexplored.

Continuous discoveries indicate ongoing evolutionary processes and underscore the need for comprehensive biodiversity assessments.

9. Threats to Biodiversity in the Western Ghats

Despite its ecological significance, the Western Ghats face numerous threats.

Deforestation

Expansion of agriculture and settlements has fragmented natural habitats.

Mining and Quarrying

Mining activities destroy fragile ecosystems and alter natural landscapes (Joshi *et al.*, 2025).

Infrastructure Development

Roads, dams, and urban expansion contribute to habitat loss and fragmentation.

Climate Change

Changes in rainfall patterns and temperature threaten endemic species with restricted geographic ranges.

Invasive Species

Non-native species adversely affect native biodiversity and ecosystem functioning.

10. Conservation Efforts and Protected Areas

Several conservation initiatives have been implemented to safeguard the Western Ghats.

Important protected areas include:

- Silent Valley National Park
- Periyar Tiger Reserve
- Bandipur National Park
- Mudumalai Tiger Reserve
- Kalakad Mundanthurai Tiger Reserve

The UNESCO designation of 39 serial sites in the Western Ghats has strengthened international conservation recognition.

Community-based conservation and sustainable ecotourism are increasingly recognized as effective approaches for biodiversity protection.

11. Future Perspectives for Sustainable Management

Long-term conservation of the Western Ghats requires:

- Strengthening protected area networks
- Promoting ecological restoration
- Encouraging sustainable agriculture
- Enhancing biodiversity monitoring
- Supporting indigenous and local communities
- Integrating climate adaptation strategies into conservation planning

Collaborative efforts among governments, researchers, NGOs, and local communities are essential for maintaining ecological resilience.

CONCLUSION

The Western Ghats represent one of the most remarkable biodiversity repositories on Earth. Their exceptional species richness, high endemism, ecological functions, and evolutionary significance make them a global conservation priority. The region supports thousands of plant and animal species, sustains major river systems, regulates climate, and provides livelihoods to millions of people. However, increasing anthropogenic pressures and climate change threaten this invaluable natural heritage. Effective conservation policies, scientific research, habitat restoration, and community participation are essential to safeguard the biodiversity of the Western Ghats for future generations. Protecting the Western Ghats is not only crucial for India but also for the global conservation of biodiversity and ecosystem services.

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