

ENCYCLOPAEDIA OF HIMALAYAS SERIES

CENTRAL HIMALAYAS



EDITED BY
KADAMBARI SHARMA

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PREFACE

World renowned 'Himalayas' are not only a great mountain range having the privilege Highest Peaks in the world.

A barrier to snowy winds from Mongolia and middle Asia to the south Asia, many great rivers originate from the Himalayas. A legendary range in Ancient Indian literature—many myths, realities and maxims are associated with Himalayas.

The present work in four volumes is encyclopaedic in nature which elaborately discusses all the major aspects viz. Geography, Economy, Fauna and Flora, Tourism, species, history and culture etc. Based on authoritative information, the four volumes, are grouped as follows:

- Understanding Himalayas
- Eastern Himalayas
- Eastern Himalayas
- Central Himalayas
- Western Himalayas.

I am thankful to all the learned authors and scientists whose writings are cited or substantially made use of in the present encyclopaedia. I am also grateful to Mr. J. L. Kumar, Managing Director, Anmol Publications Pvt. Ltd., New Delhi for undertaking the publication of this project.

This work will prove a standard reference for the students, scholars and teachers in the field of geography, economics, environment, and sociology of the Himalayan regions.

—Kadambari Sharma



Geography

1 _____ Geography

The Himalaya, extending from the eastern border of Pakistan to the western frontiers of Burma and its southern limit is formed by the upper boundary of the Indo-Gangetic plain while the international boundary between India and Tibet makes its northern boundary. About 2500 km in length, the Himalaya lying in India can be broadly divided into three divisions—the Western Himalaya consisting of the states of Jammu and Kashmir and Himachal Pradesh, the Central Himalaya comprising of the regions of Garhwal and Kumaun and the Eastern Himalaya includes the states of Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Darjeeling district of West Bengal and hill Districts of Assam. These regions may also be referred to respectively, as Dry Western Himalaya, Moderate Central Himalaya and Wet Eastern Himalaya extending over five lakh km with about 3 crore persons in 1991. It accounts for 15.21 per cent of the country's land area containing 3.57 per cent of its population.

Indian Central or Uttarakhand Himalaya, which is considered to have densely forested area and is an abode of Gods and Goddesses and natural home for various wild animals. It is also a meeting place for various cultural groups which have come down from Central Asia in the north and the Gangetic plain in the south. It extends from the river Tons—a feeder of the river Yamuna in the west to the river Kali in the east. Its northern limit is demarcated by Indo Tibet water parting ridge and southern limit of Tarai belt separating it from Hardwar, Bijnor, Muradabad, Bareilly, Rampur and Pilibhit districts. The Indian Central Himalaya or Uttar Pradesh Himalaya or U.P. Hills is often called to as Uttrakhand and Uttranchanchal, consists of two administrative divisions—Garhwal which includes the five districts of Dehradun, Uttarkashi, Tehri, Pauri and Chamoli and Kumaun which consists of three districts of Nainital, Almora and Pithoragarh and they have further been divided into 39 tehsils and 89 community developments blocks. Lying between 28°44' and 31°25' N latitudes and 77°45' and 81°1' longitudes, the Central Himalaya encompasses an area of 51,125 km and supports a population of 59,01,039 person living in 15117 villages and 74 urban centres in 1991. It accounts for 17.36 and 4.24 per cent of the state's land and population, respectively. The region is larger in size than eleven states of India—Punjab, Haryana, Kerala, Meghalaya, Manipur, Mizoram, Goa and Delhi. As per the census of 1991, the region is larger than nine states in terms of population—Himachal Pradesh, Tripura, Manipur, Meghalaya, Nagaland, Goa, Arunachal Pradesh, Mizoram and Sikkim.

Out of the total area of the region, 5385 km² land is in Almora district, 7694 in

Nainital, 8856 in Pithoragarh, 9168 in Chamoli, 8088 in Dehradun, 5397 in Pauri, 4421 in Tehri and 8016 km² in Uttarkashi district. Of the total population there are 820810 person in Almora, 560442 in Pithoragarh, 1585325 in Nainital, 237772 in Uttarkashi, 441652 in Chamoli, 575352 in Tehri, 664986 in Pauri and 1014700 person in Dehradun district. In spite of the various physical diversities, the region exhibits socio-cultural unity.

Physical setting: From the Gangetic plain in the south to a comparatively less elevated rain shadow zone of Tethys (Trans) Himalaya in the north, the Central Himalaya possesses all longitudinal physiographic zones running parallel to each other—the outer Himalaya including the narrow belts of Tarai, Bhabar, Siwaliks and Duns, the Lesser Himalaya, the Great Himalaya, and the Trans Himalaya. These geophysical divisions are respectively, separated from one another by Himalayan Front Fault, Main Boundary Thrust, Main Central Thrust and Trans Himadri Thrust. For convenience, the study area has been divided into the following heads.

The outer Himalaya: The zone of Outer Himalaya consists of Tarai, Bhabar, Upper Siwalik, middle Siwalik, Lower Siwalik and duns from south to north, respectively. Siwalik ranges are made of Late Tertiary to Quaternary rocks. With a varying altitude of 700 to 1200 m above MSL, the Siwaliks lie in a general north-east to south-east direction. The Bhabar and Siwaliks are sparsely inhabited because of its thick vegetal cover, unhealthy climate, malaria prone zone and water scarcity. Those areas are crossed by the Lesser Himalayan traverse rivers such as Yamuna, Ganga, Western Ramganga, Asan, Saun, Koh, Dabha, Baur, Bhakhara, Gaula Nandhaur etc. The Main Boundary Thrust separates it from the Lesser Himalaya. Its lithology is quite different from that of the Lesser Himalaya. Gravel filled longitudinal, almost plain, areas somewhere between the Upper and Lower Siwaliks and the Lesser Himalaya are known duns. The word dun is derived from the Sanskrit word *drona*, i.e., bowl shaped feature—made of wide leaf. There are five duns, namely, Dehra, Chaukhamba, Kothari, Patli and Kota, lying between the Rivers Yamuna and the Ganga, the Ganga and the Western Ramganga, the Western Ramganga and the Kosi and river Kosi and the Baur. Of all the duns, Dehra is the largest and best developed dun followed by Kota. The dun is an ecotonal ecosystem between the hills and upper Gangetic plains.

Lying between the Siwaliks and the Gangetic plains, two narrow belts are known as Bhabar and Tarai. A 10-20 km wide belt between the Siwalik and Tarai is formed of coarse grains and pebbles brought down by the Lesser Himalayan rivers. Himalayan Front Fault (HFF) separates the Siwalik from the Bhabar. Except in rainy season the water of all springs disappear in the Piedmont zone. Owing to its water scarcity. The surface of the area is formed by fine sand and clay. Due to the availability of fertile soil. Hot climate coupled with abundant water, a 10-25 km wide desert forested, Tarai belt was homeland of Tharus, Buxhas, Gujjars, etc. Later on it was reclaimed for agriculture due to induction of new agrarian techniques launched by the various agencies for the rehabilitation of the refugees from Pakistan and Bangladesh, retired army personnels and landless freedom fighters of the Central Himalaya. Today, Tarai is one of the most developed parts of the country. In the Tarai, Tarai is one of the most developed parts of

the country. In the Tarai, Bhabar, Dun and Siwalik regions, there are about 13 per cent rural settlements and 60 per cent urban centres including Dehradun, Rishikesh, Kotdwara, Kalagarh, Ramnagar, Haldwani-cum-Kathgodam, Tanakpur, Khatima, Sitarganj, Kichha, Rudrapur, Godarpur, Bazpur, Kashipur, Jaspur, etc. There are some artificial water reservoirs—Nanksagar, Bahgul, Haripura, Tumeria, and Kalagarh.

The foothill belt of the Central Himalaya is made of sediments consisting of sandstone, mudstone and subordinate conglomerates of the Middle Miocene to Early Pleistocene age.

The Lower Siwalik consists of fine grained calcareous subgrewacks and sublitharenites alternating with dominant horizon of maroon mudstone and rare paraconglomerates while the Middle Siwalik consists of predominant coarse grained sublitharenite and subordinate paraconglomerate. The Upper Siwalik sediment comprises of boulder-conglomerate maroon mud stones and sandstones were deposited largely by braided rivers.

The Lesser Himalaya: Lying between two fragile and active zones of MBF in the south and MCT in the north, the Lesser Himalaya represents a mature terrain. There are a number of ridges carved out into deep gorges. The average width of the region is almost 70 km. The southern slope of the Lesser Himalayan ranges are almost eroded while the northern ones have comparatively thick vegetation.

It is a densely populated part of the Central Himalaya. There are number of big river valleys such as Chaukot, Giwar, Salt and Pali valleys in the Western Ramganga basin, Borarau and Koshyan in the Kosi basin, the Katyur, Chana and Danpur valleys in the Saryu basin, the Salam in the Panar basin, Sore, Sira and Kalikumaun in the Kali basin, Sore, Sira and Kalikumaun in the Kali basin, the Satpuli in the Nayar basin, and the valleys of Yamuna, Tons, Bhagirathi, Bhilangana Nandakini and Pindar rivers, In addition to Dwarahat, Ranikhet, Almora, Bageshwar, Dharchula, Pithoragarh, Lohaghat, Champawat, Bhimtal, Bhawali, Nainital, Lansdown, Pauri, Srinagar, Tehri, Uttarkashi, Chamba, Mussoorie, Gopeshwar, Joshimath, Karnprayag, Barkot, Purola, Naugaon, etc. urban centres, there are about 81 percent of total rural settlements. In the Lesser Himalaya there are several lakes -khurpatal, Nainital, Sattal, Bhimtal, Naukuchiatal, Lokhamtal, Haristal, Syamlatal, Taragtal, Masartal, Jaraltal, Dodital, etc.

The Lesser Himalayan terrain is made of the three lithotectonic units.

- (1) The autochthonous succession of the Precambrian strata forming the larger part of the inner belt.
- (2) Late Precambrian to early Palaeozoic sedimentary rocks formation forming the Krol Nappe includes slates, phylites, sandstone and limestone.
- (3) The Precambrian metamorphics injected with granite bodies.

In summing up there are six lithological groups, namely, Krol succession, Ramgarh group, Almora group, Damtha-Tejam group, Berinag formation and Munsyari formation. The Great Himalaya: Extending between MCT in the south and THT in the North, the

Great Himalayan region is a region of high peaks and glaciers. It ranges from 30 to 50 km in width. The altitude varies from a minimum of 3000 m to a maximum of more than 7000 in above MSL. It consists of beautiful chains of glaciers and the peaks of Nandadevi, Nandakot, Nandaghunti, Panchchuli, Gangotri, Bandarpunch, Trishul, Kedarnath, Chaukhamba, Kamet, Dunagiri, Maiktoli, Swargarohini, Yamunotri, etc. There are number of magnificent and internationally known glaciers such as Pindari, Sundardhunga, Kaphani, Milam, Surajkund, Ralam, Namik, Yamunotri, Gangotri, Khatling, Tapovan etc. The crystalline sheet of the Great Himalaya is dissected by deep gorges of the Tons Yamuna, Asiganga, Bhagirathi, Dharmganga. Balganga. Bhilangana, Mandakini, Alakananda, pindar. Saryu, Eastern Ramganga, Gori, and Kali rivers. Harsh and rigorous climatic conditions together with diversified topographic features are perhaps responsible of scanty habitation. Consequently less than 70 seasonal settlements along the river valley and *bughiyals* are in existence.

The Great Himalaya is made of high grade matamorphics the Vaikrita group of Precambrian age and introduced extensively by Mid Tertiary granite. However, Jhingran referred to it as a central crystalline zone.

The Trans Himalaya: Lying between THT in the south and the Indo-Tiber water divide in the north, the Trans Himalaya extends about 40 km in width. This is a rain shadow zone because the monsoons do not cross the high peaks of the Great Himalaya. The Gori, Eastern Dhauli, Kutu, Jadganga, Vishnaganga, from beautiful valleys such as Johar, Darma, Chaudans, Byars, etc., in the region Like the Great Himalaya, it is also scantily populated; i.e., about 20-30 temporary villages of Bhotia tribes are situated there. The practice of nomism still exists there in its indigenous form. The rock formations are shattered mylonotized or otherwise completely folded.

Drainage: Broadly speaking the central Himalaya is drained by the head waters of the river Ganga. It includes there river systems—the Yamuna, the Ganga and the Kali.

The Yamuna river rises for the Yamunotri glacier and Saptarishikund on the south western slope of Bandarpunch ridge and flows in the districts of Uttarkashi and Dehradun. The Tons is the largest river in the Central Himalaya in respect of volume. It rises from the glacier of Bandarpunch range and the Tons joins the Yamuna in Dehradun district and Asaun also flows towards in Dehradun. The main tributaries of the Ganga are the Bhagirathi and the Alaknanda while Bhilangana and Ashiganga are the main head waters of Bhagirathi and the Pindar and Mandakini of the Alaknanda. The name Ganga is used from the Gaumukh, snout of Gangotri glacier in Gangotri range Upwards of Uttarkashi the Jadganga, Pilang and Ashiganga are the main tributaries of Bhagirath. These rivulets take their rise from Thangola region, Shashstratal and sough eastern slope of Bandarpunch and join with the main river at Bhairoghati, near Bhukki and Gangotri, respectively.

The Bhilangana is the main tributary of the Bhagirathi takes its rise from Khatling glacier. The Dharmganga and Mediganga are the head waters of Balganga joins with Bhilangana at Ghansali. Eventually the Bhilangana joins with the Bhagirathi at Ganesh

Prayag which has carved a beautiful gorge from Tehri to Deoprayag which has carved a beautiful gorge from Tehri to Deoprayag.

Girthi and Kiogad the tributaries of Western Dhauri, respectively, take their rise from the northern slope of Untadhura and western slope of Indo-Tibet water divide. Western Dhauri joins with Vishnuganga at Vishnuprayag. A small tributary, Nandakini joins with the Alaknanda Nandprayag. One of the important tributaries of Alaknanda river Pindar debouches from the snout of Pindari glacier—just below the Nandadevi chain and joins with the main stream at Karnprayag. River Mandakini is also of Kedarnath ridge Madmaheshwar is a main tributary of Mandakini and joins with Alaknanda at Rudraprayag.

The Kali is the largest river largest river in Kumaun both in respect in volume and catchment area. Except the Girthi, Kiogad and Pindar all snowfed rivers of Kumaun make the head water of Kali. The Kali take their rise from Lipulekh and Impiadhura passes, respectively and Kuti joins with Kalapani at Gunji. Rising in Nepal the Tinkar river joins the Kali at Garbyang. From Gunji to Tanakpur it is shown as Kali. Lissar and Darma the feeder of Eastern Dhauri, take their rise from southern slope of Lawedhura and joins the Kali at Tawaghat. The Gunkhagad a tributary of Gori, originates from southern slope of Untadhura while the main Gori takes rise form the snout of Milam glacier and eventually to join the Kali at Jauljibi. The Saryu takes its rise from the Sahastradhara-a group of spring near Khaljhuni. Kanalgad Lahur, Pungar, Gomti and Panar are the main tributaries of the Saryu which received the Eastern Ramganga at Rameshwaram takes its rise from Namik glacier. Lohawati Takes its rise from the southern slope of Barakot range and drains the Lohaghat region. Ladhia is an other feeder which joins Kali at Chukha. Thereafter the Kali is known as Sharda river from Baramdeo to Melaghat near Khatima.

The Western Ramganga takes its rise from the northern slope of Dudhatoli range in Pauri district. Binau the principal headwater of Western Ramganga, takes its rise from Binsar springs and Baramdhungi located on the southern slope of Dudhatoli range. It receives the water of Masangadi at Deghat and joins the Western Ramganga at Kedar. Rising from the Bhatkot ridge, Gagas joins the Western Ramganga at Bhikiasam. The Kosi river a tributary of Western Ramganga rises on the southern slope of Bhatkot-Kausani range and leaves Kumaun near Sarkara eventually to joins the Western Ramganga.

Few minor rivulets such as Asaun, Song, Khoh, Dhela, Dabka, Baur, Nihal, Bhakhara, Gaula, Nandhaur, Deoha, Kamm, etc. take their rise from the outer zone of the Lesser Himalayan domain. Due to the porous nature of Bhabar area these rivulets became dry and reappear in the Tarai region where these are checked in the form of artificial reservoirs which used for various purposes.

Climate: Among all environmental influences that control the human activities, climate seems to be the most important and effective constraint particularly in determining the life style in a region. Diversified topography of the region has also formed different climatic features. The Indian Meteorological Department had divided the year into four seasons, cold season (December-February), hot season (March-Mid June), rainy season (Mid June-September), and the season of retreating monsoon (October-November).

In broader sense, climate is hot and moist in the Tarai, Bhabar and low lying valleys below 600 m elevation, between 600 to 1200 m elevation, it is sub-tropical, temperate from 1200 to 2000 m cool temperate between 2000 to 2400 m and cold temperate between 2400 to 3000 m elevation. Above 3000 m elevation to area experiences alpine climate.

The mean temperature in the month of January ranges about 21°C in the sub montane belt of Tarai, Bhabar, Siwaliks and Duns while 8°C in the inner river valleys. Between the elevation of 1800 to 2400 m the temperature is observed around 6°C. The month of may and June registered the highest temperature of the year. The mean monthly temperature for these months are around 40°C in Tarai, Bhabar and Dun belt, 24°C in higher places.

About 80 per cent of the total rainfall occurs in the monsoon season alone. A average annual rainfall in 150 cm in Tarai, Bhabar and Dun belts while Nainital hills receive about 250 cm. It generally decreases towards the interior parts of the Lesser Himalaya where the average annual rainfall is 90 cm while the Trans Himalayan region falls in the rainshadow zone because of the south east monsoon does not cross the high peaks of Great Himalaya.

Vegetation: Diversity in vegetation leads the diversities in the spatial environment. Vegetation of any area depends on the several atmospheric, edaphic and biotic phenomena. These constraints not only determine the growth but also the variety of vegetation. About 51,125 km² area of the Central Himalaya exhibits a great deal of variation in altitude ranging from 250 m in the Tarai to more than 7000 m in the Great Himalaya. The tree line touches at an altitude about 4200 m above mean sea level. The forests of the region are classified as follows.

1. Tropical Moist Deciduous Forest
2. Tropical Dry Deciduous Forest
3. Sub-Tropical Pine Forest
4. Sub-Tropical Dry Evergreen Forest
5. Himalayan Moist Temperate Forest
6. Himalayan Dry Temperate Forest
7. Sub Alpine Forest
8. Moist Alpine Forest
9. Dry Alpine Shrubs

Soil: A complete soil survey of the Central Himalaya has not been carried out so far. Based on the available data, it becomes difficult to determine the remarkable characteristics of the soil. Although the soil study is the matter of Pedology which include the origin, properties, distribution and uses of soil. But it plays important part in the geographical investigation. The quality of soil largely depends on the various environmental facts such as altitude, lithology, slope, flora and vegetal density, etc. which varies considerably from, place to place.

The foot hills soils near Dehradun show the soils are loam to clay-loam in texture and acidic in nature. In Ranikhet area four broad soil groups have been identified—red loam, brown forest soil, podzolic soil and meadow soil. On the basis of altitude, lithology, landscape, slope, aspects, gradient, vegetation, drainage and field work, the soil of Kotadun, a south western part of Kumaun is classified into seven categories—loamous, conglomeratic sand soil, stony hilly soil, crushed slaty soil, hill sandy soil, podzolic soil and rocky thin regolith soil.

Human habitat: Human habitat includes all activities related to agriculture, habitation, demographic characteristics, animal husbandry, state of civil amenities, etc. which together determine the social, economic, spiritual, mental and health status of its people in a specific unit.

From the cultural point of view the present study area shows a fine example of unity in diversity, because it has always been influenced by the cultural and political changes of peripheral region such as eastern most part which is closely associated with Nepal, while northern by the Tibet, western by the Himachal Pradesh and southern part is under the influence of Gangetic plains. There are great deals of variations in social life also differing from one region to another, one valley to another and even village to village.

The Central Himalaya as referred Manaskhand and Kedarkhand in the Vedas, the Puranas, the Mahabharata and other historical documents. Some evidences of earlier civilization are found between the region of Ganga to Kali rivers. The typical situations of the region made it cradle of some primitive as well as classical culture. The Kols, Kirats and Khasas are the pre-Vedic and aboriginal inhabitation of the region which are considered as Scheduled Caste and Scheduled Tribe in the present context. The region has faced the unkind behaviour and attitude of the Muslim and Gorkha invaders even during the regime of Gorkha more than thirty thousand people were sold into slavery because were unable to pay the unnecessary taxes and other reasons. Right from the beginning the region has faced a number of cultural and natural changes. In spite of that pressed the area is playing a key role in the political economic and environmental affairs of the country.

Population distribution: The distributional pattern of the population structure differs from one place to another. These sectoral aspects are particularly determined by the environmental conditions which have both restrictive and permissive connections to human activities. Most of the its population of Central Himalayas is concentrated in Tara, Bhabar, Duns and lower valleys of the rivers, owing to their favorable environmental conditions such as conducive climate, availability of drinking water, fertile soil, well irrigational provisions and infrastructurally well developed while the mountainous part is possessing adverse conditions and steep inclines, is sparsely populated. It is noteworthy that the few decades ago, the present populated areas were abandoned due to the marshy and material conditions in Haia, Bhabar, Duns and to protect themselves from the crime of Muslims. Gorkhas and Britishers.

As per 1991 census about 6 million population of the Central Himalaya resides in

15117 rural and 74 urban settlements. The density of population shows increasing trend during 1971 to 1991. It varies from 30 person per km² in Uttarkashi to 329 person/km² in Dehradun district in 1991, while in 1971 it was 18 and 187 person/km², respectively. An average total, rural and urban densities of the Central Himalayas is respectively, 115, 112 and 2356 person/km² while these were 75, 64 and 1422 person/km² in 1971 which is much lower as compared to state averages.

According to the size of population the rural settlements fall in six groups. Out of the total 15117 inhabitats, 57.19, 31.37, 8.70, 2.19, 0.48 and 0.07 per cent settlements fall in the population size group of below 200, 200-499, 500-999, 1000-4999 and above 5000 person, respectively. It is due to the unsystematic classification of the villages, since group of helmets have been considered as a one village in certain cases whereas only one helmet has been considered as single village in number of cases. Larger size of settlements are found in Nainital and Dehradun districts of the region. The degree of adherence and closeness of houses depends mainly upon the intra-house space relation, the arrangement and grouping of houses in a piece of land. In this regard the degree of adherence and closeness is very high in the Outer Himalaya and the tribal communities based region while the scattering of settlements is higher in mid slope and ridge top locations. It is worth to note that the sub-montane zone, river valleys especially with number of terraces and transverse spurs offer more favorable situations for establishing the rural as well as urban settlements. On the hill slopes the establishments are located on the accumulated mass of old landslide and avalanches. Houses are constructed mostly on the inferior quality land usually upon the hard structure base. Mostly rural settlements are located in middle part of hillock. The agricultural fields spread over a large area and settlements are located conveniently in middle part of their land preferably above from the terrace and near the perennial water spring or streams. The climatic conditions which determine the economic activities of the society are more favorable than that of valleys and ridge tops.

In this region, it is a common feature that a person has two villages—one in higher altitude or cold sites for summer season and another ones in lower altitude or comparatively hot regions for winter season. Likewise twin village concept is also applicable here. In the process of separation a few families shift to another locations, i.e., upper, lower, left, right and middle locations from the original settlement, often called *Mala*, *Talla*, *Walla*, *Palla* and *Bichalla* village or paticcs, respectively, and main village or area name will be common for all, such as *Bhaneria Talla*, *Bhaneria Malla*, *Salt Talla*, *Salt Malla*, *Sal Walla*, *Salt Palla* and *Bichalla*. Due to the two establishments the seasonal migration was the common feature, while the induction of new technologies and reservations policy for tribal people have brought a tremendous changes in the Himalayan society and now they have left their higher altitude settlements and have settled permanently in the lower elevations close to the roads and cities. Consequently a number of high altitude settlements now have become deserted.

Generally the houses are single to double storeyed with stone wall and the roof covered with slate. The building material and house type varies one location to another.

However, the houses consist of locally available slate, stone and timber in the mountainous tract while, brick, slate, iron rods, cement and timber are used mostly near the urban centers. In some parts of the region, the ground floor is used for stalling animals although somewhere separate thatches and cattlesheds are made of locally available grasses, timber and red clay plaster. Huts are generally found in rural area of Tarai and Bhabar belts while farm house pattern is also seen in the same regions. The pattern of settlement means the special shape of dwellings of a particular village which is mainly determined by the location of village path and the sequence and arrangement of the houses. Mainly linear, checker board and irregular pattern of settlements are noticed in the region.

The number of urban centres in the Central Himalaya was 18 in 1901 and rose to 74 in 1991. About 21.56 per cent of the total population is considered as urban in 1991. Maximum 25 urban centres are situated in Nainital district while minimum 3 in Uttarkashi. Still 1991, only two, i.e., Dehradun and Haldwani-cum-Kathgodam centres could cross the 1 lakh population. The urban centres of the region are developed and developing as ancient capitals, pilgrimage, camps, administrative towns gateway towns, tourist centers, cantonments and industrial centres.

Population growth: The Central Himalaya has registered a tremendous population growth, Earlier known figures for the some part of the region in 1824 mentioned by Trail the then Commissioner of Kumaun. Considering the growth rate of 2 per cent annual during 1872 to 1901, the earlier population has been calculated upto 1790 at that time when Gorkha's had invaded this region. An estimation revealed that the population would be about 2,28,461 person in 1790 which rose upto 11,77,329 in 1872. Table 1.8 shows the growth of population during 1901 to 1991. It ranges 8 to 26 per cent except nominal decrease during 1911-21 due to the preponderance of natural calamities, superstitions, social customs such as polyandry, migration of young people for employment, attacks of wild animal, avalanches, landslides, epidemics, slavery system due to poverty. Roughly estimation of population growth during 1970 to 1991 recorded 2483 per cent at an average rate of 12.35 per cent per year while present rate is about 2 per cent/year. Table 1.8 shows the population scene of India, Uttar Pradesh and the Central Himalaya. Maximum growth 257.6 per cent recorded during 1901-1991 in the Central Himalaya followed by country and state averages. Spatial pattern of population growth is, which reveals that the maximum growth of total population is recorded in Dehradun district during 1901-1991 followed by Almora and Pithoragarh, respectively. The maximum growth of urban population is registered in Dehradun of 1201.1 per cent followed by Nainital and Pauri district. On an average the growth in population including rural and urban in the region is recorded more than the state and country averages. The spur growth in urban population of Nainital and Dehradun is due to the higher rate of migration from rural to urban centres coupled, with settlements of more refugees from Pakistan and Bangladesh, retired army personnels and landless freedom fighters of the region on the other.

Sex ratio: The average sex ratio of the Central Himalayas is 976 females/1000 males in 1991. Total sex ratio ranges between 851 in Dehradun to 1128 in Almora in 1991. Probably it is due to the young male migrated from rural areas to more developed urban centres in

search of employment as and when they get any jobs but their families with them, i.e., the former situation indicates the male proportion decline in rural areas while later increases the male population in urban, resulting higher sex ratio in urban population and lower in rural. Chamoli, Pauri, Tehri, Pithoragarh and Almora districts have more females than males in term of total figure. As early as 1872, sex ratio of the Central Himalaya was estimated 870 while in 1991 it was recorded 976 females / 1,000 males. It shows the steady decline of the ratio in the region.

Age structure: The age structure of the population in all districts, region and state is pyramidal. More than 35 per cent population fall in the age group below 14 years from the base of pyramid in each district of the region while 25.62, 16.56, 11.23 and 6.55 per cent population fall in the age group of 15-29, 30-44, 45-59 and above 60 years, respectively, as a whole. Also indicates that 53.41 per cent population is in working age group. All districts exhibit almost similar trends and it is considerable per cent that population belongs to dependent age groups. It is worth to mention here that the population considered as dependent, also provides their assistants in family occupation. Consequently the health of the children and aged persons appear to have deteriorated considerably.

Level of urbanisation: Urbanisation is the study of population structure is an increase with proportion of urban population to the total population over a period of time. The stage of socio-economic development of any society is often viewed by the degree of urbanisation attained by the particular society in a specified space and time. Due to the scanty and insufficient population record, it is difficult to trace a systematic trend of urban population in the Central Himalaya. Traill estimated that Kumaun pargana including Garhwal had 6444 population in four urban centres, namely, Almora, Srinagar, Champawat and Joshimath in 1821. About 99 per cent of the population lived in rural areas and among these four centres at the time Almora had the maximum urban population, i.e., 3114 person including 1367 males, 1179 females and 968 children in 712 houses, while 338 person were found in Champawat. The growth of urban population in the Central Himalaya has been steadily upward since 1901. The percentage of urban population of the region is 21.56 per cent in 1991. It is remarkably remained low in Uttarkashi, Pauri, Chamoli, Tehri, Almora and Pithoragarh while on an average of the region is slightly higher than the state. The percentage of urban population was 5.91 per cent in 1901, 6.70 per cent in 1911 and 7.29 per cent in 1921 while it decreased 6.70 per cent in 1931, otherwise it shows the increasing trend at every decades, The percentage of urbanisation in the region is lower than that of state averages from 1901 to 1961 and later decades slightly higher as compared to state due to the immigration in Nainital and Dehradun districts. Although the percentage of urban population in these two districts are recorded always more than the state averages.

The state of literacy in the eight hill districts with the region and state as a whole. The continuous growth in literacy during 1971 to 1981 and 1981 to 1991 except 1.40 per cent which decreased during 1981 to 1991 in the urban population of Almora district. This region exhibits the more literacy as compared to the state average Maximum literate

persons were in Dehradun district of 43.71 per cent in 1971, of 52.58 per cent in 1981 and 58.55 per cent in 1991. In 1991, about 75 and 72 per cent urban population is literate in Almora and Pithoragarh district, respectively. Except Almora, all districts of the region have registered more than 100 per cent growth in literacy during 1971 to 1991. Net 48.51 of total population is still illiterate while one third of the females are yet to be registered as literate. Only one of Dehradun district has registered more female literates than the other districts.

Occupational structure: Owing to various criteria adopted for the classification of the occupational structure in various censuses, therefore the comparative study is not possible. The working population accounts 45.61, 41.93, 38.84 and 36.36 per cent, respectively, in 1961, 1971, 1981 and 1991 of the total population which are higher than the state average. The proportion of the primary works is decreasing trend during 1961 to 1991, while the share in tertiary jobs is in increasing trend. It is partly due to the establishment of the new institutions in the region and partly due to the outmigration from rural to immigration in the urban centres. Prevailing technological inputs are not sufficient to produce the sufficient economy to feed the total growing needs of the growing population. Consequently they are compelled to leave their ancestral occupations and migrated in search of white colour jobs within region as well as state and even out of the country.

Population of reserved categories: In the new reservation policy of U.P. Government there are only three main reserved categories—Scheduled Casts, Scheduled Tribes and Other Backward Classes while among their own categories there is also some provision for the dependents of freedom fighter, physically handicapped and ex-servicemen.

Out of total population 16.7 per cent are belong to scheduled castes population in 1991 which is less than the average of Uttar Pradesh while 3.54 per cent population is under Scheduled Tribe Category which is more than state average. About the other backward Classes there is no census since 1931 but July-August 1994 the OBCs population has been enumerated. In this special census the OBCs are less than 2 per cent in the central Himalaya which is far less than the state population. The details of reserved category population of 1991 are not available, thus on the basis of 1981 census the analysis of Scheduled Castes and Scheduled Tribes population is given in following pages.

Population of scheduled castes: Of the total State's Scheduled Castes population, about 3.29 percent lived in the Central Himalayas in 1981. The region contains 15.97 per cent of Scheduled Castes population. Its proportion is lower than that of the State's and higher than that of the country's averages. Among all the hill districts, Chamoli contains maximum 21.93 per cent of the total population of the district, which is higher than the state average while minimum 11.74 per cent persons are found in Pauri district. Over all growth of Scheduled Castes population, the Central Himalaya is 25.89 per cent 1971 to 1981 lower than the state average while the growth of other castes is 26.65 per cent higher than the state average. The sex ratio of Scheduled Castes population in the Central Himalaya is 925 females/1000 males while it is 945 females/1000 males for rural and 812 for urban population, i.e., higher than the total population. In rural population the sex

ratio varies from 819 females in Dehradun district in comparison to 1066 females in Tehri. Likewise, the sex composition of urban population also varies from 666 females in Uttarkashi to 837 females in Nainital district, which is low compared to the state average.

As per, 1981 census, the Central Himalaya contains 11.95 per cent Scheduled Castes population in urban centres which is lower than the state average. As stated the Central Himalaya accounts for only 3.29 per cent Scheduled Castes population of the state while the share of urban population of the Dehradun and Nainital districts in total urban population is considerable being 39.24 and 36.07 per cent, respectively.

It is evident that 24.87 per cent Scheduled Castes person are literate in 1981 as against 39.34 per cent literacy in total population which is much higher as compared to the state average. Out of Total Scheduled Castes literate persons, 38.20 per cent males and 10.47 per cent females are literate as compared to 24.83 per cent of males and 3.90 per cent of females in the state averages. The literacy status also varies from one district to another of the Central Himalaya according to the development of educational infrastructure. Maximum 20 per cent female literacy is registered in Dehradun district followed by Pauri having 13 per cent females.

Nearly 37.88 per cent Scheduled Castes population is considered as main worker higher than the state average. Among the main workers more than 77 per cent population is engaged in primary sector because agriculture is the basic source of livelihood of the Scheduled Castes population similar to the total population of the Central Himalaya, state and country as a whole. Present time Scheduled Castes population is not so interested to perform their inheritary occupations due to the prevailing old and time consuming technology which does not support the growing requirements.

Population of scheduled tribes: Of the total Scheduled Tribes population in the state of Uttar Pradesh, about 78.08 per cent lived in this region as per 1981 census. About 3.76 per cent population is considered as Scheduled Tribes population in the region. Maximum 9.99 per cent population falls in Dehradun district followed by Nainital having 6.51 per cent Scheduled Tribes population. Major sub-groups of tribal population in the region are Tharu, Buksha, Bhotia, Raji, Jaunsari, etc. While the larger proportion of Tharu and Buksha is confined to Tarai-Bhabar region of Nainital district and Bhotia in Pithoragarh district. Likewise Jaunsaries are found in Dehradun district. Higher parts of Chamoli and Uttarkashi districts contain smaller proportion of Bhotia tribe population. The average literacy is 23.56 per cent in the region as a whole which is higher than the state average. Literacy pattern is similar to the Scheduled Castes population in all districts and region as a whole.

The sex ratio is 921 females per 1000 males in the region as a whole which is higher than the state. The sex ratio is much lower in urban areas while maximum 1048 females/1000 males found in Chamoli district in 1981. The percentage of main workers to total population. About 38 per cent Scheduled Tribes population is classified as workers which is slightly higher than the state average. Maximum 47.6 per cent of Scheduled Tribes population in Dehradun district are main workers while minimum 28.53 per cent persons

in Nainital district. It thus reveals the state of development of the tribal areas and its population in the region.

Land capability: Land Capability is the capacity of the land to support a particular human activity under constraints of a management plan without deterioration of the soil. It is taken as a most important indicator to show the spatial pattern of land development in any region. Such a study would help the planners in preparing the future perspective land development plan on a rational basis to minimize the regional disparities. Studies on land productivity are so important in a country where food requirements need constant attention to feed the rapid growth of population. A new approach for land capability classification has been made on the basis of soil depth, natural slope, erosion intensity, water holding capacity, sunlight condition, soil texture, irrigation frequency and accessibility from settlement.

There are three main land capability classes which are divided into six land capability sub-classes, namely, good quality land A_1 and A_2 , medium quality and B_1 and B_2 and poor quality and C_1 and C_2 . A study on land capability reveals that about 32.97, 55.43, 74.5 and 14.56 per cent area of Patkot, Aonlakot, Bajuniahaldu and Amgarhi villages is good quality land and extensively used in vegetables and other crops cultivation. It under goods quality and while the mid slope and upland villages contained minimum are of the same quality land and vice versa.

Landuse: The spatial variation of landuse for the year 1984-85, 1985-86 and 1986-87, respectively. By and large land brought under the various uses is equal for the specified periods. Out of the total area 63.45 per cent area is under forest, 5.88 per cent is cultivable waste land, 0.22 per cent is under current fallow, 0.82 per cent is other fallow, 5.22 is not suitable for cultivation, 2.28 per cent land under other than agricultural uses, 5.03 per cent is considered as pasture land, 3.84 per cent is under trees, bushes, gardens excluding cultivation, and 12.96 per cent is net sown area during 1984-85, while same land categories have 63.23, 6.0, 0.22, 0.84, 5.63, 2.34, 5.13, 3.91 and 12.70 per cent area in 1985-86, respectively, and 63.58, 5.90, 0.22, 0.83, 5.53, 2.30, 5.04, 3.85 and 12.75 per cent, respectively, in 1986-87.

It is evident that the maximum area is classified as forest but it is not under full tree canopy, since the area is owned by State Forest Department. A study conducted by Singh *et al* indicates that only 28.71 per cent area of the Indian Central Himalaya is now forested and 4.4 per cent of the area has a forest cover with greater than 60 per cent crown density while 60-66 per cent forest cover is minimum requirement for ecological balance in the Himalayan regions. Out of the total districts, Uttarkashi and Tehri have about 5 per cent each net sown area while it is maximum about 30 per cent in Nainital district. In this respect Dehradun stands second. Remaining district posses from 5-15 per cent cultivated area.

Rotation of crops and cropping pattern: It is well known that agricultural activities in the region are in practice since from the beginning of the civilization and when there was no awareness for the environmental degradation but for the restoration of the soil exhaustion

in one season, inhabitants used to leave deliberately the same area as a fallow for next season called *Sar System* and the landscape of the village has been almost transformed by its people. But due to the induction of new agricultural techniques and fulfilling the needs of the growing people for food, fuel and shelter have led to intensive use of available and approachable land that mostly *sar system* or crop rotation is not prevalent in its older form. However, the cropland area is divided into two types—early growing crops area and late growing crops. Keeping the landscape pattern in mind, the settlements are established in the centres of the village boundary and crop land are divided into four *sars*—*Talli Sar, Mali Sar, Walli Sar and Palli Sar*. Spatial variation in nomination also found in the villages, i.e. sloppy areas known as *Gair* or *Karaiya* and the word *Gair* has suffix with a popularly known things such as *Semal Gair, Umarai Gair, Chunia Gair, Kaphal Gair, Aithai Gair*, etc.

Cropping pattern denotes to the proportion of the area given to different crops in a particular crop season. A change in cropping pattern signifies a change in the proportion of the area under different crops. It depends upon the physical environment as well as prevailing social system of the region. Paddy and madua are two major crops in kharif foodgrains while wheat and barley are in rabi foodgrains. But source agency of present data did not mention all crops. However, about 40 per cent of the net area sown is devoted to paddy while 54 per cent area under wheat crop. Maize and barely are the principal millets of the region.

Irrigation is most significant constraint to determine the use of land and cropping choice. It shows that 30.94, 32.49 and 32.81 per cent of the net area sown is irrigated, respectively, in 1984-85, 1985-86 and 1986-87. The extent of irrigated area is 73 to 76 per cent of the net area sown in Nainital district as against more than 75 per cent irrigated area falling the plains—Tarai, Bhabar and Dun. It is followed to Dehradun having 39 to 44 per cent of net area sown is irrigated in Chamoli district and remaining districts have only 9 to 15 per cent irrigated area. There are number of streams, *gad, gadhera* in the region but very little use of them is made for irrigation, because of diverse topographical features and high cost of lift irrigation schemes on the one hand and silting and sliding of the *gules* constructed by the villagers on the other.

The size of holdings and fields in the region is very small. Per cent holding are less than one hectares in size and cover 23.76 per cent of the cultivated area. In all about 87 per cent holdings are in below 2 hectares size and account 45 per cent of the cultivated area. The study reflects that small and marginal holdings are largest in number in the region.

The economy of the region depends on agriculture which engages about 70 per cent of its total population. But there is scarcity of agricultural land and the share of per capital land is far below from the standard requirement. On an average only 0.12 ha land goes to the per head share of the cultivated land in the region while Ashish estimated it about 0.5 acre area for the optimum requirement in this region. The population pressure on the cultivated, forests and pasture lands is remarkably high. About 80 per cent of the fodder

and 100 per cent of the fuel requirement is fulfilled by the forest by the inhabitants of some villages in this region.

Horticulture: The fruit cultivation in the Central Himalaya is very old. It is observed that a number of gardens in the region have reached a state of deteriorated and have either been already removed or are in the process of being removed. However, few schemes for new plantation and establishment of large size gardens are launching in recent decades. The topography of region is optimum for growing the subtropical and temperate fruits. Out of total, 160353 ha reported area under fruit, 31.90 per cent area covers by apple tree followed by citrus fruits contain 11.57 per cent area. Litchi and mango encompasses an area of 10.06 and 10.88 per cent of total area under fruit trees. Maximum 47.25 and 40.90 per cent of the total area is under apple in Uttarkashi and Nainital district, respectively.

It is evident that 37783 ha area under vegetables in the region during 1987-88. Dehradun and Nainital districts which support more urban population, i.e., more consumers and more irrigated land contain more area for vegetables as compared to other districts. Evidently, the less production of vegetables as compared to other districts. Evidently, the less production of vegetables means less consumption of nutrition, eventually maximum proportion of vulnerable groups of the society suffer from nutrition deficiency diseases.

Potato cultivation is spread all over the region because its number of varieties and high acclimatization capacity in different elevations. Notwithstanding only 13,038 ha area is under potato cultivation. It is necessary to mention here that small area of potato cultivation is ignored to calculate, otherwise its cultivators have to pay the additional revenue charges. Potato cultivation is practised in two to three times in a year and the higher elevation belts it is cultivated almost in the summer season while in winter season in low lying valleys.

Livestock: Livestock breeding plays an important role in the agricultural economy on one hand and environmental degradation through exploitation of the pasture and forest land on the other hand. However, there are 39,41,641 animals in 1982, of which 49.92 per cent of cow, 18.90 percent of buffaloes, 10.04 per cent of sheep, 21.3 per cent of goats, 0.34 per cent of horses and 0.05 per cent of porks. It is seen that the quality of livestock population is very low, consequently leading to low byproducts of the animals. There are no schemes or efforts made so far well managed pasture and also for improving nutritional quality of grasses which form the principal food for livestock in the hills. Still few livestock development centers are established in the region. Some statutory laws appear to cause constraints for development.

State of infrastructural development: A number of institutions which provide maximum facilities to its inhabitants are the appropriate indicators to understand the socio-economic status of the region. The number of amenities are available in the district and region as a whole with on an average population per unit.

Accessibility: Prior to 19th Century, the region has completely negotiated by on foot. Some important towns such as Dehradun, Almora, Ranikhet, Mussoorie, Kotdwara, Lansdown,

Kathgodam, Haldwani, Tanakpur and Pauri were accessible by motor vehicles. After independence, Chinese and Pak aggressions in India, the pace of development of transport network in the region has accelerated and number of new roads are constructed upto interior places such as Tawaghat, Song, Tejam, Pankhu, Manch, Mungsiari, Deval, Mana, Sonprayag, Ghuttu Budkedar, Pauntha, Chirbatia, Jakholi, Sangamchatti, Gangotri, Nagchulakhal, Bachchuwaban, Saraikhet, Ufaraikhal, Beronkhal, Ghatgarh (Deghat), Manila, Jaurasi, Suraikhet, Tuini, Netwar, Sankari Chauranglikhal, Betalghat, Patkot, Kunjakharak, etc in one hand while most of the remote villages still unaccessible by motor vehicles. Most of the roads are in the region lying along the river valleys.

Pantnagar, Dehradun and Pithoragarh are connected by air ways with Delhi while Auli and Badrinath are being connected with Dehradun by a helicopter service. The foothill towns of Dehradun, Rishikesh, Kotdwara, Ramnagar, Kathgodam and Tanakpur are connected through railways with Hardwar, Nazimabad, Bareilly, Muradabad and Pilibhit, respectively.