

# 1 An Introduction to Uttarakhand

## 1.1 The Land

Pauranic scriptures refer to Uttarakhand as *Kedarkhand* and *Dev-bhumi*, which means the seat of the gods. This region is richly endowed with many natural bounties and thus has always been attractive to travellers. The total land area of Uttarakhand is 51,125 sq.km., which constitutes 17.4 per cent of the area of its parent state Uttar Pradesh (UP). Uttarakhand is divided into two revenue divisions, Kumaon and Garhwal, with a total of twelve districts, Almora, Pithoragarh, Nainital, Pauri Garhwal, Chamoli, Tehri, Dehradun, Uttarkashi, Deo Prayag, Bageshwar, Champawat, and Udham Singh Nagar. The four districts of Deo Prayag, Bageshwar, Champawat, and Udham Singh Nagar were only created recently, thus to avoid any confusion and overlap in this paper, all statistics are quoted in terms of the original eight districts.

This part of the Himalayas not only has a unique topography, soil, climate, flora, and fauna, but also a rich cultural diversity. In the scriptures this region has been referred to as the domain of *Pandavas*, or *Panchal Desh*. Evidence suggests that despite cold climatic conditions and rugged mountain tracts, this region has always been settled even in its remotest parts. Many rulers, kings, and dynasties have ruled the area. About 500 years ago, the area became divided into the two distinct regions of Kumaon and Garhwal. Today Kumaon comprises the districts of Pithoragarh, Almora, Nainital, Udham Singh Nagar, Bageshwar, and Champawat; and

Garhwal those of Chamoli, Dehradun, Pauri, Tehri, Uttarkashi and Deo Prayag.

### 1.1.1 Uttarakhand: Longitudinal Zones

Uttarakhand lies between 29°5' N and 31°25' N and 77°45' E and 81°0' E. The whole area can be divided into five altitudinal zones.

#### Siwalik and Terai

The southern boundary of Uttarakhand is formed by the outer zone of the Siwalik Hills, which run almost parallel to the main Himalayas, and the lower valleys (Doons) in Garhwal and the *Terai*-Bhabar region (below 600 masl) in Kumaon. The area runs along the Himalayan foothills and is about 450 km long from east to west and about 12 to 60 km wide from north to south. The lower regions, known as the *Terai*, are fertile areas with mixed forests and swamps. The *Terai* has thick sal forests and grasslands, and the Bhabar area has dry sal forests with many broad-leaved species.

#### Lesser Himalayas

This region can be divided into a lower hill and an upper hill region.

The Lower Hill Region lies at 600 to 1,800 masl. It is the most densely populated region of Uttarakhand. Broad-leaved species and chir-pine forests are found in this area. Vast areas have been cleared in the past for human settlement, cultivation, horticulture, and other development work. Pressure on the forests is high because

people mainly depend on them to meet their fuel and fodder needs. Water is plentiful, a striking feature of the area, and there are many brooks and rivulets.

The Upper Hill Region lies between 1,800 and 3,000 masl. This region is mainly covered with oak and *deodar* forests. Villages are sparse compared to the lower regions, but the demographic pattern is changing fast as most tourist spots are located here. There has been an increase in the number of tourist hotels and an influx of people from the lower areas for employment, particularly in the Kumaon hills. Rainfall is somewhat lower than in other parts, but broad-leaved oak forests have given rise to a rich soil, especially in the northern aspects, and vast tracts of once rich oak forest areas have been converted into agricultural fields, mainly for potato production. People largely depend on forests for their fuel, fodder, and other minor forest product needs. Nomads from the lower areas move to these areas with their cattle for summer grazing.

### The High Altitude Region

This area lies between 3,000 and 6,000 masl and is thinly populated. The most striking feature is the mainly green flat land known as *bugyals*. The *bugyals* are covered with snow during winter, but in summer herds of nomads and their animals (sheep, goats, cows, and buffaloes) arrive here for grazing. This zone is very rich in medicinal plants and has fir, spruce, blue pine, and *Taxus* trees in the lower regions and birch and juniper trees in the middle regions. There are many shrines and the area is subject to heavy tourist pressure during the summer. Many makeshift restaurants and hotels mushroom between February and June every year, and this places a heavy pressure on the forest resources. *Bhojpatra* and *Thuner* (*Taxus baccata*) wood is usually burned. Vegetation is very sparse above 4,510 metres, and above this height the mountains remain covered with snow throughout the year.

### The Great Himalaya

The high mountains lie above 6,000 masl. The prominent peaks in this area are Nanda Devi

(7,818 masl), Trishul (7,122 masl), Dunagiri (7,068 masl), Bhandar Poonch (6,315 masl), Kedarnath (6,940 masl), Nandakot (6,861 masl), and Gangotri (6,672 masl). The glaciers of Pindari and Milam, the enchanting Valley of Flowers, and the Nanda Devi sanctuary are also located here.

### Upper High Altitude Region

The northernmost region of Uttarakhand is part of the rain-shadow area of the high Tibetan plateau along the border with Tibet (China). This region consists of deep gorges, stones, barren areas, and snow. The main passes are Lepu Lekh (4,983 masl), Dama (5,642 masl), Kungari Bingrih (5,578 masl), Shalshal (1,515 masl), and Niti (5,044 masl). They are important trading routes. Rivers like the Alaknanda, Bhagirathi, Yamuna, and their tributaries have their origins in this region.

## **1.2 The People**

Uttarakhand has always attracted settlers. In earlier times, these settlements were scattered and less dense, but over the years migrants from many different parts of the country settled here. The Shilpakars, locally known as Dom, are thought to be the aboriginal people of the area. And there are a few more tribes like Tharus and Boaksas whose social milieu is intricately interwoven with the forest, and who still lead a lifestyle in which their whole sustenance is from the forests. The Khasas, a nomadic tribe from Central Asia, entered the area from the north-west and were driven into the Himalayas during the thirteenth century. Between 254 AD and 1791 AD, many warriors from the plains, mainly the central Indian states of Maharashtra, Gujrat, Madhya Pradesh, Rajasthan, and Delhi but also from Bengal and South India, came to this region to seek refuge. Bhotias from the border districts of Chamoli and Pithoragarh migrated in from Tibet during the seventh century.

The Katyris ruled the area from the latter half of the seventh century AD up to the twelfth century AD. The Mallas of Western Nepal then overpowered the Katyris, and the thirteenth century saw the advent of many smaller states,

prominent among them the Chandhas in the east and the Pamvaras in the west. In the late eighteenth century 'Kumaon' and in the early nineteenth century 'Garhwal' were ruled by the Gorkhas of Nepal, who in turn were overthrown by the British in 1815. With the exception of Tehri Garhwal, which was allowed to remain an independent state under the Pamvara rulers, the British annexed all of Garhwal (Pauri Garhwal) and Kumaon. In 1839, Garhwal was organised into a separate district with the headquarters at Pauri. The process of reorganisation was completed by the end of 1968, when the two separate divisions of Garhwal and Kumaon were created with their headquarters at Pauri and Nainital respectively.

The total population of Uttarakhand between 1901 and 1991, the overall rate of growth, and the rate of growth in rural areas, are shown in Tables 1.1. In 1991, according to the census, the total population of the region was nearly 6 million, about 4.2 per cent of the total population of the state of UP. The population growth statistics between 1901 and 1951 show a steady increase of 9 to 11 per cent per decade. After this the rate more than doubled and has remained high.

The population is concentrated in the central part of Uttarakhand, the northern part has a harsh climate that limits human settlement and agriculture, and the southern part is largely forested. The central zone has good soil, perennial water sources, and a fair climate. About 50 per cent of the total rural population

lives in Kumaon. Nainital has the highest proportion of population in any district (20.8%), followed by Almora (17.9%), Pauri Garhwal (14.5%), Tehri (12.3%), Pithoragarh (11.7%), Dehradun (9.8%), Chamoli (8.5%) and Uttarkashi (4.5%). Apart from Nainital, the new district of Udham Singh Nagar, and Dehradun, the districts are largely rural - with urban populations ranging from 4 to 9 per cent, compared with 18 per cent in UP State.

The 1991 census report shows that about 60 per cent of the population is engaged primarily in agriculture. Agriculture, with an emphasis on animal husbandry, has always been the main occupation in the area. Arable production cannot support the households because the landholdings are very small and the agriculture is mostly rainfed, and villagers keep large herds of sheep, goats, cows, and other domestic animals which are almost totally dependent on the nearby forests for fodder. The livestock population increased by 12.5 per cent between 1982 (4 million) and 1993 (4.5 million). The human and livestock population densities in the area are shown in Table 1.2.

As a result of the increasing population, the division of land continues unabated and farmers find it difficult and uneconomical to work so hard for such a limited output. Previously a system of bartering of labour and cooperative farming was practised. But now farmers find it difficult to produce sufficient grain for their own consumption, and the majority have to rely upon part-time work like road construction, road

**Table 1.1: Growth of Population in Uttarakhand (1901-1991)**

Census Year	Total Population	% Increase	Rural Population	% Increase
1901	1,650,087	-	15,55,527	-
1911	18,30,822	10.95	17,08,910	9.86
1921	18,19,881	-0.60	16,89,767	-1.12
1931	19,77,065	8.64	18,46,786	9.29
1941	22,41,498	13.38	20,52,615	11.15
1951	25,18,355	12.35	22,26,699	8.48
1961	31,06,356	26.51	27,31,328	22.66
1971	38,22,010	23.04	33,31,023	21.96
1981	48,48,403	26.85	39,60,852	18.91
1991	59,26,146	22.22	46,40,209	17.15

**Table 1.2: Population Density in Uttarakhand in Relation to Geographic and Forest Areas**

Population Density	Density with Respect to Geographical Area	Density with Respect to Forest Area
Human population per sq. km.	116	173
Number of livestock per sq. km.	88	190

Source: Forest Statistics (1997)

maintenance, and seasonal work with the Forest Department to secure their living. The increasing population, and lack of adequate employment opportunities, have led to marginal lands and sub-marginal lands that used to be pasture being used for agriculture. Food grain has to be brought from the plains to supplement the meagre agricultural production.

A large part of the population, especially men, are employed in the plains in the army and many other jobs. As a result, women play a key role in fuelwood and fodder collection and agricultural activities, in addition to undertaking household chores and the care of children. Often girls have to leave school because of the pressure of household chores, especially the labour intensive activities of collecting water, fuelwood, and fodder. As a result of the marginalised agriculture and insufficient production, remittances from the male members of households are very important. The impact of this heavy workload on the life expectancy and quality of life of women in the middle hills is severe. Even so, male and female

literacy are both 60 per cent or more, higher than the UP state average.

The *panchayat* institution has been strong in the hills and deals with such things as social disputes and arrangements for festivals.

### 1.3 The Forest

The official figure for the total area of forest and the area under different types of administration are shown in Table 1.3, and the amount in different districts in Table 1.4. The total area classified as forest is 34,247 sq. km., but only 40 per cent of this (or 13,700 sq.km.) actually has any vegetation, and the remainder includes about 10,400 sq. km. of snow-covered and rocky areas. The main forest species are oak, chir, and sal, which constitute about 18, 17, and 13 per cent of the total trees respectively.

Table 1.5 gives a summary of the overall condition of the forest area under the control of the Forest Department.

**Table 1.3: Uttarakhand Forest Area**

Classification	Area (sq.km.)	Remarks
Total land area of Uttarakhand	51,125	17.37 % of UP state
Total Forest area in Uttarakhand (legal)	34,247	67.00 % of Uttarakhand
Total forest area under the control of UP Forest Department	23,668	69.1% of total forest area
Total forest area under the Revenue Department (Civil Soyam Forest)	8,014	23.4 % of total forest
Total forest area under community forests ( <i>van panchayat</i> )	2,368	6.91 % of total forest
Cantonment, municipality, and private forest lands	197	0.57% of total forest area

Source: Uttar Pradesh Forest Statistics, 1994

**Table 1.4: Uttarakhand Forest Area Statistics by District (in sq.km.)**

District	Total area of district	Forest under the Forest Dept.	Civil Soyam	Van Panchayat	Private	Total Forest Area
Almora	5,385	1,472	1,821	628	1	3,922
Pithoragah	8,856	1,378	1,210	715	-	3,302
Nainital	6,794	3,614	192	207	22	4,035
Garhwal	5,440	2,403	1,806	296	6	4,512
Chamoli	9,125	3,639	1,043	522	-	5,203
Tihri	4,421	2,694	1,278	-	-	3,972
Dehradun	3,088	1,513	516	-	169	2,198
Uttarkashi	8,016	6,955	148	-	-	7,102
Total	51,125	23,668	8,014	2,368	198	34,247

Source: UP Forest Statistics, 1994

### 1.3.1 Forest Types

The forests of Uttarakhand can be classified into three broad categories.

#### Sub-Tropical Deciduous Forest

These forests are found below 1,200 masl in the sub-Himalayan region and can be further divided into two types: moist deciduous forests and dry deciduous forests. The moist deciduous forests are found mostly in the *Terai* region. The major species are sal, teak (introduced), and *sissoo*. Large grassy patches with *semal* trees and marsh are a special feature of the area. Bamboo is also found in wetter places. The dry deciduous forests are found in the western *Terai* and some

sub-Himalayan zones in Garhwal and Bhabar in Kumaon in areas with a long dry season. The main species are sal, *sissoo*, and *khair*.

#### Temperate Forests

There are two distinct types of temperate forest in Uttarakhand: moist temperate forests and dry temperate forests. Moist temperate forests are generally found between 1,800 and 2,800 masl, but can extend from 1,500 to 3,500 masl on valley slopes where the annual rainfall exceeds 150 cm. *Chir* is the dominant tree species in many places; broadleaved species such as *ayar*, *mehal*, and *kaphal* are found in association with *chir* on north-facing slopes where the soil is deep and there is more soil moisture. A *banj oak* zone forms the lowest forest belt, and *kharsu oak* occupies the highest zone. *Deodar* and fir trees are found at high altitudes. Dry temperate forests, with *deodar*, oak, and maple, are found on the leeward sides of hills where the annual rainfall is less than 100 cm. They occur in scattered locations in Pithoragarh and Chamoli districts.

#### Alpine Forest

The alpine forests can be sub-divided into three types: sub-tropical pine forest, sub alpine/moist alpine forest, and dry alpine forest. The main tree species found at different altitudes are silver fir (*Abies pindro*), blue pine (*Pines excelsa*), spruce (*Picea smithiana*), cypress (*Cupressus*

**Table 1.5: The Quality of the Forest Area under the Forest Department**

Forest Condition	Area (in sq.km.)
Usable and productive	11,901
Inaccessible	1,058
Low density forest	942
Plantation	616
Plantable area	888
Riverine area	171
Grassland/open area	1,780
Very low density	810
Snow-clad area	3,080
Rest	2,403
Total	23,668

*torulosa*), *deodar* (*Cedrus deodara*), and rhododendron. Blue pine and spruce are mainly found in Garhwal. The potential range of cyprus and *deodar* is between 2,015 and 3,100 masl on northern aspects. Dry alpine scrub is found in Uttarkashi, Chamoli, Tehri, and Garhwal districts. In some places, birch and alpine pastures are interspersed with sub-alpine and dry alpine forests.

### 1.3.2 Distribution of Forests

The proportion of forest at different altitudes is shown in Table 1.6, and the major tree species in Table 1.7.

The *Terai*, Bhabar, lower Siwalik, and Dun Valley areas, which lie below 600 masl, contain 25 per cent of the total forest area. The next higher belt of forest contains mainly chir and oak forests and constitutes about 67 per cent of the total forest area. This belt is the most threatened from an ecological and conservation point of view, because of human settlement and tourism and the resultant biotic pressure.

## 1.4 People and the Forest

The rural communities in Uttarakhand draw almost all their sustenance from forests. The forests provide fuelwood, water, supplementary wild food (such as wild fruit, honey, and mushrooms), medicinal herbs, timber for home construction and agricultural implements, and inputs for agriculture, horticulture, and livestock rearing. Those urban people who do not live in close proximity to the forests, also depend on them indirectly.

According to one study, each kilocalorie of agronomic yield in Uttarakhand requires the expenditure of 7 kilocalories of energy from adjoining forests. Another study estimated that in Uttarakhand about 15 ha of forest were required to maintain one hectare of agricultural land on a sustainable basis. This ratio has been under constant stress as a result of the dwindling quality of the forests, overgrazing, and the extension of agriculture on to marginal and unproductive lands. A study done in Chamoli district showed that to maintain the forests the

**Table 1.6: The Distribution of Forest Area in Uttarakhand by Altitude**

Altitude (masl)	% Total Forest Area	Altitude (masl)	% Total Forest Area
Below 300	12.8	1500 - 1800	11.8
300 - 600	12.3	1800 - 2100	9.9
600 - 900	7.9	2100 - 3000	18.9
900 - 1200	8.4	3000 - 3450	7.5
1200 - 1500	10.5		
Total			100.0

**Table 1.7: The Major Tree Species in Uttarakhand Forests**

Species	Percentage
<i>Pinus roxburghii</i>	17.0
<i>Quercus leucotrichophora</i>	12.5
<i>Shorea robusta</i>	12.3
Low level misc. spp	11.1
<i>Quercus floribunda</i> and <i>Q. smithiana</i>	5.1
<i>Abies pindro</i> and <i>Picea smithiana</i>	3.6
Plantations	3.3
<i>Populus ciliata</i>	1.2
<i>Cedrus deodara</i>	0.8
<i>Pinus wallichiana</i>	0.7
<i>Acacia catechu</i>	0.6
<i>Cupressus torulosa</i>	0.3
Source: Forest Statistics, 1994	

ratio between the total number of animals (in cow units) and land available should not exceed 0.41 cow units. The situation in Garhwal division provides an example of present day practice. The total number of animals according to the 1988 census is shown in Table 1.8. The total suitable forest area in Garhwal division is 263,000 ha, thus the ratio of animals to land area is 1.37 cattle units, more than three times the carrying capacity, and it is increasing every year as a result of the dwindling quality of the forests. This situation is not very different in other areas of Uttarakhand.

The scenario in *van panchayat* and Civil Forests is still worse because of overuse and easy accessibility. There are sporadic examples of good conservation efforts being made by *van panchayats*, but these measures have only been possible because of extraction of forest products from adjoining Reserve Forests.

The people of Uttarakhand have enjoyed rights and concessions on forest produce for domestic needs from historical times. Before the advent of British rule in the area and the introduction of regulated forestry, people had unlimited rights with open access to all forest areas. During the Katuri and Chand dynasties, it is said that the forests were managed as public property and everybody had equal rights to them. Before British rule, the only regulations of people's rights in forests and to forest products were those related to customs, but these were adhered to strictly because of religious faith and the fear of social sanctions. These customary rights continued to be exercised by local people even after regulatory guidelines on forest management were imposed by the British because the

population was small, infrastructure was not developed, and forest produce was available in plentiful supply. Now rising needs and demands have led to reckless degradation of forests in areas outside Reserve Forests, and adverse effects on Reserve Forests in close proximity to villagers.

At present, villagers have a right to enter almost all categories of forest to collect fuelwood and fodder. In the Reserve Forests, it is the duty of the forest guard to regulate grazing, fodder, and fuelwood collection from the viewpoint of scientific management and according to the prescriptions of the working plan. But it is difficult for a forest guard to control the vast areas under his control, and he/she is likely to be confronted by social sanctions and public wrath if he/she tries to stop illegal grazing and collection of fuel and fodder.

The commercial use of forests dates back to 1850 when the *deodar* forests of Yamuna Valley were leased to contractors for the production of railway sleepers. During World War II, the forests were exploited commercially to meet the timber demands for defence purposes. After partition in 1947, forests were cleared in the *Terai* to help with resettlement of the influx of refugees. Forests have also been cleared for other development activities, especially in the foothills. Tables 1.9, 1.10, and 1.11 list the extent of various non-forestry uses of, or affecting, forest land in the *Terai*, and Table 1.12 shows some details of the area of forest land used for non-forest purposes in hill areas.

With the enforcement of the Forest Conservation Act 1980, the process of conversion of forest land for non-forestry use slowed down. Table

**Table 1.8: Livestock Numbers in Garhwal Division**

Livestock Type	No. of Animals According to 1988 Census	Cow Unit Equivalents	Total Cow Units
Cows	224,479	1	224,479
Buffalo	63,140	1.5	94,710
Sheep and goats	182,715	0.2	36,543
Others	2,837	1.5	4,256
Total	473,171		359,988

Source: Working Plan, Garhwal Division

**Table 1.9: Names and Size of Reservoirs on Forest Land**

Reservoir	Area of Forest Land Used (ha)
Ramganga	8,391
Kaluwala	71
Pili	1,114
Tumaria	3,723
Kosi	41
Tumaria feeder	6.2
Baur	1,521
Haripura	903
Bhakra	16
Haldwani diversion channel	1.8
Behgul	2,210
Dhora	1,565
Survinadi barrage	13
Kutna canal	3
Nanak Sagar	1,073

Source: Rawat (1991)

1.13 shows the total area of forest land in Uttar Pradesh given for non-forest use from 1980 to 1997.

Construction of big dams like the Tehri has sparked strong protest in the hills, not only because of environmental and seismological considerations, but also because these big projects affect local communities, and especially poor people. Such projects force them to vacate their ancestral homes and fields and adopt new lifestyles that are not always suitable. A big dam project called Pancheshwar over the Kali Nadi near Pithoragarh on the border with Nepal is being planned, but construction work has not yet started.

Some deforestation has also taken place to boost horticulture. In the sixties and seventies, there was considerable deforestation in the oak zone in Kumaon for apple production. However, this

**Table 1.10: River Valley Projects in Uttarakhand**

Project (River)	Year(s) of Commissioning	Capacity (MW)
Khodri (Tons)	1983 - 1984	120
Dhalipur (Yamuna)	1965 - 1970	334
Dhalipur (Yamuna)	1965 - 1970	51
Chhibro (Yamuna)	1974 - 1976	240
Kulhal (Yamuna)	1974 - 1976	30
Maneri-Bhali-I (Bhagirathi)	1984 - 1985	90
Chilla (Ganga)	1980 - 1981	144
Kalagarh (Ramganga)	1974 - 1977	198
Khatima (Sharada)	1954 - 1956	41

Source: Kharkwal (1993)

**Table 1.11: Projects under Investigation or Construction**

Project	River	Anticipated Capacity (MW)
Vishnupryag	Alaknanda	360
Utyasu	Alaknanda	330
Pala-Maneri	Bhagirathi	400
Maneri-Bhali (Ph.II)	Bhagirathi	304
Tehri	Bhagirathi	2000
Koteshwar	Bhagirathi	400
Kishau	Tons	600
Lakhwar	Yamuna	300
Byasi	Yamuna	120
Katapathar	Yamuna	19
Khara	Asan	72
Tanakpur	Sharda	120

**Table 1.12: Forest Area Lost for Various Purposes in Hill Areas (sq. km.)**

Year	River Valley Projects	Agricultural Use	Road Construction	Industry	Other	Total Area Lost
1951-73	932	799	34	193	199	2,155
1973-74	0.41	1.78	0.78	0.62	0.13	3.72
1974-75	0.02	38.95	3.33	0.41	1.86	44.57
1975-76	3.12	0.01	7.86	-	3.75	14.79
1976-77	87.32	2.89	1.45	0.23	8.54	100.43
1977-78	-	-	0.69	-	84.03	84.72
1978-79	-	0.07	-	39.99	4.29	44.34
Total area	1023	841	48	234	302	2,448
Per cent	42	34	2	10	12	100

**Table 1.13: Area Given in Uttar Pradesh for Non Forestry Use (1980 to 1996 - 97)**

Period	Hectares
Up to 1980	230,005
1991 - 92	20,407
1992 - 93	308
1993 - 94	1,145
1994 - 95	1,014
1995 - 96	188
1996 - 97	516

Source: Forest Statistics (1997)

process has now stopped. In 1991, the total area of apple orchards in Uttarakhand was 23,342 ha. Oak forests were also exploited until the early seventies for charcoal production.