Biosphere Reserves in India

Celebrating the International Day for Biosphere Reserves

Posted On: 02 NOV 2026 6:50PM by PIB Delhi

The International Day for Biosphere Reserves celebrates the vital role these landscapes play in protecting biodiversity while sustaining human livelihoods. India's 18 notified Biosphere Reserves, including 13 recognised by UNESCO, represent a wide variety of ecosystems, from the Western Ghats to high-altitude deserts and marine habitats. Their conservation efforts are supported by scientific research, community participation and government initiatives, demonstrating how environmental protection and human well-being can coexist.

Balancing Biodiversity Conservation with Sustainable Development

Biodiversity refers to the variability of living organisms across terrestrial, marine and other aquatic ecosystems. The **Convention on Biological Diversity (CBD)** recognises three levels of this diversity. **Genetic diversity** refers to variations within a species, such as different rice varieties. **Species diversity** reflects the range of species, such as tigers, elephants and orchids in a forest. **Ecosystem diversity** encompasses different natural habitats, including forests, grasslands, wetlands and coral reefs. Collectively, these levels sustain ecological processes and support life on Earth.

Biosphere reserves are areas identified by national governments for conserving biodiversity and promoting sustainable development. They protect natural habitats, maintain ecological balance and promote the sustainable use of biological resources. Their conservation contributes to food security, water availability, climate resilience and community livelihoods. They also safeguard natural resources for the benefit of future generations.

Recognising their global importance, the **International Day for Biosphere Reserves is observed annually on 3rd November**. Proclaimed by UNESCO, the day highlights the contribution of these reserves to biodiversity conservation and sustainable development. It also promotes awareness of their role in reconciling environmental protection with human well-being.

For India, this observance reflects its commitment to protecting its rich natural heritage. As one of the world's **17 mega-biodiverse countries**, India accounts for approximately **7–8% of recorded species worldwide**, while it occupies only **2.4% of Earth's land area**. Through

its network of biosphere reserves, India seeks to strengthen ecological resilience and promote sustainable livelihoods. These efforts reflect the country's commitment to balancing conservation priorities with the developmental needs of local communities.

Biosphere Reserves: Understanding the Concept

Conserving biodiversity requires an approach that considers both natural ecosystems and the communities dependent on them. It also requires scientific research, responsible resource management and cooperation among different stakeholders. Biosphere reserves provide an internationally recognised framework for bringing these objectives together.

Launched in 1971, UNESCO's Man and the Biosphere (MAB) Programme promotes scientific approaches to improving relationships between people and their environment. Biosphere reserves function as living laboratories for testing and demonstrating sustainable development practices. They also help local communities sustain their livelihoods while living in harmony with nature.

How are Biosphere Reserves Different from Other Protected Areas?

Protected areas such as National Parks and Wildlife Sanctuaries primarily focus on protecting wildlife and their habitats under India's wildlife protection laws. **Biosphere reserves** adopt a broader approach. They connect protected ecosystems with surrounding communities, making biosphere reserves a model for demonstrating how biodiversity and human well-being can coexist.

Functions of Biosphere Reserves

Biosphere reserves pursue 3 main functions:

- **Conservation:** Protect biodiversity, genetic resources, ecosystems and landscapes, including associated cultural diversity.
- **Sustainable Economic Development:** Encourage economic and social activities that respect ecological limits and local cultural values.
- **Scientific Support:** Underpin scientific research, environmental monitoring, education, training and knowledge exchange to improve conservation practices.

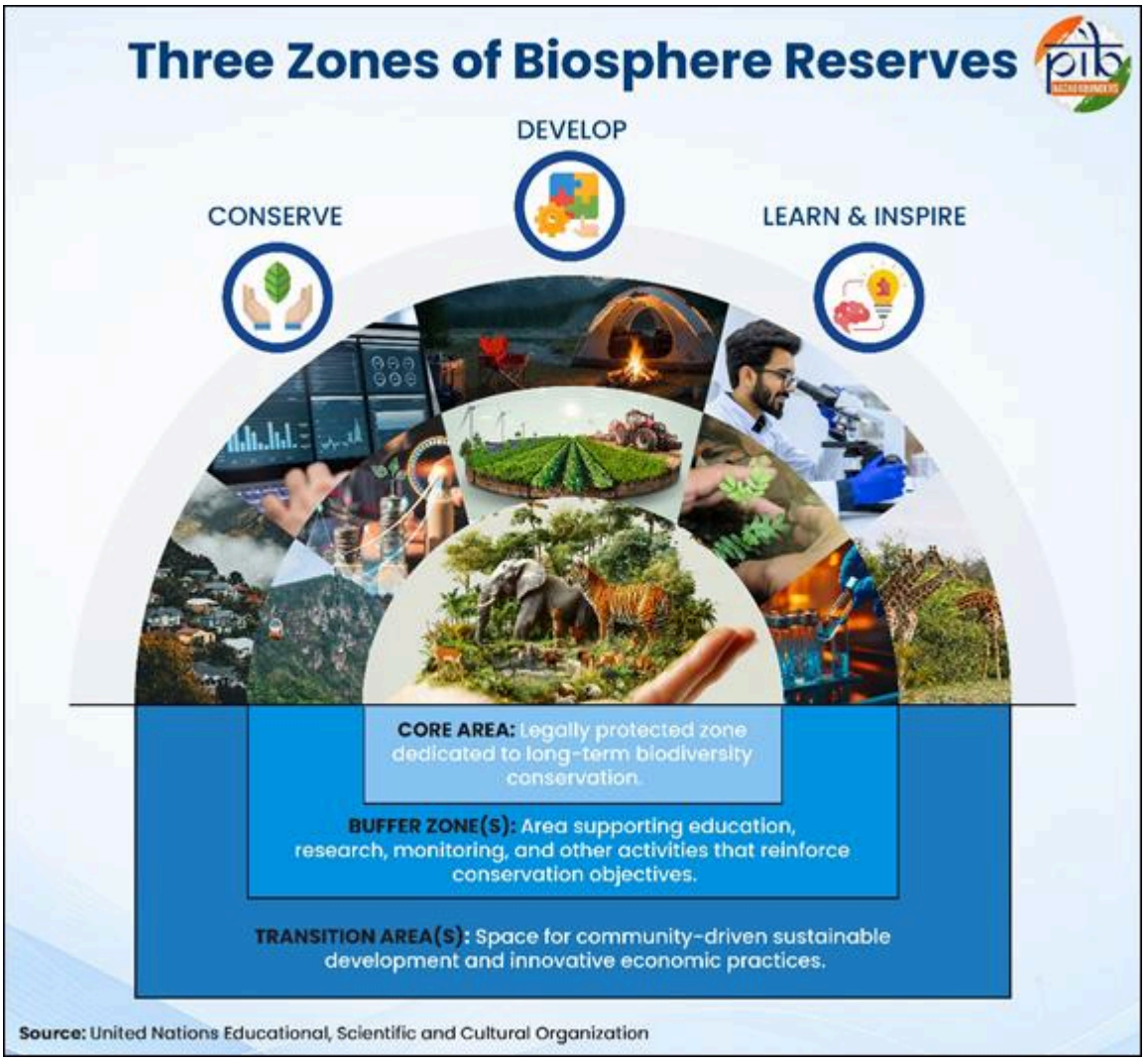
The Three Interconnected Zones

Biosphere reserves follow a zonation model that balances different levels of protection and human activity. Each zone serves a distinct purpose, while contributing to the reserve's overall objectives.

- **Core Area:** The core area provides the highest level of protection for ecosystems and biodiversity. It conserves habitats, species and genetic diversity while maintaining essential ecological processes. Human activities are strictly limited, with compatible research and monitoring supporting long-term conservation.
- **Buffer Zone:** The buffer zone surrounds or adjoins the core zone. It accommodates activities compatible with conservation, including environmental education, scientific

research and regulated ecotourism. These activities improve ecological understanding while helping reduce pressures on strictly protected areas.

- **Transition Area:** The transition area supports settlements, livelihoods and sustainable economic activities. Communities can practise responsible agriculture, sustainable forestry, ecotourism and other locally appropriate activities. This area promotes livelihoods while encouraging the sustainable use of natural resources.



Globally, biosphere reserves comprise an average of 18% core zones, 30% buffer zones and 52% transition zones. This distribution reflects their integrated approach to conservation, balancing strict protection with sustainable development.

Did You Know?

UNESCO's Network of Biosphere Reserves comprises 797 biosphere reserves across 145 countries. These sites directly benefit around 300 million people who live within these areas. Their ecological significance extends far beyond their geographical footprint. Biosphere reserves cover approximately 5% of Earth's terrestrial surface, yet sustain over 60% of the world's terrestrial vertebrate species richness. As per **the Map of the World Network of Biosphere Reserves 2025-26**, about 40% of Biosphere reserves may face more extreme climate events by 2050 and more than 50% of all biosphere reserves overlap with another international designation.

India's Biosphere Reserves

India is at the forefront of promoting and managing Biosphere Reserves, showcasing its dedication to conserving biodiversity and advancing sustainable ecosystem practices.

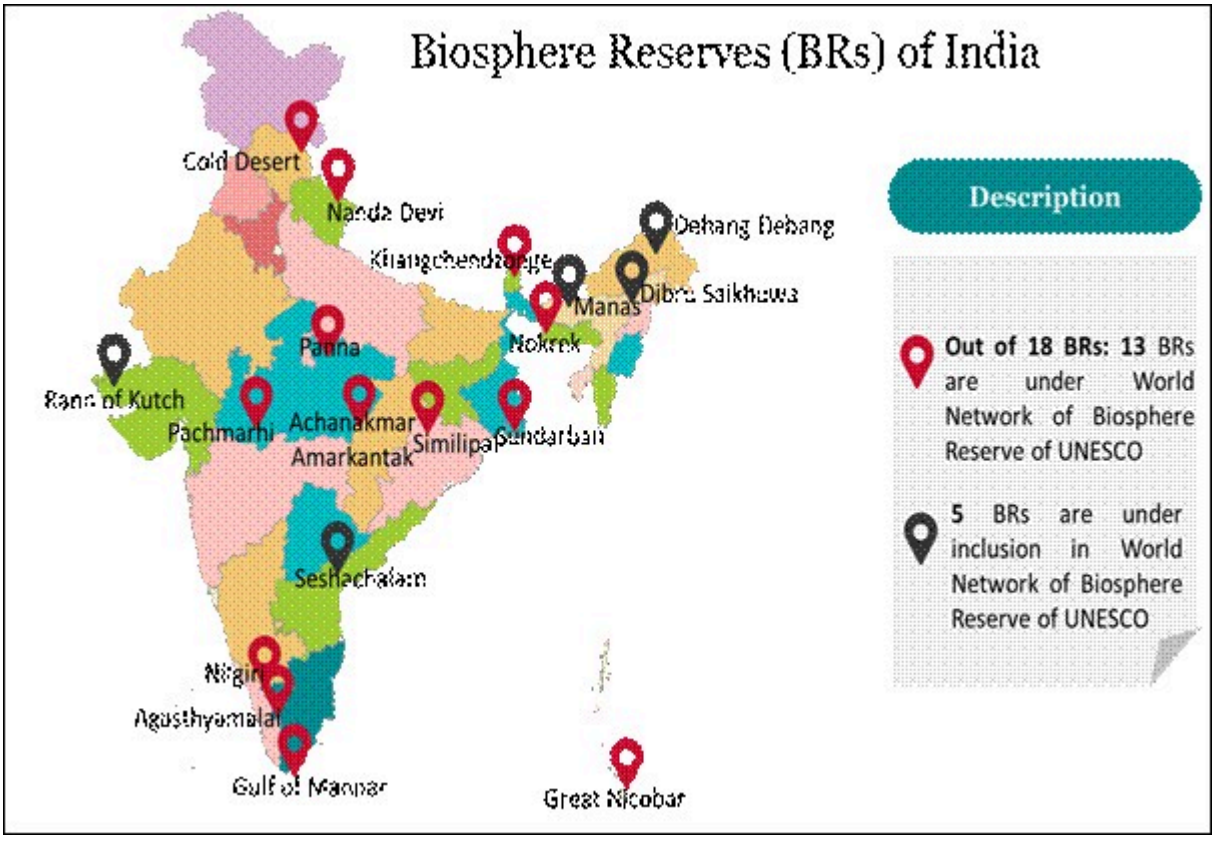
India's Biosphere Reserve Network

India's Biosphere Reserve network represents its varied ecosystems and diverse ecological heritage. As per the Ministry of Environment Forest and Climate Change (MoEFCC), the country has **18 notified Biosphere Reserves**, of which **13 belong to UNESCO's World Network of Biosphere Reserve**s. This represents the highest number of internationally recognised biosphere reserves in South Asia.

S. No.	Name of the Biosphere Reserve	Year of Designation	Year of Inclusion in WNBR	States	Area (sq. km)
1	Nilgiri*	1986	2000	Tamil Nadu, Kerala and Karnataka	5,520
2	Nanda Devi*	1988	2004	Uttarakhand	6,407.03
3	Nokrek*	1988	2009	Meghalaya	820
4	Gulf of Mannar*	1989	2001	Tamil Nadu	10,500
5	Sundarbans*	1989	2001	West Bengal	9,630
6	Manas	1989	—	Assam	2,837
7	Great Nicobar*	1989	2013	Andaman and Nicobar Islands	885
8	Similipal*	1994	2009	Odisha	5,569
9	Dibru-Saikhowa	1997	—	Assam	765
10	Dehang-Dibang	1998	—	Arunachal Pradesh	5,111.50
11	Pachmarhi*	1999	2009	Madhya Pradesh	4,981.72
12	Khangchendzonga*	2000	2018	Sikkim	2,931.12

13	Agasthyamalai*	2001	2016	Kerala and Tamil Nadu	3,500
14	Achanakmar-Amarkantak*	2005	2012	Madhya Pradesh and Chhattisgarh	3,835.46
15	Great Rann of Kutch	2008	—	Gujarat	12,454
16	Cold Desert*	2009	2025	Himachal Pradesh	7,770
17	Seshachalam	2010	—	Andhra Pradesh	4,755.58
18	Panna*	2011	2020	Madhya Pradesh	2,998.98

Note: *An (*) indicates Biosphere Reserves included in UNESCO's World Network of Biosphere Reserves (WNBR).*



Alongside this growing network, India has put in place a dedicated programme to manage and conserve these ecologically significant areas. The **Biosphere Reserve** division of the Ministry of Environment, Forest & Climate Change administers a Centrally Sponsored Scheme namely **'Biodiversity Conservation' scheme,** which is a sub-scheme under umbrella scheme **'Conservation of Natural Resources and Ecosystems'**.

Under the scheme, the Division supports Biosphere Reserves (designated under framework of UNESCO's Man and the Biosphere Programme) by providing grants-in -aid to the States where the Biosphere Reserves are located, for conservation and development activities as specified in their Management Plan. The implementation of this scheme is undertaken by the State Forest Departments. Thus, **the Ministry provides grants in aid to the states on cost sharing basis i.e. 60:40 (Central: State) for other States and 90:10 (Central: State) to North Eastern and Himalayan States.**

Since 2022–23, the Ministry has piloted five-year Integrated Management Plans for four reserves: **Nanda Devi (Uttarakhand), Pachmarhi (Madhya Pradesh), Dehang-Dibang (Arunachal Pradesh) and Agasthyamalai (Kerala & Tamil Nadu).** These plans bring reserve authorities, research institutions and local communities together. Their priorities include habitat restoration, biodiversity monitoring, scientific research and sustainable livelihoods.

Government of India's Whole-of-Government Approach

Conserving Biodiversity and Protecting Biosphere Reserves

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A Glimpse into India's Biosphere Reserves

From mountain forests to mangrove deltas, coral reefs and high-altitude deserts, India's Biosphere Reserves harbour extraordinary life.



- **Nilgiri:** Located within the Western Ghats, the Nilgiri Biosphere Reserve is a globally significant biodiversity hotspot. Spanning approximately 5,52,000 hectares across Tamil Nadu, Kerala and Karnataka, it encompasses tropical evergreen forests, montane shola forests and grasslands. This diverse landscape supports rich biodiversity, including endemic and threatened species. The reserve harbours the endangered lion-tailed macaque and Nilgiri tahr, alongside elephants, tigers, gaur, sambar and chital. It supports more than 100 mammal species and 550 bird species, besides numerous reptiles and amphibians. The Nilgiri district alone records over 6,000 plant species, highlighting the region's exceptional botanical wealth.



- **Cold Desert:** The Cold Desert Biosphere Reserve in Himachal Pradesh spans 7,770 square kilometres at elevations of 3,300–6,600 metres. Its harsh, high-altitude landscape supports 732 vascular plant species, including 30 endemics, alongside snow leopards, Himalayan ibex, and blue sheep. Around 12,000 people inhabit the region, sustaining traditional livelihoods through pastoralism, yak and goat herding, barley and pea farming, and Tibetan herbal medicine.



- **Gulf of Mannar:** The Gulf of Mannar Biosphere Reserve, located off the southeastern coast of Tamil Nadu, is one of India's richest marine biodiversity regions. Spanning approximately 1.05 million hectares, it also encompasses coral reefs, seagrass beds and mangroves. These interconnected ecosystems support 4,223 plant and animal species. The reserve sustains around 25 lakh people across a region with approximately 47 coastal villages.

Success Story: People at the Heart of Conservation



The indigenous communities in the Nilgiri Biosphere Reserve turn uprooted Lantana vines into elephant sculptures, furniture, and crafts.

This initiative supports local livelihoods while raising awareness about habitat degradation. In 2021, 125 life-sized Lantana elephants were displayed in London, promoting wildlife coexistence. Sculptures have also appeared at Bengaluru Airport, across Bengaluru, and at **Rashtrapati Bhavan**. The initiative gives removed Lantana an economic use, creates livelihood opportunities for Indigenous artisans and raises public awareness of invasive species.

Did You Know?

Lantana camara is an invasive shrub that has spread across approximately 300,000 square kilometres of Indian forests. It forms dense thickets that suppress native plants, reduce biodiversity, and alter natural fire patterns. Its chemical secretions inhibit the growth of competing vegetation, while its rapid regrowth makes removal difficult. Despite eradication efforts since 1916, controlling Lantana remains costly and challenging.

The Way Forward

India's Biosphere Reserves offer a promising model for a future where nature and people thrive together. Continued investment in scientific research, habitat restoration and community-led conservation can preserve their ecological richness. By combining traditional knowledge with modern monitoring, India can support resilient ecosystems and sustainable livelihoods. Strong partnerships among governments, researchers, local communities and international organisations will help these landscapes flourish. Ultimately, Biosphere Reserves can demonstrate how protecting nature also enriches lives, safeguards cultural heritage and secures a healthier future for generations to come.

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