

## **GEOGRAPHY AND MAJOR BIOMES OF INDIA**

India is the seventh largest country in the world and Asia's second largest nation with an area of 3,287,263 sq.km. encompassing a varied landscape rich in natural resources. India is shielded by the world's highest mountains, the Himalayas, in the north. The southern part of India takes the shape of a peninsula and divides the Indian Ocean into the Bay of Bengal to the southeast and the Arabian Sea to the southwest. The southern tip of Kanyakumari is washed by the Indian Ocean. The Andaman and Nicobar Islands in the Bay of Bengal and the Lakshadweep group of islands in the Arabian sea are also a part of India.

India has a great diversity of natural ecosystems from the cold and high Himalayan ranges to the sea coasts, from the wet northeastern green forests to the dry northwestern arid deserts, different types of forests, wetlands, islands and the oceans. India consists of fertile river plains and high plateaus and several major rivers, including the Ganges, Brahmaputra and Indus. The climate of India is determined by the southwest monsoon between June and October, the northeast monsoon between October and November and dry winds from the north between December and February. From March to May the climate is dry and hot.

**India, being a vast country, shows a great diversity in climate, topography and geology and hence the country is very rich in terms of biological diversity. India's biological diversity is one of the most significant in the world, since India has only 2% of the total landmass of the world containing about 6% of the world's known wildlife.**

The country has 10 different biogeographic zones and 26 biotic provinces.

<b>S.No.</b>	<b>Biogeographic zones</b>	<b>Biotic provinces</b>
1.	Trans-Himalaya	Ladakh mountains, Tibetan plateau
2.	Himalaya	Northwest, West, Central and East Himalayas
3.	Desert	Thar, Kutch
4.	Semi-arid	Punjab plains, Gujarat Rajputana
5.	Western Ghats	Malabar plains, Western Ghats
6.	Deccan Peninsula	Central highlands, Chotta-Nagpur, Eastern highlands, Central Plateau, Deccan South
7.	Gangetic plains	Upper and Lower Gangetic plains
8.	Coast	West and East coast, Lakshadweep
9.	North-East	Brahmaputra valley, Northeast hills
10.	Islands	Andaman and Nicobar

*Source:* Wildlife Protected Area Network in India: A Review, Wildlife Institute of India, 2000.

## 1. THE TRANS-HIMALAYAN REGION

This area is very cold and arid (4,500 to 6,000 mts. above msl). The only vegetation is a sparse alpine steppe. Extensive areas consist of bare rock and glaciers.



Marco polo sheep - ratio of horn length to body weight exceeds that of any animal in the world.

The faunal groups best represented here are wild sheep and goats (chief ancestral stock), ibex, snow leopard, marbled cat, marmots and black-necked crane.

## 2. THE HIMALAYAN REGION

### PLANTS IN INDIA

The fantastic altitude gradient results in the tremendous biodiversity of the Himalayan region. Flora and fauna vary according to both altitude and climatic conditions: tropical rainforests in the Eastern Himalayas and dense subtropical and alpine forests in the Central and Western Himalayas. The lower levels of the mountain range support many types of orchids. On the eastern slopes, rhododendrons grow to tree height.

Total number of plant species recorded in the world **2,50,000** species In India **45,000** species 33% of the above are native. There are 15,000 flowering plant species which is 6% of the world's total. Areas rich in endemism are the Northeast, the Western Ghats and the Northwestern and Eastern Himalayas. Andaman & Nicobar Islands contribute at least 200 endemic species to the endemic flora.



Monal - bird of nine colours

Classification	No. of species
Angiosperms	15,000
Gymnosperms	64
Pteridophytes	1,022
Bryophytes	2,584
Algae	2,500
Fungi	23,000
Bacteria	850
Lichens	1,600

Source: Rao, 1994: BSI, 1992

Animals of Himalayas show several behavioural and physiological adaptations. Sambar and muntjac are found in the subtropical foothills; serow, goral and the Himalayan thar are found in the temperate and subalpine regions; snow leopard and brown bear inhabit the alpine region. Carnivores are the most elusive of all mammals in the Himalayas. There are a variety of carnivores in the higher mountains,

According to Dr. M.S. Swaminathan, (1994), 2000 species are in danger of extinction in India.

In the Western Ghats alone, 700 angiosperm are in a seriously threatened condition

The BSI, (1992), has so far listed 814 plants in various categories such as extinction, endangered, vulnerable and rare.

some of which are rare and threatened with extinction.

### 3. THE INDIAN DESERT

The natural vegetation consists of tropical thorn forests and tropical dry deciduous forests, sandy deserts with seasonal salt marshes and mangroves are found in the main estuaries. Typical shrubs are phog growing on sand dunes. Sewan grass covers extensive areas called pali.

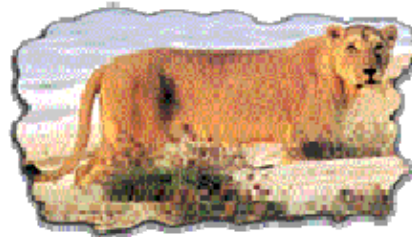


**Last surviving Wild Ass**

Thar desert possesses most of the major insect species. 43 reptile species and moderate bird endemism are found here. No niche of the Thar is devoid of birds. The black buck was once the dominant mammal of the desert region, now confined only to certain pockets. The gazelle is the only species of the Indian antelope of which the females have horns. Nilgai the largest antelope of India and the wild ass, a distinct subspecies, is now confined to the Rann of Kutch which is also the only breeding site in the Indian subcontinent for the flamingoes. Other species like desert fox, great Indian bustard, chinkara and desert cat are also found.

### 4. THE SEMI-ARID REGION

The semi-arid region in the west of India includes the arid desert areas of Thar and Rajasthan extending to the Gulf of Kutch and Cambay and the whole Kathiawar peninsula.



**Last surviving Asiatic lion.**

The natural vegetation consists of tropical thorn forests and tropical dry deciduous forests, moisture forests (extreme north) and mangroves. The sandy plains have a few scattered trees of Acacia and Prosopis. The gravelly plains have Calotropis, Gymnosporia, etc. The rocky habitats are covered by bushes of Euphorbia while species of Salvadora and Tamarix occur mainly near saline depressions.

The lion of Gir is the endemic species in this zone.



**Tiger - national animal**

### 5. THE WESTERN GHATS

They cover only 5% of India's land surface but are home to more than about 4,000 of the country's plant species of which 1800 are endemic. The monsoon forests occur both on the western margins of the ghats and on the eastern side where there is less rainfall. This zone displays diversity of forests from evergreen to dry deciduous.

The Nilgiri langur, lion tailed macaque, Nilgiri tahr, Malabar grey hornbill and Most amphibian species are endemic to the Western Ghats.

## 6. THE DECCAN PENINSULA

The Deccan Peninsula is a large area of raised land covering about 43% of India's total land surface. It is bound by the Sathpura range on the north, Western Ghats on the west and Eastern Ghats on the east. The elevation of the plateau varies from 900 mts. in the west to 300 mts. in the east. There are four major rivers that support the wetlands of this region which have fertile black and red soil. Large parts are covered by tropical forests. Tropical dry deciduous forests occur in the northern, central and southern part of the plateau. The eastern part of the plateau in Andhra Pradesh, Madhya Pradesh and Orissa has moist deciduous forests.



**Asiatic wild buffalo -  
the most impressive and  
magnificent  
animal in the world today**

Fauna like tiger, sloth bear, wild boar, gaur, sambar and chital are found throughout the zone along with small relict populations of wild buffaloes, elephants and barasingha.

## 7. THE GANGETIC PLAIN

The Gangetic plain is one of India's most fertile regions. The soil of this region is formed by the alluvial deposits of the Ganges and its tributaries. The four important surface differences recognized in the geomorphology of the plains are

- **Bhabar** - pebble studded zone with porous beds
- **Terai** - marshy tract
- **Bhangar** - older alluvium of the flood plain
- **Terai** - marshy tract
- **Khadar** - newer alluvium

### ANIMALS IN INDIA

Total animal species recorded in the world is **11,96,903** In India **86,874**

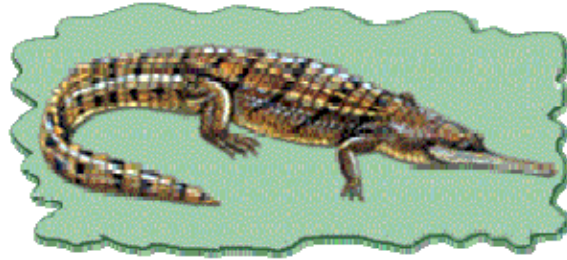
Larger animals	No. of species
Mammals	390
Birds	1,232
Reptiles	456
Amphibians	209
Fishes	2,546

Source: Faunal diversity in India, ENVIS Centre, Zoological Survey of India, 1998

The Gangetic plains stretching from Rajasthan through Uttar Pradesh to Bihar and West Bengal are mostly under agriculture. The large forest area is of 68.52% and the southeastern end of the Gangetic plain merges with the littoral and mangroves regions of the Sunderbans. Among the large animals, 173 species of mammals, 101 of birds, 15 of reptiles, 3 of amphibians and 2 of fishes are considered endangered.

The fauna includes elephants, black buck, gazelle, rhinoceros, Bengal florican, crocodile, freshwater turtle and a dense

waterfowl community.



Gharial - present only in the Ganges river



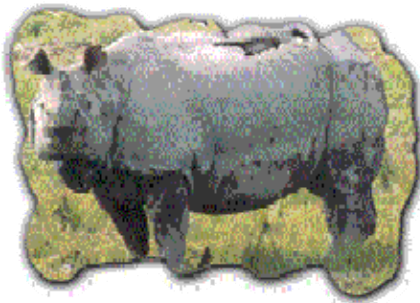
**Mangroves**

## 8. THE COASTAL REGION

The natural vegetation consists of mangroves. Animal species include dugong, dolphins, crocodiles and avifauna. There are 26 species of fresh water turtles and tortoises in India and 5 species of marine turtles, which inhabit and feed in coastal waters and lay their eggs on suitable beaches. Tortoise live and breed mainly on the land.

Over 200,000 Olive Ridley turtles come to Orissa to nest in the space of three or four nights. The highest tiger population is found in the Sunderbans along the east coast adjoining the Bay of Bengal.

Lakshadweep consists of 36 major islands - 12 atolls, 3 reefs and 5 submerged coral banks - make up this group of islands more than three hundred kilometers to the west of the Kerala coast. The geographical area is 32 sq. km. and the usable land area is 26.32 sq. km. The fauna consists mainly of four species of turtles, 36 species of crabs, 12 bivalves, 41 species of sponges including typical coral, ornamental fishes and dugongs. A total of 104 scleractinian corals belonging to 37 genera are reported.



**Great Indian one-horned rhinoceros** - largest of all existing rhinoceros

## 9. THE NORTH-EAST

Biological resources are rich in this zone. The tropical vegetation of northeast India is rich in evergreen and semievergreen rain forests, moist deciduous monsoon forests, swamps and grasslands.

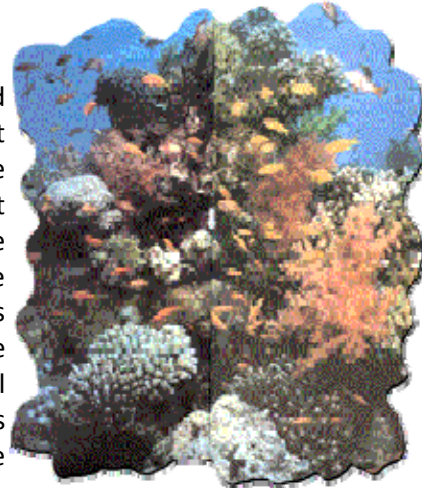


**Hoolock gibbon** - the only ape found in India

Mammalian fauna includes 390 species of which 63% are found in Assam. The area is rich in smaller carnivores. The country's highest population of elephants are found here

## 10. THE INDIAN ISLANDS

It is a group of 325 islands: Andaman to the north and Nicobar to the south. The two are separated by about 160 kms. by the Ten Degree Channel of the sea. The rainfall is heavy, with both Northeast and Southwest monsoons. At present, 21 of the 325 islands in the Andaman & Nicobar Islands are inhabited. Many unique plants and animals are found here. About 2,200 species of higher plants are found here of which 200 are endemic. The Andaman & Nicobar Islands have tropical evergreen forests and tropical semievergreen forests as well as moist deciduous forests, littoral and mangrove forests.



Living corals

112 endemic species of avifauna, the Andaman water monitor, giant robber crab, 4 species of turtles, wild boar, Andaman day gecko and the harmless Andaman water snake are found only in these islands. The Narcondam hornbill found only in Narcondam is a large forest bird with a big beak. Coral reefs are stretched over an area of 11,000 sq.km. in the Andamans and 2,700 sq.km. in Nicobar.

### CAUSES OF ECOLOGICAL DESTRUCTION AND DEPLETION

The rapid deterioration of the ecology due to human interference is aiding the disappearance of wildlife from the biosphere.

**The common problems are habitat disturbance and destruction, introduction of exotics, exploitation, marine pollution, natural disasters like floods, earthquakes and forest fires.**

The major problems of certain specific zones are as follows.

- **Wetlands:** siltation, eutrophication, encroachment, tourism.
- **Forests:** deforestation and degradation, extended cultivation, road laying, mining operation.
- **Seas:** hot water from nuclear and thermal power plants, toxic effluents from coastal areas, oil spills, blasting and dredging, collection of undersized fishes and other organisms, exploitation of ornamental seashells, chanks and pearl oysters by domestic shell craft industry, export of sea fans and seaweeds.
- **Corals:** used as a raw material in the cement factories, exploitation of antipatharians and precious red coral for jewellery, commercial exploitation of aquarium fishes from Indian coral reefs.
- **Mangroves:** agriculture, aquaculture, fuel wood extraction, diversion of fresh water for irrigation resulting in increased salinity.
- **Rivers:** heavy metal pollution, persistent biocides, organic wastes, removal of sand from river beds.
- **Animals:** exploited for their skin, fur, wood, tusk, meat, medicine and oil, trade, hunting, poaching.

## **LEGISLATION FOR PROTECTING ENDANGERED SPECIES**

Considering the importance of flora and fauna, major national and international efforts have been made to protect and conserve the rich biodiversity and endangered species of wildlife and flora. Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973, is a significant step in this direction. The convention recognized that wild fauna and flora in their many beautiful and varied forms are irreplaceable parts of the natural systems of the earth, which must be protected by all means. The United Nations Convention on Biological Diversity, 1992 is another milestone.

The Wildlife (Protection) Act, 1972, is our national initiative to protect wildlife. The Act provides for establishment of a Wildlife Board and setting up of Wildlife Sanctuaries and National Parks. The Act also makes hunting of wild animals a punishable offence. The Biological Diversity Bill, 2000 which is in the offing, also inter alia, strives to protect and conserve the biodiversity and endangered species in India.

## **ECOSYSTEM BALANCE**

There is an urgent need for sustaining wild species due to the following reasons.

- Forests render the climate more equable, prevent soil erosion and landslides and help in flood control
  - Most of today's food crops were domesticated from wild tropical plants
  - About 80% of the world's population relies on plants or plant extracts for medicines
  - Pollination and seed dispersal by birds, insects and animals is essential to increase diversity of genetic recombination
  - Agricultural scientists and genetic engineers require the existing total stock of species - most of them still unknown and unnamed - as the source of food and to develop the new crop strains of tomorrow
  - Survival of humans and other species is dependent on the producer
  - Wildlife serves as a gene library; premature extinction of species leads to irreversible loss of genetic information that influences the future evolution of life on earth
- Aesthetic value

Biodiversity and ecological integrity are essential to all life on earth and should not be disturbed by human actions. To save the natural world, ecosystems as a whole have to be saved. Unless the entire ecosystem is preserved, the individual species will not be able to survive for long. The steps taken to preserve our wildlife are:

- Gene banks and Botanical Gardens
- Zoological Gardens and Captive Breeding Centres
- Biosphere Reserves
- National Parks and Wildlife Sanctuaries
- Treaties and laws to protect endangered species

Zone Name	% of India	Existing Protected Areas		Proposed Protected Areas	
		No.of National Parks + Wildlife Sancturries	% of Zone	No.of National Parks + Wildlife Sancturries	% of Zone
Trans-Himalaya	5.62	7	9.20	19	3.44
Himalaya	6.41	67	9.92	29	2.44
Desert	6.56	6	7.45	15	-0.20
Semi-Arid	16.60	91	2.80	18	0.19
Western Ghats	4.03	56	10.12	32	4.67
Deccan Peninsula	41.99	137	3.71	75	0.52
Gangetic Plain	10.79	36	2.16	19	0.17
Coasts	2.52	26	6.79	19	0.96
North-East	5.21	37	2.54	44	3.38
Islands	0.25	103	18.54	22	17.57

*Source: Wildlife Protected Area Network in India: A Review, Wildlife Institute of India, 2000*

**Most things on earth are interdependent and interconnected.**  
**When man alters nature to meet his needs or wants,**  
**his actions have a much greater impact than expected.**  
**Thus he should work with the rest of nature**  
**to sustain the ecological integrity, biodiversity and earth's genetic variety**  
**which is the raw material for all future evolution.**