

2nd sem unit 2 biogeography

BIODIVERSITY HOTSPOTS IN INDIA

There are 4 biodiversity region found in India. These are--

1. **Himalaya:** Includes the entire Indian- Himalayan region (and that falling in Pakistan, Tibet, Nepal, Bhutan, China and Myanmar)
2. **Indo-Burma:** Includes entire North-eastern India, except Assam and Andaman group of Islands (and Myanmar, Thailand, Vietnam, Laos, Cambodia and southern China)
3. **Sunda lands:** Includes Nicobar group of Islands (and Indonesia, Malaysia, Singapore, Brunei, Philippines)
4. **Western Ghats and Sri Lanka:** Includes entire Western Ghats (and Sri Lanka)

1. HIMALAYA



The Himalaya Hotspot is home to the world's highest mountains, including Mt. Everest. The mountains rise abruptly, resulting in a diversity of eco systems that range from alluvial grasslands and subtropical reeline. Vascular plants have even been recorded at more than 6,000m. The hotspot is home to important populations of numerous large birds and mammals, including vultures, tigers, elephants, „rhinos and wildwater buffalo.

VITAL SIGNS

Hotspot Original Extent (km ²)	741,706
Hotspot Vegetation Remaining (km ²)	185,427
Endemic Plant Species	3,160
Endemic Threatened Birds	8
Endemic Threatened Mammals	4
Endemic Threatened Amphibians	4
Extinct Species†	0
Human Population Density (people/km ²)	123
Area Protected (km ²)	112,578
Area Protected (km ²) in Categories I-IV*	77,739

†Recorded extinctions since 1500. *Categories I–IV afford higher levels of protection

Location:— It stretching in an arc over 3,000 kilometers of northern Pakistan, Nepal, Bhutan and the northwestern and northeastern states of India, the Himalaya hotspot includes all of the world's mountain peaks higher than 8,000 meters. This includes the world's highest mountain, Sagarmatha (Mt. Everest) as well as several of the world's deepest river gorges.

This immense mountain range, which covers nearly 750,000 km², has been divided into two regions :— 1. the Eastern Himalaya, which covers parts of Nepal, Bhutan, the north-east Indian states and of West Bengal, Sikkim, Assam, and Arunachal Pradesh, southeast Tibet (Autonomous Region of China), and 2. northern Myanmar; and the Western Himalaya, covering the Kumaon-Garhwal, northwest Kashmir, and northern Pakistan.

SPECIES DIVERSITY AND ENDEMISM

Taxonomic Group	Species	Endemic Species	Endemism (%)
Plants	10,000	3,160	31.6
Mammals	300	12	4.0
Birds	977	15	1.5
Reptiles	176	48	27.3
Amphibians	105	42	40.0
Freshwater Fishes	269	33	12.3

Biogeographically, the Himalayan Mountain Range straddles a transition zone between the Pale arctic and Indo-Malayan realms. Species from both realms are represented in the hotspot. In addition, geological, climatic and altitudinal variations in the hotspot, as well as topographic complexity, contribute on their east-west and north-south axes.

PLANTS

Of the estimated 10,000 species of plants in the Himalaya hotspot, about 3,160 are endemic, as are 71 genera. Furthermore, five plant families are endemic to the region, the Tetra-centraceae, Hamamelidaceae, Circaesteraceae, Butomaceae and Stachyuraceae. The largest family of flowering plants in the hotspot is the Orchidaceae, with 750 species, and a large number of orchids, many representing rather young endemic species, have recently been reported from the hotspot, indicating a much higher degree of plant endemism. The Eastern Himalaya is also a center of diversity for several widely distributed plants, such as *Rhododendron*, *Primula*, and *Pedicularis*.

In the Himalaya Hotspot, a zone of permanent rock and ice begins at about 5,500–6,000 m; in , while a high-altitude scree plain in the mustard family, *Ermania himalayensis*, was found at 6,300 m on the slopes of Mt. Kamet in the north western Himalayas.

2. INDO-BURMA



Encompassing more than 2 million km² of tropical Asia, Indo-Burma is still revealing its biological treasures. Six large mammal species have been discovered in the last 12 years: the large-antlered muntjac, the Annamite muntjac, the grey-shanked douc, the Annamite striped rabbit, the leaf deer, and the saola.

Vital signs—

Hotspot Original Extent (km ²)	2,373,057
Hotspot Vegetation Remaining (km ²)	118,653
Endemic Plant Species	7,000
Endemic Threatened Birds	18
Endemic Threatened Mammals	25
Endemic Threatened Amphibians	35
Extinct Species†	1
Human Population Density (people/km ²)	134
Area Protected (km ²)	235,758
Area Protected (km ²) in Categories I-IV*	132,283

Location—

The Indo-Burma hotspot encompasses 2,373,000 km² of tropical Asia east of the Ganges - Brahmaputra lowlands. Formerly including the Himalaya chain and the associated foothills

in Nepal, Bhutan and India, the Indo-Burma hotspot has now been more narrowly redefined as the Indo-Chinese subregion. The hotspot contains the Lower Mekong catchment. It begins in eastern Bangladesh and then extends across north-eastern India, south of the Brahmaputra River, to encompass nearly all of Myanmar, part of southern and western Yunnan Province in China, all of the Lao People's Democratic Republic, Cambodia and Vietnam, the vast majority of Thailand and a small part of Peninsular Malaysia.

The transition to the Sundaland Hotspot in the south occurs on the Thai-Malay Peninsula, the boundary between the two hotspots is represented by the Kangar-Pattani Line, which cuts across the Thailand-Malaysia border, though some analyses indicate that the phytogeographical and zoogeographical transition between the Sunda land and Indo-Burma biotas may lie just to the north of the Isthmus of Kra, associated endipterocarp rainforest to mixed moist deciduous forest.

SPECIES DIVERSITY AND ENDEMISM

Taxonomic Group	Species	Endemic Species	Endemism (%)
Plants	13,500	7,000	51.9
Mammals	433	73	16.9
Birds	1,266	64	5.1
Reptiles	522	204	39.1
Amphibians	286	154	53.8
Freshwater Fishes	1,262	553	43.8

The patterns of biological diversity in Indo-Burma have resulted from the interaction of topography, past climate changes, soil characteristics, and the hotspot's patterns of seasonal rainfall. The hotspot contains many localized centers of endemism, particularly montane isolates, but also are as of lowland wet evergreen forest that were isolated at some stage, and river basins.

PLANTS

Knowledge of plant species within the Indo-Burma hotspot is uneven and is hampered by socio-political divisions and taxonomic complications. A conservative estimate of total plant

diversity in the hotspot reveals about 13,500 vascular plant species, of which about 7,000 (52%) are endemic. Among the flora of the Indo-Burma Hotspot are a wide array of orchid and ginger species.

3.SUNDALAND



The spectacular flora and fauna of the Sundaland Hotspot are succumbing to the explosive growth of international animal trade that claims tigers, monkeys, and turtle species for food and medicine in other countries.

Populations of the orangutan, found only in this hotspot, are in dramatic decline. Some of the last refuges of two South east Asia rhino species are also found on the islands of Java and Sumatra.

VITAL SIGNS

Hotspot Original Extent (km ²)	1,501,063
Hotspot Vegetation Remaining (km ²)	100,571
Endemic Plant Species	15,000
Endemic Threatened Birds	43
Endemic Threatened Mammals	60
Endemic Threatened Amphibians	59
Extinct Species†	4
Human Population Density (people/km ²)	153
Area Protected (km ²)	179,723
Area Protected (km ²) in Categories I-IV*	77,408

†Recorded extinctions since 1500. *Categories I–IV afford higher levels of protection.

Location:–

The Sunda land hotspot covers the western half of the Indo-Malayan archipelago, an arc of some 17,000 equatorial islands, and is dominated by two of the largest islands in the world: 1) Borneo (725,000 km²) and 2) Sumatra (427,300 km²). More than a million years ago, the islands of Sunda land were connected to be mainland Asia. As sea levels changed during the Pleistocene, this connection periodically disappeared, eventually leading to the current isolation of the islands. The topography of the hotspot ranges from the hilly and mountainous regions of Sumatra and Borneo, where Mt. Kinabalu rises to 4,101m, to the fertile volcanic soils of Java and Bali, the former dominated by 23 active volcanoes. Granite and limestone mountains rising to 2,189 m are the backbone of the Malay Peninsula.

Sunda land is bordered by three hotspots. The boundary between the Sunda land Hotspot and the Indo-Burma Hotspot to the north west is here taken as the Kangar-Pattani Line, which crosses the Thailand-Malaysia border. Wallace's Line lies immediately to the east of the Sundaland Hotspot, separated by the famous Wallace's Line, while the 7,100 islands of the Philippines Hotspot lie immediately to the northeast.

SPECIES DIVERSITY AND ENDEMISM

Taxonomic Group	Species	Endemic Species	Endemism (%)
Plants	25,000	15,000	60.0
Mammals	380	172	45.3
Birds	769	142	18.5
Reptiles	452	243	53.8
Amphibians	244	196	80.3
Freshwater Fishes	950	350	36.8

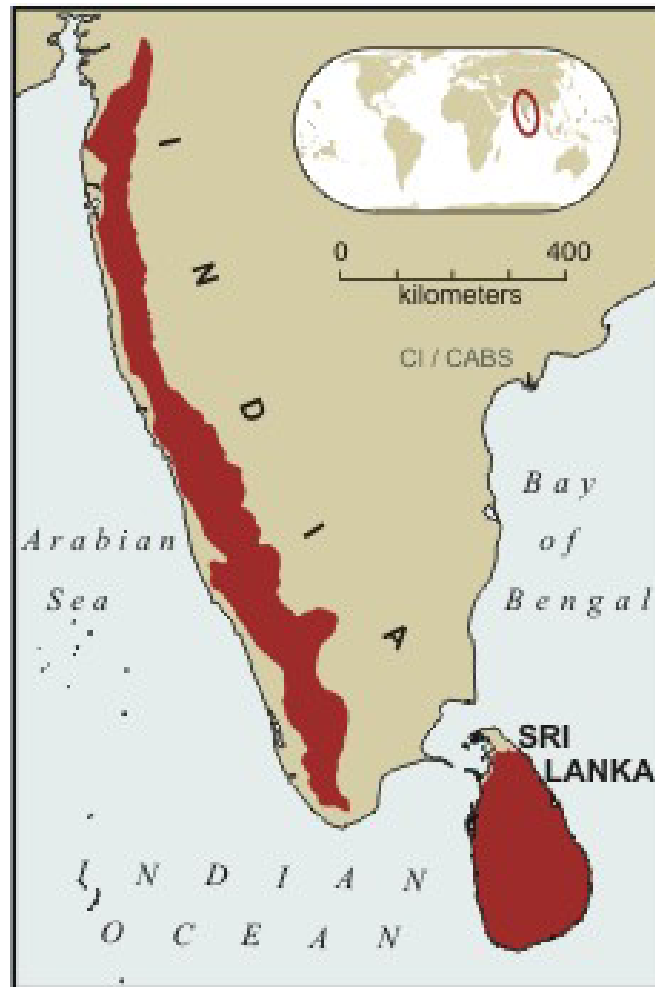
PLANTS

Sunda land is one of the biologically richest hotspots on Earth, holding about 25,000 species of vascular plants, 15,000 (60%) of which are found nowhere else. One plant family, the Scyphostegiaceae, is confined to the hotspot and is represented by a single treespecies, *Scyphostegiaborneensis* from Borneo. The rare are atleast 117 endemic plant genera in the hotspot; 59 of the endemic genera are found in Borneo, 17 in Sumatra, and 41 on the Malay Peninsula.

Borneo boasts aspect a cular diversity of trees. There are about 3,000 species, including more than 265 species of dipterocarps; no less than 155 of the seare endemic to the is land. Borneo also has more than 2,000 species of orchids. The other islands are less diverse than Borneo but still boast an impressive variety of plantlife. Sumatran forests include more than 100 dipterocarp species, nearly a dozen of which are endemic ,and Java has more than 270 endemic orchids.

Notable plants in the hotspot include members of the genus *Rafflesia*, represented by 16 species with very large flowers. One of these, ***Rafflesiaarnoldii***, has the largest flowers in the world, measuring up to one meter indiameter.

4.WESTERN GHATS AND SRILANKA



Faced with tremendous population pressure, the forests of the Western Ghats and Sri Lanka have been dramatically impacted by the demands for timber and agricultural land. Remaining forests of the Western Ghats are heavily fragmented; in Sri Lanka, only 1.5% of the original forest remains.

Population levels are also applying increased stress on the fringes of protected areas where many farms, loggers, and poachers use the resources illegally. Due in part to the varying effect of the yearly monsoons and the high mountain regions, this hotspot is home to a rich endemic assemblage of plants, reptiles, and amphibians. Sri Lanka alone may be home to as many as 140 endemic species of amphibians. The region also houses important populations of Asian Elephants, Indian Tigers, and the Endangered Lion-tailed Macaque. Freshwater fish endemism is extremely high as well, with over 140 native species.

VITAL SIGNS

Hotspot Original Extent (km ²)	189,611
Hotspot Vegetation Remaining (km ²)	43,611
Endemic Plant Species	3,049
Endemic Threatened Birds	10
Endemic Threatened Mammals	14
Endemic Threatened Amphibians	87
Extinct Species†	20
Human Population Density (people/km ²)	261
Area Protected (km ²)	26,130
Area Protected (km ²) in Categories I-IV*	21,259

†Recorded extinctions since 1500. *Categories I-IV afford higher levels of protection.

Location:--

The Western Ghats of southwestern India and the highlands of southwestern Sri Lanka, separated by 400 kilometers, are strikingly similar in their geology, climate and evolutionary history. The Western Ghats, known locally as the Sahyadri Hills, are formed by the Malabar Plains and the chain of mountains running parallel to India's western coast, about 30 to 50 kilometers inland. They cover an area of about 160,000 km² and stretch for 1,600 km from the country's southern tip to Gujarat in the north, interrupted only by the 30 km Palakkad Gap.

Sri Lanka is a island separated from southern India by the 20-meter-deep Palk Strait. The island, some 67,654 km² in size, has been repeatedly connected with India between successive inter-glacial, most recently until about 7,000 years ago by a land bridge up to about 140 kilometers wide.

SPECIES DIVERSITY AND ENDEMISM

Taxonomic Group	Species	Endemic Species	Endemism (%)
Plants	5,916	3,049	51.5
Mammals	140	18	12.9
Birds	458	35	7.6
Reptiles	267	174	65.2
Amphibians	178	130	73.0
Freshwater Fishes	191	139	72.8

PLANTS

There are a minimum of 6,000 vascular plant species in the Western Ghats and Sri Lanka hotspot, of which more than 3,000 (52%) are endemic. There are also more than 80 endemic plant genera, many of which have only one species.

The Western Ghats harbors approximately 5,000 species of vascular plants belonging to nearly 2,200 genera; about 1,700 species (34%) are endemic. There are also 58 endemic plant genera, and while some are remarkably speciose (like **Niligrianthus**, which has 20 species), nearly three-quarters of the endemic genera have only one species.

Some prominent genera and families are represented by large numbers of endemic species, such as *Impatiens* with 76 of 86 species endemic, **Dipterocarpus** with 12 of 13 species endemic, and **Calamus** with 23 of 25 species endemic. Of the 490 tree species recorded from low- and mid-elevation forests, 308 species are endemic. The only gymnosperm tree, **Podocarpus (=Nageia) wallichianus**, is also endemic. Of the 267 species of orchids, 130 are endemic.

Similarly, plant diversity and endemism in Sri Lanka are quite high, with 3,210 flowering plant species in 1,052 genera, of which 916 species and 18 genera are endemic. Amazingly, all but one of the island's more than 55 dipterocarp species is found nowhere else in the world. In addition, the island's ferns (although not recently assessed) are estimated to number about 350 species. Approximately 433 plant species, and at least five genera, are confined to Sri Lanka and the Western Ghats combined.