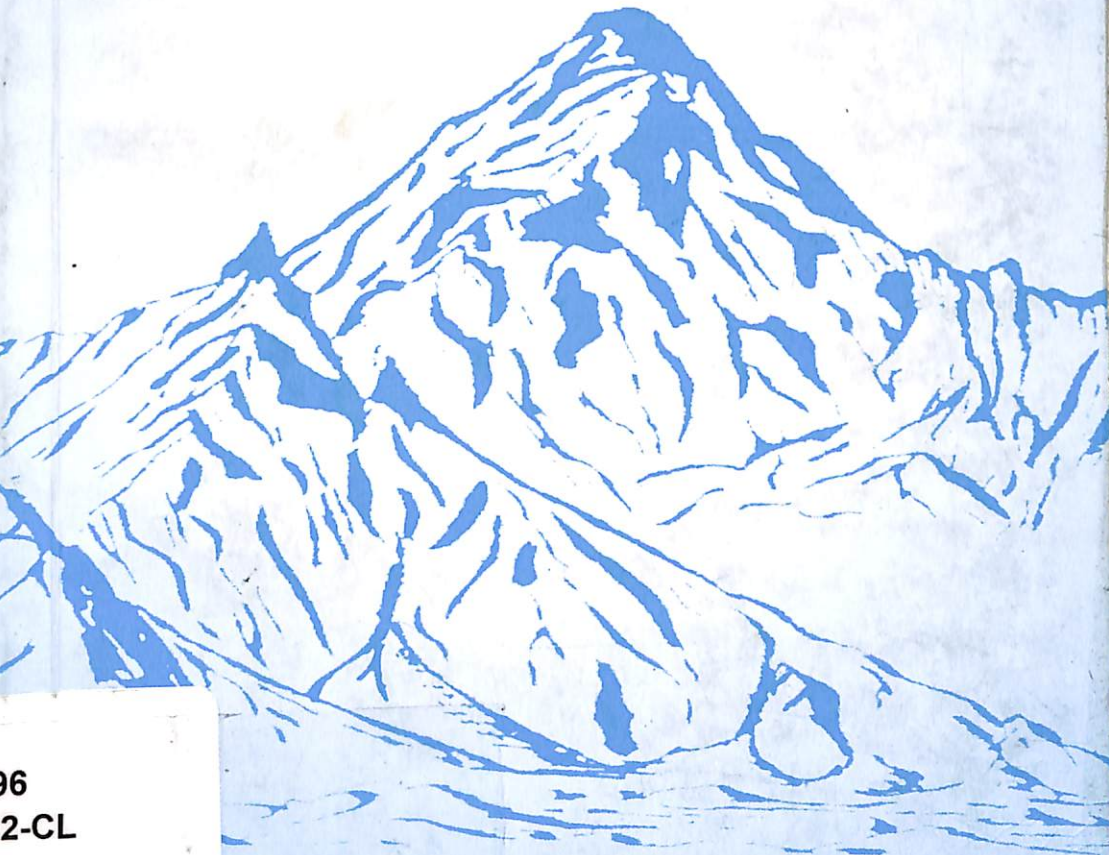


SECOND EDITION

COLD DESERTS OF INDIA



S.S. NEGI

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Preface

The arid tracts lying in the rain-shadow of the main Himalayan range are commonly referred to as cold deserts. They include the trans-Himalayan areas lying across the towering main Himalayan mountain wall and the inner dry valleys within this range, both of which fall in the rain-shadow of the soaring mountains, thereby remaining largely uninfluenced by the monsoon system that brings rain to other parts of India.

The cold desert areas of India include Ladakh (J&K); Lahaul, Spiti, Kinnaur and Bharmour (H.P.); pockets of northern Uttaranchal and Sikkim. These regions have a unique physical, biological, hydrological and anthropological setting that is markedly different from that of the adjoining regions.

This book deals with the regional geography, climate & soils, rivers, lakes & glaciers, geology & structure, vegetation, pasture-lands, wildlife & protected areas, history, communities, religion, fairs & festivals, socio-economic set-up, environmental problems, and places of interest. It provides useful and handy information on the cold desert areas.

My deep sense of gratitude to my friends and colleagues for their good wishes and encouragement; to my wife Manju for her self-denial and to the publisher for bringing out this informative book in paperback edition.

SHARAD SINGH NEGI

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CHAPTER 1

Regional Geography

The Himalaya are the most fascinating feature on the face of the earth. They radiate from the Pamir Knot and form the southern edge of the imposing Tibetan plateau, giving rise to a wide variety, of climatic, physiographic and ecological conditions. This mountain chain has a significant bearing on the climate of most parts of India. While they cause the SW monsoon system to bring widespread rain in the Indian subcontinent, their towering height has created a vast rain-shadow zone which remains devoid of any significant precipitation. These tracts are referred to as the *cold deserts*.

Cold Deserts

Cold deserts in India have been formed primarily due to the rain-shadow effect of the towering main Himalayan mountain wall and its offshoot ranges which run in an arcuate shape from the Indus gap in the north-west to the Brahmaputra gap in the north-east. The average elevation of this imposing barrier is more than 6000 mts; thus creating an effective barrier against the movement of the rain-bearing SW monsoons to the regions lying to the north of it. There are two physiographic classes of cold deserts in India:

1. Trans-Himalaya

The trans-Himalaya lies across the main Himalaya and physiographically forms a part of the vast Tibetan plateau which lies further towards north. The average elevation of this region is more than 3000 mts., e.g., Ladakh, Lahaul, Spiti and Pooh.

2. Inner Dry Valleys

These are smaller valleys within the main Himalayan range which lie in the rain-shadow zone. They are arid regions though the inner dry valleys are not a part of the trans-Himalayan cold deserts, e.g., parts of Kinnaur in H.P.; Uttarkashi, Chamoli and Pithoragarh districts in U.P. and northern Sikkim.

The state-wise distribution of cold deserts in India is given in the following table:

| <i>State</i> | <i>Cold desert region</i> |
|--------------------|--|
| Jammu and Kashmir | — Ladakh (Leh and Kargil districts) |
| Himachal Pradesh | — Lahaul and Spiti district — Kinnaur district (except certain moist tracts) — Bharmour of Chamba district |
| U.P. (Uttarakhand) | — Upper Jadh Ganga or Jahnvi valley (Nilang tract) of Uttarkashi district — Mana and Niti tracts of Chamoli district (Paikhanda tract) — Malla Johar, Darma, Chaudan and Byans valleys and Unta Dhura tracts of Pithoragarh district |
| Sikkim | — Barren and desolate northern tip. |

Climate

The climatic conditions prevailing in the cold desert regions vary from dry temperate to arctic. Rainfall is very low and in the core zone, it may be restricted to a few showers each year. The total annual rainfall in these regions is usually less than 50 cms; much lower in some tracts.

Bulk of the precipitation received each year is in the form of snow. Snowfall is very heavy in the upper reaches. A thick layer of snow and ice covers the ground for long periods. Winter sets in early and the first snowfall of the season may be received in mid-

October. The cold season lasts till late May when the snow cover in the lower tracts melts. The higher reaches lie above the line of perpetual snow.

The summer season extends from late May to early September. Climate of these regions has been discussed in detail in a separate chapter.

Physiography

The cold deserts are hemmed by the high Himalayan mountain wall in the south. They extend like a flat tableland towards north. High mountain ranges like the Karakoram and Zaskar dissect the cold deserts. Broad, sandy river terraces have been formed by the larger rivers such as the Indus, in the core zone of the cold desert.

The inner dry valleys are formed by high mountains on all sides. Often, they may be in the form of steep gorges with rivers draining their bottoms.

Drainage/River Systems

The cold desert regions drain both into the sea and into inland lakes. The main river systems draining the cold deserts are:

- Indus river system
- Chenab (Chandra-Bhaga) river system
- Satluj river system
- Bhagirathi-Alaknanda river system
- Teesta river system

Rivers and lakes have been described in detail in a subsequent chapter.

In the following text, we shall discuss the cold desert regions in detail.

LADAKH

Ladakh is a part of Jammu and Kashmir state. A part of Ladakh is under the illegal occupation of Pakistan and China. The border of Ladakh touches those of Afghanistan, Pakistan, China, Kashmir

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valley and Himachal Pradesh. This region is made up of two administrative districts, viz:

1. Leh with headquarters at Leh
2. Kargil with headquarters at Kargil

The existing area of these districts is about 59 thousand sq. kms with a total population of 1,40,000 (1981). This is one of the lowest population densities in the world with a little over 2 persons per sq. km.

The average elevation of Ladakh ranges from 2700 to 4200 mts. According to Cunningham, the aridity of this region is due to elevation and radiation of heat from the bare soil whereas the most striking feature in the physical aspect of Ladakh is the parallelism of its mountain ranges.

Rainfall in the region may be as low as 10 cms each year though some tracts receive a slightly more average annual rainfall.

Large rivers and their tributaries have carved deep gorges far below their steep banks. However, their water is not of much use as the terraced fields lie high above.

Major valleys and geographical regions of Ladakh have been described in the following pages (after Kaul and Kaul 1992).

1. Dras Valley

This is an enchanting valley formed by the Dras river which rises in the Machoi glacier near the famous Zozila pass. The river is joined in its course by many other rivers and streams flowing in from other snow fields in the nearby mountains.

The river Shigar flowing in from the north, drains an adjoining part of the Dras valley. In summer as the snow in the uplands melts, the volume of this river rises considerably. It meets the Suru river near Kharul short distance away from Kargil. The terrain is characterised by rock and stone with occasional greenish patches formed by willow and groves.

The town of Dras is located on a relatively flat and open space. It has extensive willow groves along the river. In summer this town presents a pleasant look while in winter it is covered under a thick blanket of snow. Dras experiences the lowest temperatures in the

valley and with its altitude of 3300 mts, this town is said to be the second coldest inhabited place in Asia. The mercury may drop to as low as 40 degrees below the freezing point. Often the snow may cover the small huts and communication with the outside world is cut off.

There is a short summer season in the Dras valley. It begins in May which is accompanied with the melting of the snows. Crop sowing starts late while harvesting is done early so that the crops are brought in before the beginning of snowfall.

Barley and other coarse cereals form the main crops grown in this valley. Agricultural production is hampered by the following constraints.

- poor and unproductive soil
- short growing season
- lack of irrigation facilities in many parts of the Dras valley.

Agricultural yields are not enough to meet the needs of the people living in this valley. Foodgrains have to be imported from the Kashmir valley. Fuel too is a scarce commodity. It has to be brought from across the Zozila pass. The people also use bushes/shrubs growing in the Dras valley.

Brokpas are the people living in the Dras valley. They probably migrated to this tract from Gilgit several centuries ago. They have been described in detail in another chapter.

2. Suru Valley

The Suru valley is formed by the catchment of the Suru river which rises from the Panzella glacier. On its way to the confluence with the Indus river at Nurla, it is joined by numerous tributaries including the Dras river which flows into the Suru river at Kharul.

The Suru valley is co-extensive with the limits of Kargil tehsil. The general topography is as rugged and mountainous as most of Ladakh, though it is relatively more fertile.

The Suru valley extends from the Panzella glacier to south of Kargil town where the Suru river merges with the Botkul river rising from the Botkul glacier.

Kargil is the most important town of the Suru valley. It is the

headquarters of Kargil district and has most modern amenities, though not of the level of those found in the plains of India. There are a number of other settlements of significant size in the Suru valley. Kargil is a fairly busy town servicing the villages of the surrounding region. The important Srinagar-Leh road passes through Kargil.

The average elevation of the Suru valley is 3000 mts. Winters are very severe and there occur heavy and frequent snowfalls; though it is not so bad as in the Dras valley. The cold season begins around mid-November and usually continues till May. During this period, most of the valley is covered under a thick layer of snow.

As the snow melts, the water becomes muddy, often attaining a darkish hue which is quite a contrast with its normal bluish-green shade. The colour becomes normal in early September when melting of the snow in the uplands slows down considerably.

The summer season begins in May and it becomes warm fairly quickly. Vegetative growth picks up readily. The duration of the summer season is relatively longer than in other parts of Ladakh.

Agriculture is the main source of livelihood for the people of this valley. In many parts of the Suru valley, they are able to harvest two crops each year which is quite a contrast with those tracts of Ladakh where raising even one crop a year may not always be possible when summer sets in late or there is early snowfall.

The main crops raised by the people of Suru valley are wheat, barley and millets. Improved varieties of wheat have recently been introduced. This has helped to increase the production of cereals. Amongst the vegetables grown here are turnip, radish, peas and black peas. The latter two are grown in many areas.

Grapes, apricots and melons are produced in fairly large quantities at Darchik and Garkoon along the lower course of the Indus through Ladakh. These find a ready market in Kargil. Liquor is made from grapes.

The summer season begins to end in mid-September as the sun's warmth decreases. The autumn season is short and the hours of sunlight become shorter. As the sun goes down below the surrounding high hills, it seems as if mid-afternoon has turned into dusk. Winter is severe and snowfall is frequent. The temperature quickly drops down to below the freezing point.

The people living in the Suru valley are the Baltis. They are a mixture between the Dards from Dardistan and Mongoloids from Tibet.

3. Zanskar Valley

The Zanskar valley is formed by the Zanskar river and its tributaries. It is a prominent valley of Ladakh. On the road to Zanskar, Panikhar, which is commonly considered to be on the border of the Suru valley, is an important place. There is a high pass between Panikhar and Sanko, a moderate sized valley about 40 kms from Kargil. Zorawar Singh and his force entered Ladakh from the Suru pass in 1832 enroute to conquer Tibet. He built a fort whose ruins stand to this day.

Tangol is a small hamlet situated on a level plain at a distance of about 14 kms from the pass. It has a well formed willow grove which serves as a welcome change from the surrounding drab topography.

In the backdrop is the towering Himalayan mountain wall, on whose slopes are tenanted a number of glaciers. A track leads to Kishtwar from Tangol, across the snowfields on the mountain wall. The Suru river forms a deep gorge through this mountain wall and is spanned by a short bridge.

Parkhachik is a small village forming the border between the Suru and Zanskar valleys. The people in the former valley are Baltis while the latter is mainly populated by Buddhists.

The Zanskar valley has an open undulating plain surrounded by high mountains. River terraces have been brought under cultivation, both for cereals and vegetables. The people also grow fruits on a moderate scale. These are consumed locally or may be sent to markets outside the Zanskar valley. Usually one or in some cases two crops are raised each year.

There are many settlements and places of various significance in this valley. These include:

Padam

This is the largest town of the Zanskar valley. It was once the capital of the Rajas of Zanskar. The area surrounding Padam is

relatively flat. There is also a level plain along the river which becomes water-logged in summer due to the melting of the snow. The soil is poor and thus yields are meagre.

Trees have been planted in Padam for providing fuelwood and fodder which is usually in short supply. It has to be brought in from outside as the surrounding mountain sides are devoid of vegetation, quite like other tracts of Ladakh.

The inhabitants of Padam are both Buddhists and Muslims. This is one of the few settlements in Zaskar with a Muslim population. They are believed to be the descendants of men who came with Zorawar Singh from Kishtwar in his expedition to conquer Ladakh and Tibet. The victorious Zorawar Singh granted land in Zaskar to his followers.

The Muslim population of Padam is of Sunni faith. They speak both Kashmiri and the native language. Kashmiri is gradually being disused over the years as the new generations are more proficient in the native language. These people were sharp witted and aggressive and hence dominated the meek and simple native population. They married local girls and converted them into Islam. Their population multiplied rapidly and though initially the Muslim followers of Zorawar Singh who settled in Zaskar could not have been more than a few dozen, they form a sizeable proportion of the population today.

Experts on the issue are of the opinion that due to their antagonistic behaviour, the Muslims of Padam have still not been able to fully integrate themselves into the local society.

There is a large gompa at Padam which is revered by the local Buddhist population and that of the surrounding villages.

Padam also has a school, a small dispensary and post and telegraph facilities. It is connected by road with Leh and Kargil, the latter being only a summer route.

Shagma Karphu

This is the first village of Zaskar when approached from the Suru valley. The Zaskar valley opens into a broad undulating plain flanked by a long stretch of marshy land that is formed when the river overflows its banks due to the melting of the snow in the summer season.

This flat plain stretches for a distance of nearly 15 kms till a place named Gilmatongas. Shagma Kharphu is a fairly small village inhabited by simple and docile Buddhists. They grow barley on the unproductive soils and manage to survive.

Rangdom Gompa

This is an impressive gompa situated about 6 kms from Shagma Kharphu village. The gompa dominates the surrounding countryside for miles around.

It is one of the most important monasteries of the Zanskar valley with more than 50 monks. The gompa is a massive structure having lama quarters, hall for worship, stores, quarters for guests, kitchens and working rooms.

The Rangdom gompa is revered by most of the population living in the surrounding region. Annual offering in the form of grain and butter are sent to the gompa. These are collected by monks who go around the villages at the close of the harvesting season. These offerings are the sustenance and mainstay of the gompa of this region. Lands gifted to them by the people and rulers in the past also form the sustenance of this monastery.

In 1946, the Rangdom gompa was attacked and ransacked by Bakerwals from Kishtwar.

Penzella Pass

The Panzella pass is situated at an elevation of more than 4200 mts. It separates the Suru and Zanskar valleys. On either side of the pass there are camping grounds used by migratory grazier communities and travellers. There is an enchanting view from the top.

Different forms of vegetation comes up around the pass soon after the snow melts in summer. They consist of many species of medicinal importance. Marmots live in burrows, moving to lower elevations in winter. The brown bear is also found on the slopes of the Penzella pass.

There are glaciers on both sides of the pass, from which streams flow either into the Suru or Zanskar catchments. On the Zanskar side, there occurs an extensive stretch of flat land at the foot of the pass. It is dissected by a number of streams and supports riverine vegetation which becomes thick in summer. This is an ideal camp-

ing ground for graziers and trekkers.

The Penzella pass remains open only from May to September, being closed due to heavy snowfall for the rest of the year.

Karsha

This is another large settlement opposite Padam across the river at a distance of about 10 kms from the latter. It has a small market, school, dispensary, post and telegraph facilities.

There is also a monastery at Karsha which is revered by the population living in the surrounding region.

4. Nubra Valley

As the name suggests, this valley is formed by the Nubra river. The average elevation of the Nubra valley is more than 3300 mts. The slopes in the valley have a relatively more vegetative cover which is the source of fuelwood for the people living in the surrounding tract.

Agriculture is the main source of livelihood for the inhabitants of the Nubra valley. They also grow apricots, apples, walnuts and vegetables which are consumed both locally and sent outside. Water supply is readily available. However the unproductive soil gives meagre yield for want of manures and fertilizers.

5. Shyok Valley

The Shyok river receives waters of the Nubra and Changchenmo river. It rises from the Khumdang glacier which can be approached from Shyok. The Shyok river takes a southerly course after it is joined by the Nubra river, thereby forming a waterway between the Nubra valley and Khaplu in Baltistan. Thereafter the Shyok river flows into the Indus at Keris.

The river freezes in winter, thus forming an easy access between Khaplu and the Nubra valley. In summer, as the snow melts in the uplands the river overflows its banks and inundates the surrounding plain for many kilometres, at times creating a vast marsh. During this period, the Shyok river has to be crossed on rafts of inflated skin.

Khardong La Pass

The Khardong La pass is situated at an elevation of over 5800 mts. It lies on the route between Leh and the Shylok (Nubra) valley. There is a large glacier on the Nubra side of this pass. The route over this pass is difficult and treacherous.

Digar La Pass

This pass too connects Leh and the Shyok (Nubra valley). It is situated at an elevation of about 6000 mts. The Digar La pass remains open for a longer time than the Khardong La pass. It is relatively easier to cross though the route across the pass is longer.

6. Indus Valley

This is a large valley formed by the main channel of the Indus river as it flows across Ladakh. It includes parts of Leh district, erstwhile Skardu tehsil and the vast cold desert beyond. This valley consists of large stretches of undulating lands interspersed by high mountains across which there are many passes.

The Indus valley is the soul of Ladakh region and strategically the most important part. Its borders touch those of Pakistan, Afghanistan and China.

Important places and tracts of the Indus valley have been described below:

Changthang Plateau

This is a vast plateau with an average elevation varying from 4200 to 5000 mts. It is amongst the highest inhabited lands in the world. The Changthang plateau provides some of the most magnificent natural settings known to mankind.

There are two approaches to this moonland, viz.:

- over the Tanglang La pass (5700 mts) to the south-east of Leh
- over the Chang La pass (5900 mts) to the north-east of Leh.

The climatic conditions of this plateau are extremely dry. The snowline may be as high as 6600 mts and snowfall is scanty. Scorching heat is radiated by the sun's rays during the day time and at

night the mercury drops down to below the freezing point even in the middle of the summer season, as a result of which the water freezes. Newcomers to this tract are likely to feel giddy, faint and breathlessness due to the extreme rarity of the air.

Changpas are the people inhabiting this plateau. They rear sheep and goats for their livelihood, though barley is sown on a very limited scale. These people live in tents made of yak and goat hair which provides them with shelter even in the harsh winter months.

Rupshu

Rupshu is the highest inhabited part of the Changthang plateau. The average altitude of Rupshu ranges from 4600 to 5000 mts. The Rupshu is inhabited by the Changpas. There are few permanent settlements. The population density is extremely sparse in Rupshu.

Karzok is the main settlement of Rupshu. It is situated near the Tsomorari lake. Karzok has small fields around it. The yields are poor due to extremely harsh conditions. At an elevation of about 5000 mts Karzok is considered to be the highest inhabited and cultivated place in the world. Dora is the winter pasture of the Changpas of Rupshu.

Salt Lake Valley

The salt lake valley is one of the widest open areas in Rupshu. It can be approached from Leh across the Tanglang La pass. The valley has a length of about 20 kms and maximum width of about 7 kms. Its average elevation is 5000 mts. Thuggi is the main settlement of the salt lake valley.

Two lakes occur in this valley. These are:

- the fresh water Panluk lake with an area of about 2 sq. kms. It is fed by springs originating near Thuggi.
- the saltwater Tsokar lake having an area of about 10 sq. kms. Deposits of impure salt occurring on the northern shore of this lake are collected by the Changpas and used as a barter to obtain goods from other parts of Ladakh.

Puga Valley

The Puga valley lies at a distance of about 22 kms to the east of the salt lake valley across the Polokonka La pass (5350 mts). It is

famous for its borax and sulphur deposits and hot water springs. The former are of little commercial value at present due to the inaccessibility of this valley and short working season.

Hundreds of people suffering from ailments like rheumatism and skin diseases come for a both in the hot water springs in the Puga valley.

Tsomorari Lake

The Tsomorari lake is one of the largest lakes in Ladakh region. Situated at an elevation of about 4900 mts this lake has a length of about 22 kms, width varying from 5 to 7 kms and depth of more than 30 mts at the deepest point. The water is brackish and fit for animals but not human beings. In winter the surface of the Tsomorari lake freezes and it is possible for animals and human beings to walk over it. Karzok is situated near this lake.

Lake Kyaghr

This is a small lake situated about 10 kms to the north of Tsomorari lake. It has a length of about 3 kms and width of 1.5 kms with maximum depth of 22 mts. The water is brackish and is not fit for human consumption.

Pangong Lake

A common name given to a series of lakes about 150 kms to the north-east of Leh across the Chang La pass. The longest lake in this group has a length of more than 60 kms though its width is only between 3 to 6 kms. The Pangong lake is considered to be the longest lake in Ladakh.

This saltwater lake sprawls over both Ladakh and Tibetan territory.

Kiangdum

Kiangdum is a famous camping ground about 22 kms to the south of Kyaghr lake. It is on the route from Ladakh to Spiti in Himachal Pradesh.

Chushul

An important and strategically vital place near the border of Ladakh and Tibet. It is about 10 kms to the east of Mordo almost

right on the border. Chushul can be approached by a number of routes from Leh.

- over the Chang La pass and skirting the Pongkong lake
- over the Chang La pass and taking a more easterly direction
- Leading along the right bank of the Rong valley over a flatish terrain.

Chushul has been developed by the Indian military as a vital settlement.

Leh

Leh is the headquarters of Leh district and the largest town of Ladakh. For a long time Leh remained the capital of the Rajas of Ladakh.

It is situated in a relatively open valley along the Indus river. The tract around Leh is cultivated. However the mountains are devoid of a vegetative cover resulting in perpetual fuelwood scarcity at Leh.

Leh can be approached by road from Srinagar and Manali. There is also an airport at Leh with regular flights from Delhi and Srinagar.

LAHAUL AND SPITI

Lahaul and Spiti are two geographical cold deserts that were brought together to form a new district of Himachal Pradesh in 1960. Before that these areas were a part of Kangra district of Punjab.

The total geographical area of this district is 12,210 sq. kms. With a population of about 32,000, the population density is only 2 persons per sq. km.

The Bara Lacha range separates Lahaul-Spiti district from the cold desert of Ladakh in the north. The average elevation of this range is 5500 mts. The Manali-Leh motor road runs over the Bara Lacha pass. Tibet lies to the east of this district. A lofty mountain range which is an offshoot of the main Himalaya separates this district from Kinnaur in the south-east. The average altitude of this

mountain range is about 5000 mts. Chamba and Kulu districts lie to the west and south-west respectively. The boundary is marked by the high main Himalayan ranges.

Lahaul and Spiti regions are separated by an offshoot of the main Himalayan range. The road over this range runs across the Kunzam La pass (4500 mts). Spiti is also linked by road with the Satluj valley. The Lahaul region is approached by road from Kulu over the Rohtang pass (3915 mts).

A large part of Lahaul and Spiti remains cut-off from the rest of the country due to blockade of high passes by snow in winter. A brief description of the physiography and regional geography of Lahaul and Spiti region is given below (after Bajpai 1987).

LAHAUL

The Lahaul region is a district geographic entity. It consists of a network of soaring mountains and deep valleys. The altitude varies from over 6500 mts at high peaks to 2740 mts where the Chenab river makes its exit from the Lahaul region. Different units of Lahaul have been described below:

1. Chandra Valley

This valley is formed by the Chandra river which merges with the Bhaga river at Tandi to form the Chandra-Bhaga or Chenab river. Locally, this valley is also known as Rangoli. The upper tracts of the Chandra valley are made up of a vast snowbed near the Bara Lacha pass. It is largely uninhabited and consists of high mountain peaks, large glaciers and vast snowfields.

Alpine vegetation comes up in the form of pastures when the snow melts in summer. Migratory graziers camp on these pastures with their cattle. There is no habitation for about 72 kms along the length of the Chandra river from its source. Koksar, a small hamlet is the first village in the Chandra valley. There are several villages on the right bank, downstream of Koksar, though the left bank is like a steep wall. The Mandi-Leh motor road crosses the Chandra river at Koksar.

Most of the land at lower elevation downstream of Koksar is under cultivation. There occur sporadic pastures. The villagers have planted fields on terraces to provide them with fuelwood and fodder for their cattle. This tract produces a considerable quantity of seed potatoes.

2. Bhaga Valley

The valley formed by the Bhaga river is locally known as Gara, though the portion from Darcha to Keylong is termed as Stod.

This valley is a desert-like tract with mountain slopes largely devoid of a vegetative cover. It starts from the south-western base of the Bara Lacha pass and consists of a narrow gorge till the mountain hamlet of Darcha. Downstream of Darcha, the Bhaga valley widens. There are many villages between Darcha and Tandi, where the Bhaga river merges with the Chandra river to form the Chandra-Bhaga or Chenab river.

Keylong

Keylong, the headquarters of Lahaul and Spiti district is a small town located on the right bank of the Bhaga river downstream of Darcha. The terraces between Darcha and Tandi are under cultivation. The middle slopes consist of grasslands. The forest department is planting trees and shrubs on these slopes in an effort to increase the tree cover, to solve the problem of fuelwood and fodder.

3. Chandra-Bhaga Valley

The rivers Chandra and Bhaga merge at Tandi to form the Chandra-Bhaga or Chenab river. Thereafter this river flows through an open valley to Thiroit from where it enters Chamba district. In Lahaul, this valley is known as the Pattan valley.

The Pattan valley is relatively wider, fertile and densely populated. There are many villages on both banks of the Chenab river. The terraces and lower slopes are under cultivation. Seed potato is the main cash crop of this valley. The people have also raised many fruit orchards and planted trees to provide them with fuelwood, and fodder for their cattle in the severe winter months.

4. Great Mountain Mass

The great mountain mass occupies a position between the Chandra and Bhaga valleys. It extends as an offshoot of the main Himalaya with peaks soaring to over 6400 mts. The Bara Lacha pass is also a part of this great mountain mass.

Standing like a huge fort, this mountain mass contains high peaks, valleys, snow-fed streams, glaciers and ice fields. Three important rivers, viz., Chandra, Bhaga and Yunam rise from near the Bara Lacha pass.

This landmass is sparsely populated. Settlements are few, though graziers often ascend to the high alpine pastures in summer with their animals.

5. Lingti Plains

This is a desolate and barren tract located to the north of Bara Lacha pass. Its area is 260 sq. km and average elevation is more than 4400 mts. The small rivers Lingti and Yunam flow through these plains before entering the Zaskar region of Ladakh.

The Lingti plains are largely uncultivated and uninhabited. A good growth of grass covers the slopes in summer which are grazed by the stock of migratory graziers.

SPITI

Spiti is more desolate and barren than Lahaul. It resembles, to a considerable degree, Ladakh and Tibet. The climate is dry, arid with very low rainfall. The mountain slopes of Spiti are virtually devoid of vegetation. There are three distinct geographic regions in Spiti:

- the valley of the Spiti river, or Spiti valley
- the valley of the Pin river or Pin valley
- the high mountain regions located in the north and east of Spiti tehsil

High mountain peaks with an elevation of over 6000 mts surround Spiti. In the north, the Chocho-Lang Kilta has a height of

more than 6400 mts, while in the east lies the main Himalayan range whose peaks soar to more than 7000 mts. The Manirang peak having an elevation of more than 6500 mts, is to the south. The towering Kunzam range divides Spiti from Lahaul in the west.

Physiographically, this region consists of very high mountains, open valleys and narrow gorges with an average elevation of 5485 mts.

The natural access to Spiti is along the Spiti river from the Satluj valley (Kinnaur). A motor road over the Kunzam La pass links it with Lahaul. However, this road is open only for a few months in summer.

Spiti faces extreme conditions of cold. The summer season lasts from late May to September. Winter sets in early and the temperature remains below the freezing point for long periods. High velocity winds lash most parts of Spiti all round the year.

The inhabitants of Spiti depend both on cultivation and animal husbandry for their livelihood. Kaza is the main town and head-quarter of Spiti.

KINNAUR

Kinnaur, before being created as a separate district in 1960 was known as the Chini tehsil of Mahasu district. It extends on both banks of the Satluj river. The area of Kinnaur is 6553 sq. kms with a population of 60,000. The density of population is 9 persons per sq. km.

In the east is the Ngari region of Tibet; the Dhauladhar range forms its southern boundary separating it from Uttarkashi district of U.P. and Rohru tehsil of Shimla district, and in the west the Srikhand Dhar marks the boundary between Kinnaur and Kullu and Rampur. Spiti is on the northern border of Kinnaur; the boundary being formed by the rivers Spiti and Pare near the Indo-Tibetan border.

Kinnaur consists of very high mountains, deep valleys or gorges, glaciers and rivers. The river Satluj, which is the main river draining this district, divides it into two unequal parts. This river enters Kinnaur from Tibet in the north-east near Namgia and makes its exit near the hamlet of Wangtu.

The average elevation of Kinnaur ranges from 1220 mts to 3050 mts. There are high peaks on the mountains whose elevation is more than 5500 mts. They remain covered by snow and ice on a perpetual basis. The highest peaks in Kinnaur include Leo Pargial (6770 mts); Manirang (6593 mts) and Kinner Kailash (4573 mts).

There are three roughly parallel ranges in Kinnaur—

- a) the Zanskar range whose crest forms the eastern international border of Kinnaur with Tibet.
- b) the main great Himalayan range running from north-west to south
- c) the Dhauladhar range that forms the southern boundary of Kinnaur. It merges with the main Himalayan range at the south-eastern cover of the district.

Agriculture is the main occupation of the people of Kinnaur. Animal husbandry too contributes significantly to the income of the population. In recent times cottage industries and fruit plantations too have increased their proportion in the socio-economy of this district.

Kinnaur is made up of the following geographic units:

1. Satluj Valley

This valley extends on both flanks of the Satluj river, from where it enters Kinnaur to where it makes its exit. It is the largest valley extending in a north-east to south-west alignment for a length of about 140 kms along the Satluj river. Several smaller tributaries join this river enroute.

The north eastern part of this valley is drier and conditions become moisture towards south-west. The Satluj river has carved a deep gorge across the main or great Himalaya near Pshong-tong.

There is extensive cultivation of fruits and agricultural crops in the southern part of this valley.

2. Hangrang Valley

The second largest valley by size, the Hangrang valley is situated along the border of Kinnaur with Tibet and Spiti. There are

only 8 villages in this tract. The general topography is extremely rugged and barren. Vegetative growth is very poor.

Cultivation is difficult and a considerable proportion of the population depends on animal husbandry for their livelihood.

3. Ropa Valley

Formed by the Ropa river, this valley is also known as the Shyaso or Sangnam valley. The Ropa river passes through an inhabited tract of about 13 kms of which 8 kms are fit for cultivation. There are fruit orchards in this valley. Other parts of this valley remain extremely poor in vegetation except for stunted pine and birch.

4. Sangla Valley

The famous Sangla valley is formed by the Baspa river. This is considered to be the most beautiful tract of Kinnaur. The Chung Sakhago pass lies at the head of this valley. The river has a length of about 95 kms in the valley which is inhabited from Chitkul (3475 mts) to its junction with the Satluj river at an elevation of 1830 mts.

A large part of this valley is either under cultivation, pasture or forest. There are a number of villages in the Sangla valley.

5. Bhaba Valley

The Bhaba or Wangpo valley is formed by a small tributary of the Satluj river. It has a number of villages. A large hydro-electric project is coming up in this valley.

6. Tirung Valley

Also known as the Tidong valley, this is a rugged terrain drained by the Tidong river. At places the river has formed a steep gorge which is crossed by narrow tracks. Only the lower portion of the Tirung valley is cultivable.

The population density is very low perhaps due to the rugged terrain. This valley has the highest village in the region which is

Charang, located at an elevation of 3600 mts with a population of about 250.

7. Other Valleys

Other smaller inhabited valleys of Kinnaur which have rich pastures/grazing lands include:

- Gyanthing or Nesang valley
- Pejur or Leppa valley
- Keshang valley
- Mulgoon valley
- Yula valley.

BHARMOUR

The Bharmour tract of Chamba district of H.P. is an inner dry valley lying in the rain-shadow of the main Himalayan range. The terrain is extremely rugged and conditions resemble a cold desert. Bharmour receives low precipitation due to the barrier created by the imposing mountain range.

Dry temperate type of vegetation is found in Bharmour. The population density is relatively low. Herds of grazier communities graze on the steep mountain slopes after the snow melts in summer.

NILANG

This is a relatively small dry tract lying in the rain-shadow of the main Himalayan range in Uttarkashi district of U.P. It is situated at an average elevation of over 3000 mts in the upper Jadh Ganga or Jaharvi valley drained by the river bearing its name. This river is a tributary of the Bhagirathi river.

The Nilang tract is inhabited by migratory grazier communities who move up to the alpine pastures with their animals in summer and return to the shelter of the valleys in winter.

MANA AND NITI

Located at an average elevation of over 3100 mts, these tracts

lie in the rain-shadow zone of the main Himalayan range in the hinterland of Badrinath and Joshimath respectively. Mana and Niti form a part of Chamoli district of Uttar Pradesh.

The entire tract is dry with bulk of the total annual precipitation being received in the form of snow. Dry sub-alpine and alpine vegetation is found on the lower slopes while the upper reaches are under a blanket of snow and ice.

Mana and Niti are the two main villages. Population is sparse and animal husbandry forms the main occupation of the people. The north eastern part of this valley is drier and less populated.

UPPER PITHORAGARH

The upper tracts of Pithoragarh district of U.P. too lie in the rain-shadow of the main Himalayan range. These include:

- upper valley of the Gori ganga (Malla Johar)
- upper valley of the Dhauri river (Darma and Chaudan)
- upper Kuti (Byans) valley

This tract has an average elevation of over 3000 mts. The Unta Dhura ridge divides the catchments of the Gori or Gauri river in the south-west and the Girithi in the north. The north-facing slopes of this ridge are extremely dry.

The terrain is extremely rugged with a poor vegetative cover. The people depend on animal husbandry for their livelihood.

1. Mungsiari Area

The Mungsiari subdivision lies in the northern part of Pithoragarh. To its north lies Tibet and to its south is the Didihat subdivision. The Panchchuli range separates it from Dharchula in the east. This almost N-S trending range has an average elevation of over 5000 mts. It is a cultural, social and linguistic barrier between the Bhotias of Johar valley and those inhabiting the Darma, Dyans and Chandans valleys. Mungsiari is made up of three distinct tribal tracts—Malla Johar, Talla Johar and Gauri Phat. These in turn may be grouped into two zones. The upper zone lies between 3300 and 4500 mts and consists of a number of villages falling in the Malla Johar tract. The lower zone lies between 1000 and 2500 mts and consists of the

villages of the Talla Johar and the Gauri Phat tracts. Both these zones experience different climatic conditions which in turn have influenced the lives of the Bhotias.

Almost all settlements of the *Malla Johar tract* lie along the Gauri river which originates from the Milam glacier. The largest village is Milam which is located at about 3 kms from the glacier at an altitude of 4000 mts. The area remains under a thick blanket of snow for five months in a year. Bulk of the precipitation is received in the form of snow. Due to high altitude and the short growing season that is available, the only crops that can be grown are potatoes, barley, mustard, etc.

The *Talla Johar and Gauri Phat tract* lie at relatively lower elevations. Talla Johar is in the upper Ramganga valley between an elevation of 1100 mts and 3000 mts. Gauri Phat lies along the river Gauri between an elevation of 1500 and 2500 mts.

The total annual rainfall is about 150 cms which is much more than that of the Malla Johar tract which lies at a higher elevation. Rainfall is more in regions lying below elevation of 2000 mts. Two crops are grown in a year, the main ones are wheat, barley, paddy and maize. Climatic conditions are also favourable for the cultivation of fruits.

2. Dharchula Area

The Bhotias of Dharchula area inhabit the Darma revenue circle in the extreme north-eastern corner of Pithoragarh district. This tract is bounded in the north by the Indo-Tibetan border; in the east by the river Kali which forms the Indo-Nepal border; and to the west there occurs the Panchchuli range which separates it from the Johar tract.

A large part of this tract is desolate, barren and made up of glaciers, snowy wastes and high mountain peaks that remain under a thick cover of snow for most of the year. Human settlements are thus confined to the three river valleys, viz., Darma, Byans and Chandans. Amongst these three valleys, the Chandans valley is situated at a relatively lower elevation and the socio-economy of the Chandanis differs from that of the inhabitants of the Darma and Byans valleys.

NORTHERN SIKKIM

Inner dry valleys lying in the rain-shadow of the main Himalayan range of the extreme northern tract of Sikkim have conditions that resemble the cold deserts though aridity is much less than that experienced in Ladakh. The average elevation is more than 3000 mts with an extremely rugged terrain. This is made up of two main valleys:

- the Lanchung valley
- the Lachen chu valley

Both the Lanchung and Lachen chu rivers are tributaries of the Teesta river. The latter narrows down considerably in its higher reaches before taking an abrupt turn through the gap at Gagong at the base of the spectacular Chomoyomo mountains. Here the terrain converges with the head of the Lanchung valley over the 6000 mts high Donkya La pass across which the plateau first descends and then rises towards the Indo-Tibetan border.

The two main mountain ranges of the tract are the Donkya and Chomo Lhari mountains. Two important passes across them are the Jelep La and Nathu La, both having an elevation of more than 4000 mts.

The arid tracts lying in the rain-shadow of the main Himalayan range are commonly referred to as cold deserts. They include the trans-Himalayan areas lying across the towering main Himalayan mountain wall and the inner dry valleys within this range, both of which fall in the rain-shadow of the soaring mountains, thereby remaining largely uninfluenced by the monsoon system that brings rain to other parts of India.

The cold deserts of India include Ladakh (J&K); Lahaul, Spiti, Kinnaur and Bharmour (H.P.); pockets of northern Uttaranchal; and Sikkim. These regions have a unique physical, biological, hydrological and anthropological setting that is markedly different from that of the adjoining regions.

This book deals with the regional geography, climate, soils, rivers, lakes, glaciers, geology, vegetation, pasturelands, wildlife & protected areas, history, communities, religion, festivals & fairs, socio-economic set-up, environmental problems, and places of interest.

The book provides useful and handy information on the cold desert regions of India.

Dr. S.S. Negi, I.F.S. has several books on forestry, Himalayan studies, geology and natural resource management to his credit. Till recently, he was the Project Director of the World Bank-funded Integrated Watershed Development Project for Himachal Pradesh. He has also been associated with the Munich University, Germany, and Ballarat University, Australia. His previous assignments include Associate Professor, IGNFA, and Assistant Director General, ICFRE, Dehradun.

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