

GLOBAL BIODIVERSITY HOTSPOTS WITH INDIAN HOTSPOTS

Biodiversity is a contraction of the term “biological diversity” that refers to variety among and between living organisms. The term biological diversity was used first by *Arthur Harris (1916)*, an American botanist in his article "The Variable Desert" published in a science magazine called, *The Scientific Monthly* as part of a statement:

“The bare statement that the region contains a flora rich in genera and species and of diverse geographic origin or affinity is entirely inadequate as a description of its real biological diversity”. The term, “biodiversity” was first coined by *Walter G. Rosen in 1985*.

This widely used term biodiversity does not have a universally unified definition as it is often redefined according to the context and purpose of the each author. However, biodiversity is usually defined by the biologists as the **“totality of genes, species and ecosystem of a region”**. Generally, biodiversity is divided into three fundamental categories namely genetic diversity, species diversity, and ecosystem diversity.

Biodiversity is very often regarded as a synonym of species diversity, and measured by the number of species in a particular area, species richness. The distribution of biodiversity is neither random nor uniform on earth. The distribution of species is highly concentrated in specific geographical regions of the world.

Over two-thirds of world’s biodiversity occur in tropical areas, especially in tropical forests. The tropical zones with high level of species diversity have been identified as “Biodiversity Hotspots”.

History of Biodiversity Hotspot

The term ‘biodiversity hotspot’ was coined by *Norman Myers (1988)*. He recognized 10 tropical forests as “hotspots” on the basis of extraordinary level of plant endemism and high level of habitat loss, without any quantitative criteria for the designation of “hotspot” status.

Two years later, he added eight more hotspots, and the number of hotspots in the world increased to 18 (Myers 1990).

Subsequently, the Conservation International in association with Myers made the first systematic update of the hotspots, and introduced the following two strict quantitative criteria, for a region to qualify as a hotspot:

Biodiversity Hotspots in the World

Sl. No.	Name of the Hotspot	Location
1.	Tropical Andes	South America
2.	Tumbes-Choco-Magdalena	South America
3.	Madrean Pine–Oak Woodlands	North and Central America
4.	Cerrado	South America
5.	Chilean Winter Rainfall and Valdivian Forests	South America
6.	Atlantic Forest	South America
7.	Mesoamerica	North and Central America
8.	Caribbean Islands	North and Central America
9.	California Floristic Province	North and Central America
10.	Guinean Forests of West Africa	Africa
11.	Cape Floristic Region	Africa
12.	Succulent Karoo	Africa
13.	Maputaland–Pondoland–Albany	Africa
14.	Coastal Forests of Eastern Africa	Africa
15.	Eastern Afromontane	Africa
16.	Horn of Africa	Africa
17.	Madagascar and the Indian Ocean Islands	Africa
18.	Mediterranean Basin	Europe and Central Asia
19.	Caucasus	Europe and Central Asia
20.	Irano-Anatolian	Europe and Central Asia
21.	Mountains of Central Asia	Europe and Central Asia
22.	Western Ghats and Sri Lanka	South Asia
23.	Himalaya	South Asia
24.	Mountains of Southwest China	East Asia
25.	Indo-Burma	South Asia
26.	Sundaland	Southeast Asia and Asia-Pacific
27.	Wallacea	Southeast Asia and Asia-Pacific
28.	Philippines	Southeast Asia and Asia-Pacific
29.	Japan	East Asia
30.	Southwest Australia	Southeast Asia and Asia-Pacific
31.	East Melanesian Islands	Southeast Asia and Asia-Pacific
32.	New Zealand	Southeast Asia and Asia-Pacific
33.	New Caledonia	Southeast Asia and Asia-Pacific
34.	Polynesia–Micronesia	Southeast Asia and Asia-Pacific
35.	Forests of East Australia	Southeast Asia and Asia-Pacific

Biodiversity Hotspots in India

India, the seventh largest country in the world by geographical area (constitutes 2.4% of the total geographical area of the world) with varied physiographic divisions, climatic regimes, and ecological habitats exhibits a rich floral diversity, and harbours nearly 8% of the globally known flora, of which 28% of floral elements are endemic to the country (Mao & al., 2020). India is one of the 17 mega diversity countries in the world

India has four biodiversity hotspots namely Himalaya, Indo-Burma (Northeastern India and Andaman Islands), Sundalands (Nicobar Islands) and Western Ghats (and Sri Lanka)

1. The Himalaya hotspot stretching in an arc over 3,000 km of northern Pakistan, Nepal, Bhutan and the northwestern and northeastern states of India, includes all of the world's mountain peaks higher than 8,000 m, including the world's highest mountain, Mt. Everest as well as several of the world's deepest river gorges.

The Himalayan mountains with elevation ranging from less than 500 m to more than 8,000 m supports a variety of ecosystems, from alluvial grasslands (the tallest in the world) and subtropical broadleaf forests along the foothills to temperate broadleaf forests in the mid hills, mixed conifer and conifer forests in the higher hills, and alpine meadows above the tree line. The

Himalaya hotspot was demarcated and recognized as a separate hotspot from the Indo-Burma hotspot while the global hotspot regions were revisited and redefined based on the distribution of species, threats, and changes in the threat status of these regions.

Threats:

The conversion of forests and grasslands for agriculture and settlements resulted in high rate of deforestation and habitat fragmentation, especially in Nepal, and in the Indian states of Sikkim, West Bengal (Darjeeling), and Assam. Furthermore, other anthropogenic activities such as overgrazing by domestic livestock, overexploitation of plants for traditional medicine, fuel wood collection and extraction of non-timber forest products have posed severe damage to some forest ecosystems.

The unplanned and poorly managed tourism activities contribute to deterioration of environment. Illegal poaching is also a serious problem in the Himalayas, especially the tigers and rhinoceros are hunted for their body parts for traditional medicines, whereas snow leopards and red pandas are sought for their beautiful pelts.

Other activities such as mining, construction of roads and dams, and pollution also pose threats to the existing natural habitats and biodiversity of the hotspot. In recent years, the high mountain range is also exhibiting the impacts of climate change – the glaciers are retreating, the permafrost is melting and the cloudbursts and floods are frequent.

2. Indo-Burma: Myanmar, Thailand, Vietnam, Laos, Cambodia and southern China; also included the entire northeastern India (Mizoram, Manipur, Nagaland, Meghalaya, and Tripura), and Andaman group of Islands, Bangladesh and Malaysia.

According to Conservation International the Indo-Burma is one of the top five most threatened biodiversity hotspots, due to the rate of resource exploitation and habitat loss.

Threats:

The top-ranked threats to the biodiversity of this hotspot are poaching, trade and consumption of wildlife and industrial agriculture, followed by construction of large infrastructures (such as dams, roads and ports), logging, over-exploitation of natural resources, agricultural encroachment and climate change.

3. Sundaland:

The Sundaland hotspot covers a group of some 17,000 islands in the western half of the Indonesian archipelago, and stretching around 5,000 km along the equator between Asia and Australia. The hotspot covers about 1.6 million km² area; majorly occupied by the islands of Borneo (725,000 km²) and Sumatra (427,300 km²).

Politically, Sundaland covers a small portion of southern Thailand (provinces of Pattani, Yala, and Narathiwat), nearly the entire Malaysia (nearly all of Peninsular Malaysia and the East Malaysian states of Sarawak and Sabah in northern Borneo),

Singapore at the tip of the Malay Peninsula, all of Brunei Darussalam, and all of the western half of Indonesia, including Kalimantan (the Indonesian portion of Borneo, Sumatra, Java, and Bali).

The Nicobar Islands, which are under Indian jurisdiction, are also included.

Threats:

The destruction of forest is the most significant threat to the existing biodiversity of Sundaland hotspot. The illegal and legal commercial extraction of timber and non-timber forest products, rubber production, pulp production and oil palm plantations are some of the serious threats to the forest cover in the hotspot region.

In the Jambi Province of Sumatra, the regional government is promoting expansion of oil palm plantations, and hectares of forest have been converted for the plantations. Rapid road construction increases the extent and speed of deforestation, by providing access for loggers, settlers, and miners.

The gold and silver mining operations in South Sumatra resulted in forest destruction, and increased flooding and pollution of river systems in the adjacent areas.

4. Western Ghats and Sri Lanka: Includes the entire Western Ghats [Tamil Nadu, Kerala, Karnataka, Goa, Maharashtra and Gujarat] and Sri Lanka.

Threats:

Habitat loss due to destruction, fragmentation, or degradation of natural habitats, overexploitation of biological resources, encroachment of forest areas for various plantations, conversion of forest areas and wetlands for agriculture, mining activities, grazing of livestock, invasion of alien species, illegal poaching, pollution, and climate change are posing threats to the existing flora and fauna of this hotspot.

The frequently occurring landslides due to extreme rainfall events during monsoons are considered as one of the most devastating natural disasters in the Western Ghats. Similarly, the natural and artificial forest fires also pose threat to the biodiversity of this region. The extremely high population pressure in both countries of this hotspot has seriously stressed the region's biodiversity.