and West Bengal are the representative species of the primordial vegetation. The vegetation of Uttar Pradesh is mainly dry deciduous type which changes to moist deciduous type, in Bihar and West Bengal. Sheesham, neem, mahuwa, jamun, acacia, ber, bel, etc. are the examples of this type of vegetation. In addition to these, there are numerous types of grasses found in the Gangetic Plain.

5. The Indus Plain

This floristic region spreads over Punjab, Haryana, Rajasthan, west of the Aravallis, Kuchchh, and north-western parts of Gujarat. In this region the average annual rainfall is less than 75 cm . Consequently, its vegetation is of the type which can bear the arid and severe drought conditions. Acacias, cacti, wild-palms, khejra, and palas, etc. are the main trees of this region. During the rainy season, numerous grasses develop which wither during the dry season.

6. The Deccan Region

This region covers the greater parts of Peninsular India. This region has teak, tendu, sal, palm, and thorny shrubs.

7. The Malabar Region

This region stretches all along the western coast from the Gulf of Khambat (Cambay) to cape Camorin (Kanniyakumari). Here, the vegetation type ranges from moist tropical evergreen to broad leafed mixed and monsoon deciduous type. The Nilgiri hills show temperate forests at higher altitudes. The region also contains several species of plants of the Malay origin.

8. Andaman and Nicobar

The Andaman and Nicobar Islands are covered by the equatorial evergreen forests of heavy wood.

SPATIAL DISTRIBUTION OF FORESTS IN INDIA

The total geographical area of India is 32,87,263 sq km, of which about 6,75,500 sq km—equal to 22.50 per cent—is under forests. According to the National Forest Policy (1952) about 33 per cent of the geographical area should be under forest. However, the existing forest area is much below the desired level. The areas under forest cover in India have been shown in **Fig. 5.2**. It may be observed from **Fig. 5.2** that the Himalayan mountains, Bhabhar and Tarai, Western Ghats, Eastern Ghats, Bundelkhand, Baghelkhand, Chotanagpur Plateau, Nilgiris, and the hills of Peninsular India are the main areas of Indian forests. Unfortunately, about 5 to 6 per cent of the total forest area of the country is under the category of degraded forests.

The forest area in India is much below the world average of 34.5 per cent and that of Brazil (57 per cent), Sweden (58 per cent), USA (42 per cent), Germany (41 per cent), and Canada (36 per cent). Similarly, the per head forest area in India is only 0.07 hectare as against the world average of 1.10 hectares, Canada at 23 hectares, Brazil 8.6 hectares, Australia 5 hectares, Sweden 4 hectares, and USA 3.5 hectares per head of population.

2. **The Tropical Moist Deciduous**: These are typical monsoon forests with teak (*Tectona grandis*) and sal (*Shorea robusta*) as the dominant species. They form the natural vegetation all over the country where the average annual rainfall ranges between 100–200 cm. The tropical moist deciduous forests are found in Sahyadris, the north-eastern parts of the peninsula and along the foothills of the Himalayas **(Fig. 5.3).** These forests on the whole have gregarious species. The typical landscape consists of tall teak trees with sal, bamboos, and shrubs growing fairly close together to form thickets. Both teak and sal are economically important and so are the Sandalwood (*Santalum album)* Shisham (*Dalbergia sissoo*), Hurra (*Terminalia chebula*), and Khair (*Acacia catechu*).
3. **The Tropical Thorny Forests:** The tropical thorny forest is a degraded version of the moist deciduous forest. They are found in the average annual rainfall varies between 75 and 100 cm and the average annual temperature between 16°C and 22.5°C. These forests are found in peninsular India, Rajasthan, Haryana, Punjab, western Uttar Pradesh, Kachchh, Madhya Pradesh and the foothills of the Himalayas **(Fig. 5.3).** The important trees of these forests are acacia, wild-palms, euphorbias, jhad, tamarix, khair, kokko, dhaman, erunjha, cacti, kanju, and palas.
4. **The Subtropical Montane Forests**: These forests are found in areas where the average annual rainfall varies between 100 to 200 cm and the temperature varies between 15° and 22°C. These forests are found in the north-western Himalayas (except in Ladakh and Kashmir), Himachal Pradesh, Uttarakhand, Arunachal Pradesh and on the slopes of north-eastern hill states **(Fig. 5.3).** Chir (pine) is the main tree but broad leaved trees are also found in these areas. Oak, jamun, and rhododendron are the other varieties in these forests.
5. **The Dry Deciduous Forests:** These forests are found in areas where the average annual rainfall ranges between 100–150 cm. These forests are characterised by closed and rather uneven canopies. Enough light reaches the ground to permit the growth of grasses and climbers. Acacia, jamun, modesta, and pistacia are the main trees. Grasses and shrubs appear during the season of general rains.
6. **The Himalayan Moist Forests**: These forests are found in Jammu and Kashmir, Himachal Pradesh, Uttarakhand, and northern hilly parts of North Bengal **(Fig. 5.3).** The wet temperate type is found in a belt where the altitude varies between 1000 and 2000 metres. They occur largely as bands of crested dark green landscape of coniferous varieties. The important varieties are oak, chestnut, chir, sal, shrubs, and nutritious grasses.
7. **The Himalayan Dry Temperate Forests:** These forests are found in Jammu and Kashmir, Lahul, Chamba, Kinnaur (Himachal Pradesh), and Sikkim **(Fig. 5.3)**. These are predominantly coniferous forests with shrubs. The important varieties of trees are deodar, oak, chilgoza, ash, maple, olive, mulberry, willow, celtis, and parrotia.
8. **Montane Wet Temperate Forests:** These forests are found in the entire Himalayas from Jammu and Kashmir to Arunachal Pradesh between the altitudes of 1500 m to 3300 m where the temperature varies between 12°C to 15°C, and the mean annual rainfall is between 100 to 250 cm. Oak, fir, spruce *Picea*, deodar, (*Cedrus deodara*), magnolia *(Magnolia glandifora*) celtis, chestnut, cedar (*Chamaecyparis*) and maple, spruce, deodar, silver-fir (*Abies alba)*, kail, and yew are found here. These forests also contain scrubs, creepers, and ferns. The woods of these forests are durable.

(i) Chir (Pinus Longifolia)

Chir occurs in the Himalayas between 900 m and 1800 m, from Jammu to Arunachal Pradesh. The wood is light and reddish brown in colour and is moderately hard. It is used for furniture, for making tea-boxes, match industry, and railway sleepers. It yields resins, gums, and turpentine oils.

(ii) Deodar (Cedrus Deodara)

It grows in the north-western Himalayas in the states of Jammu and Kashmir, Himachal Pradesh, and Uttarakhand, between the heights of 1500 m and 2500 m. Its wood is of light brown to yellow colour. Its wood is very sturdy and duarable. It is also an easy timber to saw and work to smooth finish. The timber is used for construction-work, and for railway sleepers. It is also suitable for beams, floor-boards, ports, doors, window frames, light furniture, and shingles.

(iii) Blue-Pine (Pinus Excelsa)

It grows along the entire length of the Himalayas from Chumbi Valley to Sikkim between the elevation of 1800 m and 3600 m. The wood is pink in colour, moderately hard and of good quality. It is used for making doors, windows, furniture, and railway sleepers. It also yields resins and turpentine.

(iv) Silver-fir (Abies)

It is found in the north-western and north-eastern Himalayas between 2200 m and 3000 m. The food is soft but not very durable. It is mostly used for planking, packing boxes, containers, wood-pulp, paper, and match sticks.

(v) Spruce (Picea Mithiana)

It is found in the western Himalayas between 2100 m and 3600 m. Its soft white wood is used for construction of houses, railway sleepers, cabinets, packing, and pulp making.

(vi) Walnut (Juglans Regia)

It is found in Kashmir, Himachal Pradesh, Uttarakhand, and Khasi hills. It is a relatively light wood on which work can be done easily and the finish is fine and attractive. Once dried it does not shrink, swell or split. The wood is used for musical instruments, gun-butts, and cabinet works.

(vii) White Willow (Salix Alba)

It is a small tree found in north-western Himalayas including the Kashmir Valley. Its twigs are used for making baskets. The wood is used for making cricket bats and other sports goods.

(viii) Indian Birch

It is obtained from the higher slopes of the Himalayas. The wood is grayish in colour, even textured and straight grained. It is largely used for the making of furniture, plywood, and radio cabinets.

(ix) Cypress

It mostly occurs in Uttarakhand, Himachal Pradesh and Jammu & Kashmir. Its wood is durable and used for making furniture.

FOREST PRODUCTS AND THEIR UTILITY

In addition to fuel-wood, timber, and charcoal, the forests provide a number of other products.

The National Forest Policy 1952 lays emphasis on :

(i) Weaning the tribal people by persuasion to desist from shifting cultivation.
(ii) Implementation of forest laws more effectively.
(iii) To provide adequate facilities for the management of forest resources.
(iv) To control grazing of cattle, sheep and goats in forest areas.
(v) Providing fuel-wood to rural areas.
(vi) To improve the availability of timber wood for industrial purposes.
(vii) To increase the area under social forestry.
(viii) To promote research in forestry.

The National Forest Policy 1988

The main emphasis of the National Forest Policy 1988 is on the protection, conservation, regeneration and development of forests. The main points of the National Forest Policy 1988 are:

(a) Maintenance of environmental stability through the preservation and restoration of ecological balance.
(b) Conservation of forests as a national heritage with vast varieties of flora and fauna.
(c) Control of soil erosion and denudation in catchment areas of rivers, lakes and reservoirs.
(d) Check on the extension of sand-dunes in desert areas of Rajasthan and along sea-coasts.
(e) Substantial increase in forest cover through massive afforestation and social forestry programmes.
(f) To meet the needs of fuel-wood, fodder and minor forest products for the rural and tribal people.
(g) Augment the productivity of the forests to meet national needs.
(h) Encouragement of efficient utilisation of forest produce and optimum substitution of wood.
(i) Steps to create massive movement of people with the involvement of women folk to achieve these objectives and to minimise pressure on existing forests.
(j) Involvement of people in forest management under joint forest management.

SOCIAL FORESTRY

Social forestry refers to the forests (trees) planted by the people of a society. It has been defined as '*the forestry of the people, for the people by the people*'. The significance of social forestry has been emphasised in the National Forest Policy 1952 and 1988. The main objective of social forestry is to reduce pressure on traditional forests by plantation of fuel-wood, fodder, timber, and grasses. The two types of social forestry include:

Agro-forestry which includes community forestry and agro-forestry (commercial and non-commercial farm forestry).

Community Forestry

Community forestry is a part of social forestry. It involves the raising of trees on community lands with the set objective to provide benefits to the community as a whole. Although the plants and seedlings are provided by the forest departments, the protection of planted trees is primarily the responsibility of the community as a whole.

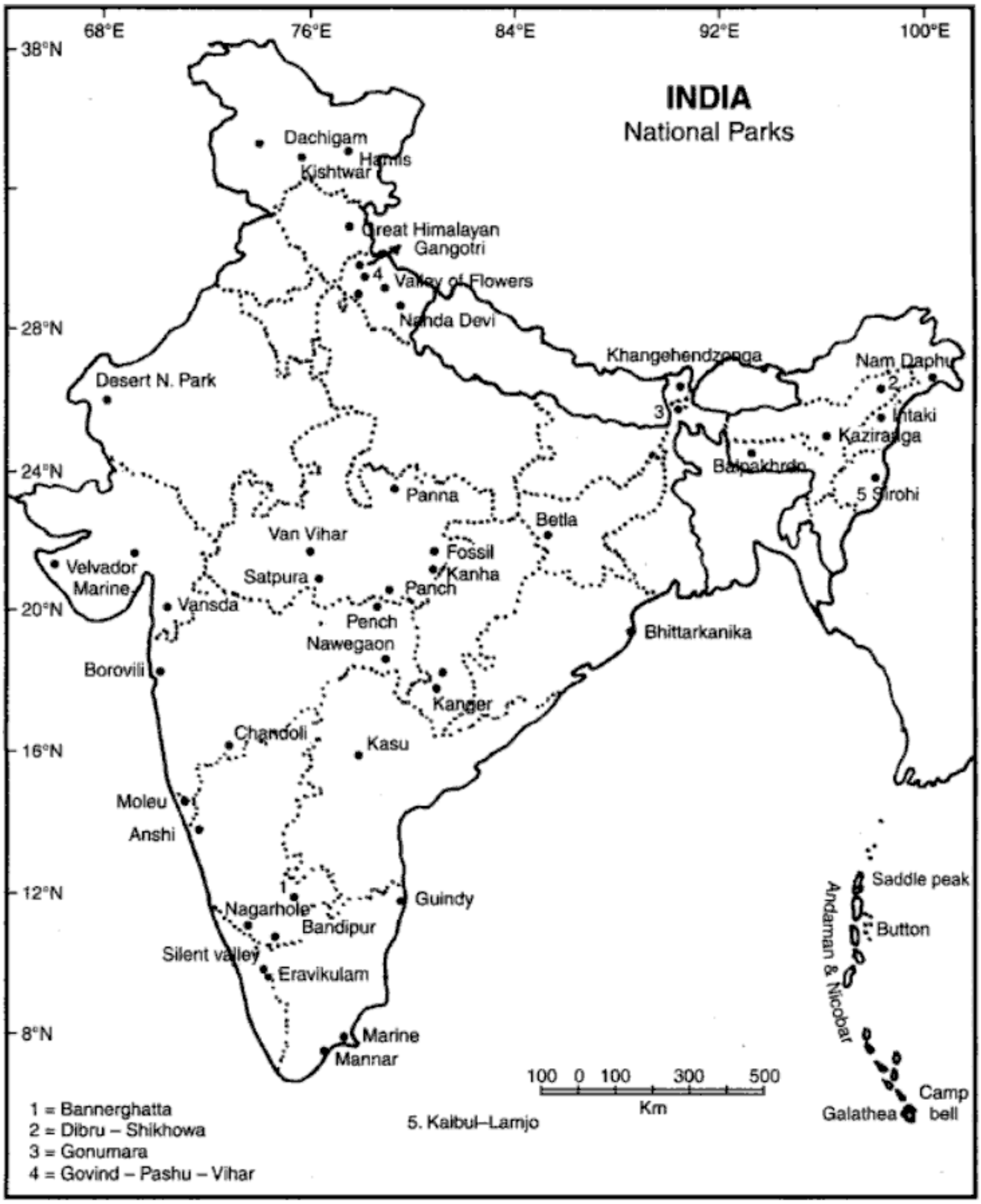

Fig. 5.5 National Parks

Wildlife Sanctuary: Similar to a national park, a wildlife sanctuary is dedicated to protect wildlife and particular species. In a sanctuary, human activities are allowed, but in a national park human interference is totally prohibited.

Tiger Reserves: Some of the important Tiger Reserves of India have been discussed in the subsequent pages. Their geographical distribution has been shown in **Fig. 5.6.**