

Types of Forests in India, Tropical, Montane, Alpine

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India has a wide variety of forests, from the rainforests of Kerala in the south to the alpine meadows of Ladakh in the north, from the deserts of Rajasthan in the west to the evergreen forests of the northeast. These variations are **determined by** factors such as **climate, soil type, topography, and elevation**. Additionally, forests can be **categorised based on** their characteristics, composition, prevailing climate, and interactions with the surrounding environment.

Accordingly, Indian forest types include moist tropical, dry tropical, montane sub-tropical, montane temperate, and alpine forests.

Classification of Forest

Classification of forests is primarily **based on spatial and annual rainfall**. However, **Champion & Seth's** system of classification provides an elaborate description of forest types in India in **six major groups** which are further divided into **16 type groups** and are subdivided into 200 types including subtypes and variations of forests.

- The 'forest type' is defined as a unit of **vegetation with specific physiognomy and structure** sufficiently pronounced to permit its differentiation from other such units.

- **The determining factors** of the forest types are climate, soil, vegetation, and past treatment (including biotic interference).
- **Major classification:** Moist tropical, dry tropical, montane sub-tropical, montane temperate, alpine forests.
- **Other classification:** For other purposes, forest resources in India are classified as constitution-based, administration-based, ownership-based, composition-based, and exploitation-based classification.

Moist Tropical Forests

Moist tropical forests, also known as **tropical rainforests**, are **dense, lush forests** found in **equatorial regions** characterised by **high temperatures, abundant rainfall**, and extraordinary biodiversity. They can be subcategorized as follows:

- **Tropical Wet Evergreen Forests:** These are characterised by **dense vegetation** that remains **green throughout the year**, boasting a rich diversity of plant and animal species.
 - **Climatic conditions:** It requires an average annual rainfall of >250 cm and 25°-27°C temperature.
 - **Distribution:** Andaman and Nicobar (A&N) Islands, Hills of the North-Eastern region, and the western slopes of the Western Ghats (Kerala & Karnataka).
 - **Flora:** They are known for fine-grained, durable, and robust timber
 - For example Mahogany, Epiphytes, Mesua, White Cedar, Jamun, Canes, and Bamboo.
- **Tropical Semi-Evergreen Forests:** These are **transitional ecosystems**, featuring a **mix of evergreen and deciduous** tree species. They thrive in regions with moderate rainfall and exhibit a seasonal variation in leaf shedding.
 - **Climatic Conditions:** It requires an average annual rainfall of **200-250 cm** and **24°-27°C** temperature.
 - **Distribution:** Lower slopes of the Eastern Himalayas, Western coast, Assam, Odisha.
 - **Flora:** Laurel, rosewood, *Mesua*, thorny bamboo, white cedar, Indian chestnut, *Champa*, mango, etc.
- **Tropical Moist Deciduous Forests** These **trees shed their leaves** during a distinct dry season, thriving in regions with **pronounced wet and dry periods**.
 - **Climatic Conditions:** It requires an average annual rainfall of 100-200 cm and about 27°C temperature.
 - **Distribution:** Manipur, Mizoram, Madhya Pradesh, Chhattisgarh, Most of Odisha, **Chota Nagpur Plateau**, and A&N Islands.
 - **Flora:** Teak, Sal, Laurel, Rosewood, Amla, Jamun, Bamboo.
- **Littoral and Swamp Forests:** They can survive and grow both in brackish and fresh water. These ecosystems are found **along coastlines** and in swampy areas, featuring trees **adapted to waterlogged conditions**. They provide **critical habitat for various aquatic and semi-aquatic species** and play a vital role in coastal protection and water filtration
 - **Climatic Conditions:** Trees are adaptable to both fresh and brackish water.
 - **Distribution:** The most famous and the densest is the Sunderbans in the Ganga delta.
 - **Flora:** Sundri, Screw pines, Agar, Rhizophora, Canes, and Palms

Dry Tropical Forests:

Dry tropical forests are **biomes** characterised by **low rainfall levels and seasonal droughts**, supporting vegetation adapted to arid and semi-arid conditions.

- **Tropical Dry Evergreen Forests:** They are characterised by evergreen trees adapted to regions with distinct dry seasons. Despite limited rainfall, these **forests retain their foliage year-round**, supporting a unique assemblage of plant and animal life.
 - **Climatic Conditions:**
 - Rainfall: **100 cm.**
 - Temperature: Approximately **28°C.**
 - **Distribution:** Along the coastal area of Tamil Nadu.
 - **Flora:** Jamun, tamarind, neem
- **Tropical Dry Deciduous Forests:** These are regions where **trees shed their leaves during dry seasons**, common in areas with distinct wet and dry periods, hosting diverse plant and animal life.
 - **Climatic Conditions:**
 - Mean Annual rainfall: **100-150 cm.**
 - **Distribution:** Foothill of the Himalayas to Kanyakumari except in Rajasthan, West Bengal, and Western Ghats.
 - **Flora:** Teak, axlewood, bamboo, laurel, rosewood, red sanders, satinwood, and other species.
- **Tropical Thorn Forests:** They are characterised by sparse, **drought-resistant vegetation**.
 - **Climatic Conditions:**
 - Rainfall: **<75 cm**
 - Temperature: **25°-30°C.**
 - **Distribution:** Rajasthan, western Haryana, Punjab, Kachchh, and Saurashtra in the west, as well as the Western Ghats in Maharashtra, Karnataka, Telangana, Andhra Pradesh, and Tamil Nadu in the south.
 - **Flora:** Neem, Babul, Cacti, etc.

Montane Sub-Tropical Forests

They are forest ecosystems **found at higher altitudes in subtropical regions**, characterised by diverse flora and adapted to cooler temperatures.

- **Sub-tropical Broad-leaved Hill Forests:** They are situated at moderate elevations in subtropical regions, distinguished by a variety of broad-leaved tree species and high humidity levels.
 - **Climatic Conditions:**
 - Rainfall: 75 cm -125 cm
 - Temperature: 18°- 21°C
 - **Distribution:** Eastern Himalayas at altitudes varying from 1000 to 2000 m.
 - **Flora:** Oak, chestnut, *ash*, *sal*, and pine trees.
- **Sub-tropical Moist Pine Forests:** They constitute a diverse ecosystem with a unique mix of flora and fauna adapted to subtropical climates that thrive in regions with moderate winters and warm summers.
 - **Distribution:** Western Himalayas (at elevations 1000 to 2000 m.)

- **Flora:** Chir is the most dominant tree forming pure stands. It supplies great wood for boxes, furniture, and structures. It is also used to produce resin and turpentine.
- **Sub-tropical Dry Evergreen Forests:** These forests have resilient ecosystems found in regions with limited rainfall, featuring evergreen trees adapted to drought conditions, often interspersed with shrubs and grasses, supporting diverse wildlife species adapted to arid environments.
 - **Climatic Conditions:** Rainfall: 50-100 cm; the summers are hot and the winters are very cold.
 - **Distribution:** Found in the Shiwaliks and the western Himalayas up to about 1000 m above sea level.
 - **Flora:** Low scrub forest with small evergreen trees and shrubs. Olive, Acacia, and pistacia

Montane Temperate Forests

Montane temperate forests are evergreen or deciduous forests found at **mid-elevations on mountainsides**. They are characterized by cool temperatures, moderate to high rainfall, and coniferous or broadleaf trees.

- **Montane Wet Temperate Forests:** are biodiverse ecosystems found in mountainous regions, characterized by high rainfall, cooler temperatures, and lush vegetation, serving as critical habitats for diverse flora and fauna
 - **Climatic Conditions:**
 - Rainfall: **150 cm to 300 cm**
 - Temperature: **11°C to 14°C.**
 - **Distribution:** Higher hills of Kerala and Tamil Nadu, in the Eastern Himalayan region.
 - **Flora:** Deodar, Indian chestnut, birch, Chilauni, plum, machilus, Cinnamomum, blue pine, magnolia, oak, hemlock, etc.
- **Himalayan Moist Temperate Forests:** Rich ecosystems found in the Himalayan region, featuring diverse vegetation including broadleaf and coniferous trees, thriving in cool, moist conditions, crucial for biodiversity and watershed protection in the region.
 - **Climatic Conditions:**
 - Rainfall: **150 cm to 250 cm**
 - **Distribution:** Occurs in the temperate zone of the Himalayas. Cover the entire mountain range in Kashmir, Himachal Pradesh, Uttarakhand, Darjeeling, and Sikkim.
 - **Flora:** Composed of coniferous species mainly Pines, cedars, silver firs, spruce, etc.
- **Himalayan Dry Temperate Forests:** The ecosystems in the Himalayan region are characterized by sparse vegetation, dominated by drought-tolerant trees, adapted to the region's dry and cooler climate, crucial for soil stabilization and supporting unique wildlife species.
 - **Climatic Conditions:** Rainfall: <100 cm (mostly in the form of snow)
 - **Distribution:** Inner dry ranges of the Himalayas - Ladakh, Kinnaur, Garhwal, Lahaul, Chamba, and Sikkim.
 - **Flora:** Coniferous forests with xerophytic shrubs Deodar, oak, ash, olive, etc are the main trees.

Alpine Forests:

Alpine forests are high-elevation woodlands with cold temperatures, short growing seasons, and hardy conifers.

- **Sub-alpine Scrub**

- **Climatic Conditions:** Occur throughout the Himalayas above 3000 m elevation up to the tree limit; Rainfall 83-600 mm.
- **Distribution:** Western Himalaya sub-alpine forests reported from Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Arunachal Pradesh, Sikkim, and West Bengal.
- **Flora:** *Abies densa* and *Betula utilis*, and *Rhododendron* spp, *Abies spectabilis*, and *Betula utilis*

- **Moist- Alpine Scrub**

- **Climatic Conditions:** Moist Alpine Scrub occurs throughout the Himalayas, above timberline to 5,500m altitude.
- **Distribution:** Uttarakhand, in inner Himalaya, Arunachal Pradesh, Sikkim and West Bengal.
- **Flora:** composed entirely of species of *Rhododendron* with some birch (*Betula*) and other deciduous trees.

- **Dry- Alpine Scrub**

- **Climatic Conditions:**
 - Rainfall < 370mm
- **Distribution:** Jammu and Kashmir, Himachal Pradesh, Uttarakhand, and Arunachal Pradesh.
- **Flora:** *Juniperus wallichiana*, *Lonicera* spp, *Potentilla* spp., Honeysuckle & Juniper etc.

Types of Forests in India UPSC PYQs

Question 1: Which one of the following regions of India has a combination of mangrove forest, evergreen forest, and deciduous forest: **(UPSC Prelims 2015)**

1. North Coastal Andhra Pradesh
2. South-West Bengal
3. Southern Saurashtra
4. Andaman and Nicobar Islands

Answer: (a)

Question 2: Consider the following States: **(UPSC Prelims 2015)**

1. Arunachal Pradesh
2. Himachal Pradesh
3. Mizoram

Which of the statements given above is/are correct?

1. 1 only
2. 2 and 3 only
3. 1 and 3 only
4. 1, 2 and 3

Answer: (c)

Question 3: In India, in which one of the following types of forests is teak a dominant tree species? **(UPSC Prelims 2015)**

1. Tropical moist deciduous forest
2. Tropical rainforest
3. Tropical thorn scrub forest
4. Temperate forest with grasslands

Answer: (a)

Question 4: “Leaf litter decomposes faster than in any other biome and as a result, the soil surface is often almost bare. Apart from trees, the vegetation is largely composed of plant forms that reach up into the canopy vicariously, by climbing the trees or growing as epiphytes, rooted on the upper branches of trees.” This is the most likely description of **(UPSC Prelims 2021)**

- (a) Coniferous forest
- (b) Dry deciduous forest
- (c) Mangrove forest
- (d) Tropical rainforest

Answer: (d)

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