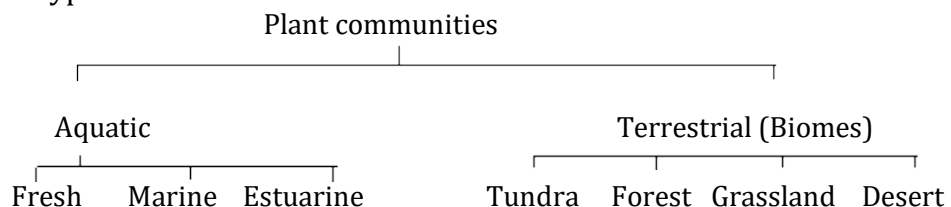


PHYTOGEOGRAPHY

No organism occurs in uniform numbers throughout the world. Rather, specific organisms are restricted to specific communities or groups of communities. Three aspects of the distribution of an organism are generally recognized: **geographic range**, or the specific extent of land or water area where the organism normally occurs; the **geologic range**, or the distribution in time, past and present; and the **ecological distribution**, or the major biotic communities (*i.e.*, marine biome, freshwater biome and terrestrial biome) of which the organism is a member. Certain biologists have also made distinction between **geographic distribution** (horizontal or superficial distribution) and **bathymetric distribution** (vertical or altitudinal distribution). Bathymetric distribution includes the following three realms: (i) **Halobiotic**, or vertical distribution of organisms in marine (sea) habitat, (ii) **Limnobiologic**, or vertical distribution of organisms in freshwater habitat; and (iii) **Geobiologic** or altitudinal distribution of organisms on land. All the living organisms in a given region are termed the **biota** of that region. The animals of a given region are collectively termed the **fauna**, and the plants of a given region, the **flora** (*i.e.*, fauna+flora=biota). Here, a distinction can be made between the following two terms– flora and vegetation. **Flora** mainly refers to the botanical composition of a place, *i.e.*, the names of different plant species, while **vegetation** means the totality of forms in which the emphasis is not on names of different plants but their life forms, number and coverage. The studies of the distribution of biota are collectively called **biogeography**; of animals only, **zoogeography**; and of plants only, **plant geography** or **phytogeography**. There are two major approaches to the study of biogeography or **geographical ecology** (Kendeigh, 1974): (i) **descriptive** or **static biogeography** which deals with the description of biota of different botanical and zoological areas of earth ; and (ii) **interpretative** or **dynamic biogeography** which describes the forces which have brought about plant and animal distribution.

MAJOR PLANT COMMUNITIES (BIOMES) OF THE WORLD

As already discussed in sufficient details major plant communities of the world are classified chiefly on the basis of the kinds of habitat and environmental conditions into the following chief types:



PHYTOGEOGRAPHICAL DIVISIONS OF INDIA

The Indian sub-continent is characterised with a variety of climate types and the flora of the country is also correspondingly of different types in its different parts. A phytogeographical region is defined as an area of uniform climatic conditions and having a distinctly recognisable type of vegetation. According to D. Chattarjee (1962), India can be divided into nine phytogeographical regions.

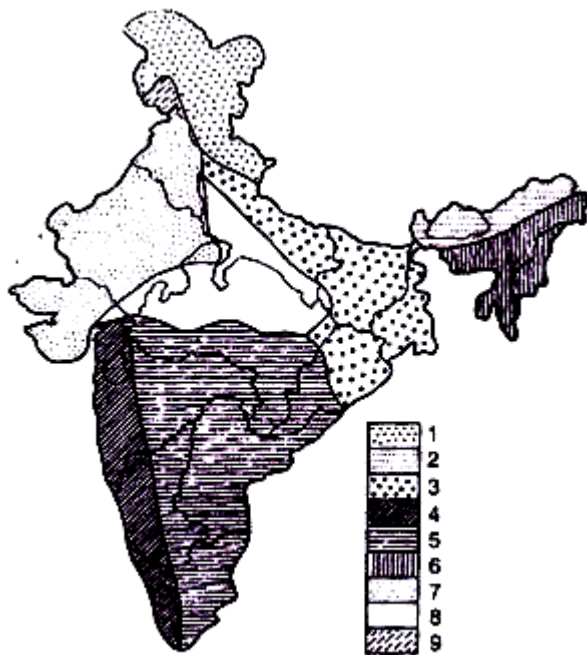


Fig. 11.4. Botanical zones of India.

- (1) Western Himalayas,
- (2) Eastern Himalayas,
- (3) Indus plain,
- (4) Gangetic plain,
- (5) Central India,
- (6) Deccan,
- (7) Western coasts of Malabar,
- (8) Assam, and
- (9) Bay Islands of Andaman and Nicobar.

1. **Western Himalayas.** It extends from Kumaon to Kashmir and has annual rainfall up to 200 cm. Altitudinally there are following three zones of vegetation corresponding to three climatic belts:

- i. **Submontane zone.** This extends up to 1500 metres altitude and comprises mostly of Siwalik ranges. The forests are tropical and subtropical having trees such as *Shorea robusta*, *Dalbergia sissoo*, *Cedrela toona*, *Ficus glomerata*, *Eugenia jambolano*, *Acacia catechu*, *Butea monosperma* (dhak), *Zizyphus* and thorny succulent euphorbias on slopes.
 - ii. **Temperate zone.** Above submontane zone extend montane temperate forests up to 3500 metres altitude. They are dominated by plant species such as *Quercus*, *Acer*, *Ulmus*, *Rhododendron*, *Betula* (birch), *Salix* (cane), *Populus*, *Cornus*, *Prunus*, *Fraxinus*, *Pinus*, *Cedrus*, *Picea* and *Taxus*.
 - iii. **Alpine zone.** This zone extends from 3500 to 4500 metres altitudes (snow line) and is characterised with alpine forest vegetation with scrub and meadows. Most common tree species are *Abies*, *Betula*, *Juniperus* and *Rhododendrons*. The herbs which occur near the snow line include species such as *Primula*, *Potentilla*, *Polygonum*, *Geranium*, *Saxifraga*, *Aster*, etc.
2. **Eastern Himalayas.** It includes regions of Sikkim and NEFA and is characterised by more rainfall, less snow and higher temperature. This is also divided into the following three zones altitudinally :
- a. **Tropical zone.** Up to 1800 metres altitudes, this zone has tropical semi-evergreen or moist deciduous forests. These forests comprise the plants such as *Shorea robusta*, *Acacia catechu*, *Delbergia sissoo*, *Terminalia*, *Albizia*, *Cedrela*, *Dendrocalamus* (bamboo), etc.
 - b. **Temperate zone.** This zone extends between 1800 metres to 3800 metres altitudes and has typical montane temperate forests which are dominated by oaks such as *Michelia*, *Quercus*, *Pyrus*, *Symplocos*, *Eugenia*, etc., at lower levels and by conifers as *Juniperus*, *Cryptomeria*, *Abies*, *Pinus*, *Larix* and *Tsuga* and also *Salix*, *Rhododendron* and *Arundinaria* (bamboo) at higher cooler levels.
 - c. **Alpine zone.** Beyond the temperate zone extends alpine zone up to 5000 metres altitudes. It has alpine vegetation including *Juniperus* and *Rhododendron* with its other typical flora.
3. **Indus plains.** This zone includes the arid and semiarid regions of Punjab, Rajasthan, Kutch, part of Gujarat and Delhi. The rainfall is less than 70 cm. The vegetation is tropical thorn forest in semi-arid region and is typical desert in the arid region. The plants of this zone are primarily xerophytic. The common plant species of this zone are *Acacia nelotica*, *Prosopis* sp., *Salvadora*, *Tecomella*, *Capparis*, *Tamarix*, *Zizyphus*, *Calotropis*, *Panicum*, *Saccharum*, *Cenchrus*, *Euphorbia*, etc.

4. **Gangetic plains.** This region extends over Uttar Pradesh, Bihar, Bengal and part of Orissa and is characterised by moderate amount of rainfall and most fertile (*i.e.*, alluvial) soils. Vegetation of this zone is chiefly of tropical moist and deciduous and dry deciduous forest type. The common plants of this zone are *Dalbergia sissoo* (shesham), *Acacia nelotica* (babul), *Saccharum munja*, *Butea monosperma*, *Madhuca indica* (mahua), *Terminalia arjuna* (arjuna), *Buchanania lanzan* (chiraunji), *Diospyros melanoxylon* (tendu) , *Cordi myxa* (lisora), *Acacia catechu* (khair), *Azadirachta indica* (neem), *Ficus bengalensis* (bergad), *Ficus religiosa* (pipal), *Mangifera indica* (mango), and weeds and grasses such as *Xanthium*, *Cassia*, *Argemone*, *Amaranthus*, etc. In Gangetic delta (South Bengal) mangrove vegetation is common.

5. **Central India.** It comprises Madhya Pradesh, parts of Orissa and Gujarat. The rainfall is 150–200 cm and its vegetation is thorny, mixed deciduous and teak type. The chief plants of this region are *Tectona grandis*, *Madhuca*, *Diospyros*, *Butea*, *Dalbergia*, *Terminalia*, *Carissa*, *Zizyphus*, *Acacia*, *Mangifera*, etc.

6. **Malabar (west coast).** This region includes western coast of India from Gujarat to Cape Comorin and has heavy rainfall. The forests are tropical evergreen in west, semi-evergreen towards interior, subtropical or montane temperate evergreen forests in Nilgiris and mangroves near Bombay and Kerala coast.

7. **Deccan Plateau.** This region extends all over peninsular India (*i.e.*, Andhra Pradesh, Tamil Nadu and Karnataka) and has rainfall up to 100 cm. Its central hilly plateau has tropical dry deciduous forests of *Bowsellia serrata*, *Tectona grandis* and *Hardwickia pinnata*, while, the low eastern dry Coromandal Coast has tropical dry evergreen forests of *Santalum album* (chandan), *Cedrela toona* and plants such as *Acacia*, *Prosopis*, *Euphorbia*, *Capparis*, *Phyllanthus*, etc.

8. **Assam.** This region is characterised by heavy rainfall (200 to 1000 cm). The vegetation is either dense evergreen forest or sub-tropical. The evergreen forests include trees such as *Dipterocarpus macrocarpu*, *Mesua ferrea*, *Shorea robusta*, *Ficus elastica*, etc. bamboos as *Bambusa pallida*, *Dendrocalomus hamiltonii*, etc., grasses such as *Imperata cylindrica*, *Saccharum* sp., *Themeda* sp., insectivorous plants as *Nepenthes* sp., and also epiphytes (ferns and orchids). In the northern cooler regions, wet hill forests include plants such as *Alnus*, *Betula*, *Rhododendron*, *Magnolia*, etc., The hilly tracts also have pine forests of *Pinus khasiya* and *P. insularis*.

9. **Andmans.** This region possesses a varied type of vegetation: mangroves and beech forest at its coasts and evergreen forests of tall trees in the interior. Important plant species of this island are *Rhizophora*, *Mimusops*, *Calophyllum*, *Lagerstroemia*, etc.