

## Introduction

The state of Jammu and Kashmir constitutes northern most extremity of India and is situated between  $32^{\circ} 17'$  to  $36^{\circ} 58'$  north latitude and  $37^{\circ} 26'$  to  $80^{\circ} 30'$  east longitude. It falls in the great northwestern complex of the Himalayan Ranges with marked relief variation, snow-capped summits, antecedent drainage, complex geological structure and rich temperate flora and fauna. The state is 640 km in length from north to south and 480 km from east to west. It consists of the territories of Jammu, Kashmir, Ladakh and Gilgit and is divided among three Asian sovereign states of India, Pakistan and China. The total area of the State is 222,236 km<sup>2</sup> comprising 6.93 per cent of the total area of the Indian territory including 78,114 km<sup>2</sup> under the occupation of Pakistan and 42,685 km<sup>2</sup> under China. The cultural landscape of the state represents a zone of convergence and diffusion of mainly three religio-cultural realms namely Muslims, Hindus and Buddhists. The population of Hindus is predominant in Jammu division, Muslims are in majority in Kashmir division while Buddhists are in majority in Ladakh division. Jammu is the winter capital while Srinagar is the summer capital of the state for a period of six months each. The state constitutes 6.76 percent share of India's total geographical area and 41.83 per cent share of Indian Himalayan Region (Nandy, et al. 2001). It ranks 6<sup>th</sup> in area and 17<sup>th</sup> in population among states and union territories of India while it is the most populated state of Indian Himalayan Region constituting 25.33 per cent of its total population.

The state is bounded on north by China and Afghanistan, Tibet on east, Pakistan on west and on south by Himachal Pradesh and Punjab states of India. The State is well connected with rest of the country by air, rail and road. The National Highway 1-A connects the capital cities of Srinagar and Jammu with rest of the country. The mountain chains that adorn the region include the Karakoram Range, Nun Kun range, the Zaskar range and Nanga Parbat. The State of Jammu and Kashmir has many Himalayan rivers flowing through it; the most significant among these are the Indus, Jhelum and Chenab. Among the glaciers are the Baltoro and Siachen Glaciers. There are many low lying valleys in the state like Tawi Valley, Chenab Valley, Poonch Valley, Sind Valley and Lidder Valley, but the main Valley is the valley of Kashmir, which is 100 km wide and 15520.3 km<sup>2</sup> in area.

## Administrative Divisions

Jammu and Kashmir is a multi-lingual, multi-religious and multi-racial state and each group has its own distinct and peculiar cultural ethos, further deepened by geographical divisions created by

formidable mountain ranges. The state comprises of three natural divisions, namely, Jammu, Kashmir and Ladakh. For administrative purposes, the state is divided into two main divisions, i.e., Kashmir and Jammu Provinces. A Divisional Commissioner heads the administration of each division. The two districts of Ladakh region, namely, Leh and Kargil are part of the Kashmir Division for purposes of administration. A Deputy Commissioner who is also District Development Commissioner, heads each district. In Ladakh region, the 'Autonomous Hill Development Council' was established in 1995 as part of decentralized administration. The districts are divided into blocks for development purposes and into tehsils for revenue purposes. The state consists of 22 districts with Kashmir and Jammu divisions equally having 10 districts each and the remaining two districts belonging to Ladakh division.

**Jammu Region:** The Jammu region is situated on the North Indian plains, close to the Siwalik ranges. This region comprises the plains, hills and mountains south and west of the mighty Pir Panjal range that separates Kashmir Valley from the plains of the subcontinent. North of the Siwaliks, the rest of the Jammu region is drained by the Chenab River whose vast catchment area includes several narrow valleys that extend deep into the Himalayas. Jammu is about 305 meters above the mean sea level (MSL). Jammu is famous for its ancient temples and palaces. Today, the Jammu region comprises the districts of Kathua, Jammu, Udhampur, Doda, Rajouri, Ramban, Kishtiwari, Reasi, Samba and Poonch.

**Kashmir Region:** The Kashmir region or valley is a significant part of the state. The valley is an ancient lake basin 140 km long and 32 km wide (Raza, 1978). The average elevation of the valley is 1630 m above MSL. The tall mountains that surround the valley rising up to 5400 m ensure that the weather here is pleasant for most of the year. The region is famous for its picturesque natural beauty and among other things is known for its Dal Lake that reflects the surrounding snow-capped mountain peaks. Its rich alluvial soil well drained by rivers and streams, yields rice, saffron, vegetables and a variety of fruit. Wular Lake in Kashmir valley is the largest fresh water lake of India which acts as a drainage basin for Jhelum river. The Valley is known for its fresh apples and the intricate embroidery stitching. It comprises of ten districts, namely, Anantnag, Baramulla, Badgam, Kupwara, Pulwama, Shopian, Kulgam, Bandipora, Ganderbal and Srinagar.

**Ladakh Region:** Ladakh constitutes the eastern-most part of the state of Jammu and Kashmir. It comprises of two districts, namely, Leh and Kargil. This is one of the most breathtakingly beautiful parts of the state and its surreal landscape has often been termed as 'moonscape'. Ladakh covers about 117,000 km<sup>2</sup> and includes the Karakoram Range and the upper Indus River valley. Ladakh is

one of the highest places on earth with the average altitude being above 3700 m. Situated on the leeward side of the mountain, it hardly gets any rain. The region is sparsely populated and people live traditional life, herding sheep and yak and growing barley near the river beds in summer. Physical features that characterize the region are its uplands, craggy barren cliffs and plateaus. The mighty river Indus flows right through Ladakh. Leh is famous for its adventure sports. The region is famous for the Leh Palace and the Namgyal Tsemo Gompa monastery.

### **1. Physiography (Physical divisions)**

The state of Jammu and Kashmir possesses a peculiar geo-physical setting as all the major landforms i.e. mountains, plateaus, plains and valleys are present in its landscape. Geographically, the state is divided into four zones – the mountainous and semi-mountainous plain known as Kandi belt, hills including Siwalik ranges, mountains of Kashmir valley and Pir Panjal range, and Tibetan tract of Ladakh and Kargil. The state has a number of lakes, rivers, rivulets and glacial regions. The Physiography of the territory as a whole is divided into seven zones those are closely associated with the structural components of the western Himalayas. These include:

**The Plains:** The outer plain also known as Andarwah and Bajwat is a part of Great Plains of India. The rocks of this region are of fluviate and subaerial formation. Its width varies from 5-25 kilometers and it stretches from river Ravi to River Chenab for an extension of 110 kilometers with the elevation of 330 to 360 meters. The narrow zone of plains in the Jammu region is characterized by interlocking sandy alluvial fans that have been deposited by streams discharging from the foothills and by a much-dissected pediment (eroded bedrock surface) covered by loams and loess (wind-deposited silt) of the Pleistocene Epoch (i.e., those about 10,000 to 1,600,000 years old). Besides Ravi and Chenab the region is also drained by Ujh, Basantar, Tawi and Manawar Tawi. This plain is badly dissected by a series of deep and shallow ravines which carry off the seasonal flood waters of monsoon rains. Such is the number of ravines that there are 200 bridges on the Jammu railway line which passes through this region (Khan, 2001). The mountains of Jammu almost run parallel to the outer plain region. Rainfall is low, amounting to about 15 to 20 inches (380 to 500 millimeters) a year, and it occurs mainly in the form of heavy but infrequent rain showers in the summer (June to September) when the monsoon winds blow. These plains are highly fertile owing to the favorable climatic conditions and assured irrigation which enables the cultivation of crops throughout the year. Jammu, Kathua, Samba, Hiranagar

and Akhnoor belong to the outer plains (Husain, 1987). The countryside has been almost entirely denuded of trees, and thorn scrub and coarse grass are the dominant forms of vegetation. At higher elevations the topography changes and the hill slopes appear wooded.

**The Siwaliks:** The outermost relatively low hills of the Himalayas along its whole length from the Indus to the Brahmaputra are known as the Siwaliks. The width is between 20-50 kms and the altitude ranges between 600 -1200 meters in the state. The Siwaliks are made of the younger tertiary rocks (Husain, 1987). The rocks are deposited in the parallel folded zones. Subjected to folding these low hills resulted in the formation of a series of anticlinal hills with sloping plateaus, gently towards the plain. The hills consist of clay, sand, round pebbles and boulders which are badly dissected by ravines and seasonal stream courses. A series of wide longitudinal valleys called dunes lie to the north of Siwalik hills. Udhampur, Sunderbani, Bosahli, Ramkot and Dansal are typical examples of such dunes. The slope facing the outer plains is gentle covered with deciduous forests while the northern slopes are steep with dense vegetation. Due to the presence of ravines, the Siwaliks appear as isolated and broken hills. Rainfall increases with elevation, and the lower scrubland gives way to pine forests at higher altitudes. The undulating slope adjacent to the plains up to an elevation of 300 m between Ravi and Chenab rivers is locally known as Kandi. Characterized by numerous torrents, hilly soils and scarcity of water. Xerophytic vegetation is common in these areas while agriculture is subjected to the availability of rainfall. Lake Mansar and Sarunsar are situated at an elevation of 600 meters to the east of Jammu city in the Siwalik hills. The important towns are Jammu, Jasrota, Samba and Akhnoor.

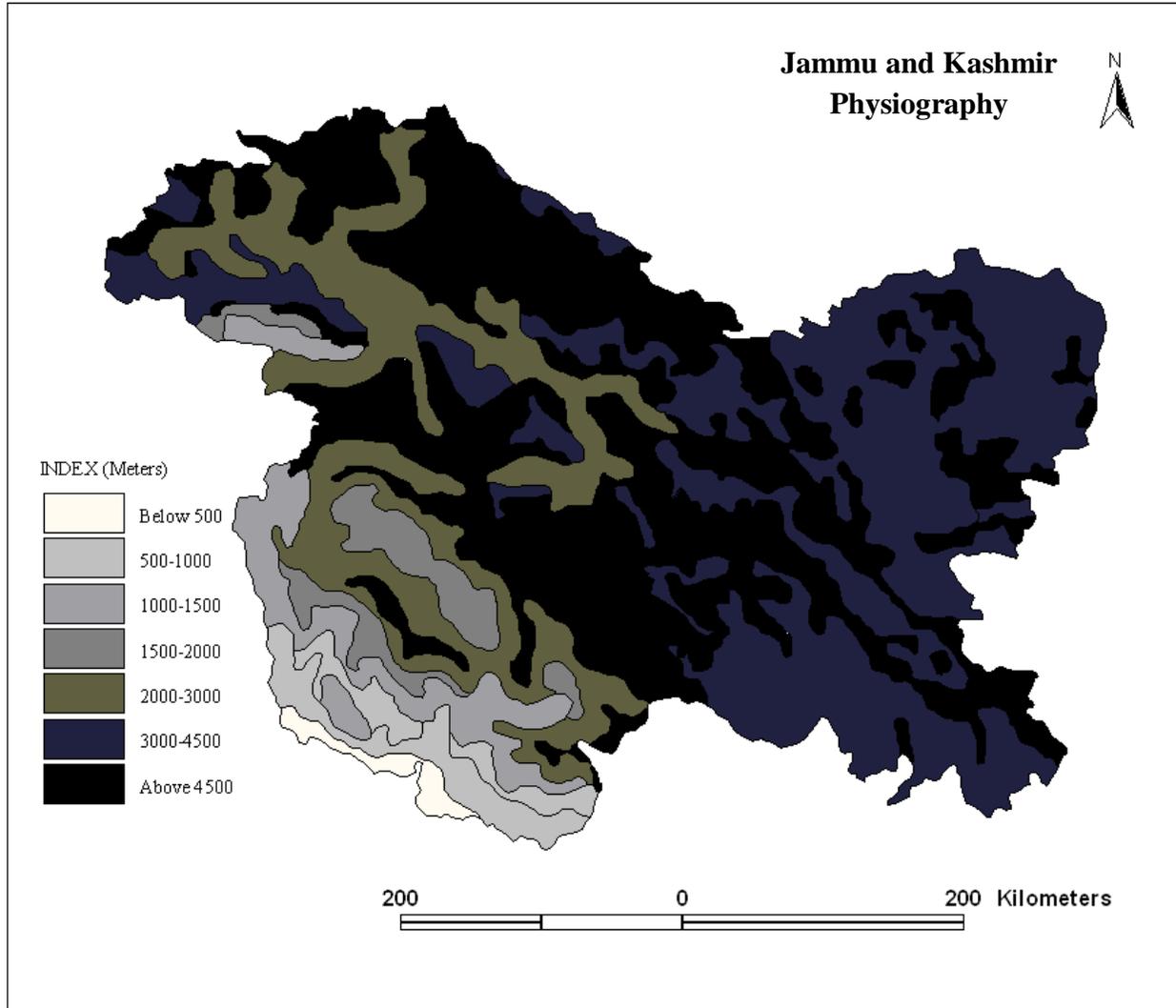
**The Middle Himalayas:** The middle Himalayas are also known as the middle mountains, lesser Himalayas or Pir Panjal. They have an east-west extension. They vary in elevation between 1820 m to 2240 m with a width of about 60 kms in the eastern part of Jammu division and 10 kms near Rajouri. This physical division lies between the Ravi in the east and the Poonch in the west and continues up to Muzafarabad. They are locally known as Pahar (mountain) in Jammu region. They are composed of highly compressed and altered rocks of various geological ages, ranging from the puranas and carboniferous to Eocene (Wadia, 1928). Consisting of an ancient rock core of granites, gneisses, quartz rocks and slates, it has been subject to considerable uplift and fracturing and was heavily glaciated during the Pleistocene Epoch (Diener, 1912). Several important rivers like Tawi, Manawar Tawi, Basantra and Ujh have their sources in middle Himalayas. However, Chenab is an important river of this region and the famous Salal

Hydroelectric project near Reasi is constructed on it. The mountains are orthoclinal which is helpful in preserving soil and supporting huge and thick temperate vegetation like deodar, oak, pine, spruce and fir. The range receives considerable precipitation in the form of winter snowfall and summer rain and has extensive areas of pasture above the tree line. The people are largely dependent on forestry, lumbering, herding and tourist activity.

**The Valley of Kashmir:** Between the Pir Panjal and the western end of the Great Himalayan ranges lies a deep asymmetrical basin called the Vale of Kashmir and has an area of 15220 km<sup>2</sup>. Average height of the valley is 1630 metres above MSL (Lawrance, 1996) but the surrounding mountains, which are always snow-clad, rise from 3000-4000 metres above MSL. The river Jhelum, which flows out from the spring at Verinag in Anantnag district, passes through this Valley at a very slow speed and ultimately flows out through a narrow gorge at Baramulla. There are also some small valleys in this region. On the north of Baramulla is Lolab valley which is 6 kms. long and 4.4 kms. wide. It has many meadows and groves of walnut trees. Forests are so thick that they hide villages in them. Sind is the largest tributary of the river Jhelum. The Sind valley is 100 Kms long upwards and its scenery is diversified. At the head of the valley is the Zojilla pass which leads to Ladakh. Towards Pahalgam lies the Lidder Valley. Its length is 64 Kms. It has glaciers, grassy meadows, huge rock walls and gorges in its upper mountains. The path to the holy Amaranth cave passes through this valley. The Kolahoi and Sheshnag streams join at Pahalgam to form the Lidder River. The karewa formation cover a wide range of area on the southern periphery of the valley all along its longitudinal extent. They are divided into sloping karewas and flat topped karewas on the basis of surface characteristics. The sloping karewas are found along the flanks of Pir Panjal range, where they form a continuous series, reaching from Shalura in the north-west to below Shopian in the south-east. The flat topped karewas consist of horizontal beds and attain a thickness of 92 m near Anantnag. Up to 2000 m, woodlands of deodar cedar, blue pine, walnut, willow, elm, and poplars occur; from 2000 to 3000 m coniferous forests with fir, pine, and spruce are found; from 3000 to 3500 m birch is dominant; and above 3500 m there are meadows with rhododendrons and dwarf willows as well as honeysuckle. The climate is characterized by an annual rainfall of about 30 inches, some of which is derived from the summer monsoon winds and some from winds associated with winter low-pressure systems. Snowfall often is accompanied by rain and sleet.

**The Greater Himalayas:** The Greater Himalayan range along with the Zaskar range lie in the northern side of Kashmir valley (Raza, et al. 1978). Geologically complex and topographically immense, the Great Himalayas contain ranges reaching more than 6000 m in altitude and deeply entrenched, remote valleys. The region was heavily glaciated in the Pleistocene (Wadia, 1928) and remnant glaciers and snowfields are still present. Beyond this range lies the high plateau-desert which is devoid of any kind of vegetation. The elevated plateaus and ridges are separated from one another by great depressions. The altitude rises further north till the peak K2 (second highest peak in the world) in the Karakorum range attains the height of 8621 m. The Zaskar range is situated at an altitude of 5940 m. This range is famous for its two river valleys-the Zaskar and the Suru. The famous Kargil town lies in the Suru valley. The Karakoram region is aptly named the "roof of the world." The zone receives some rain from the southwest monsoon winds in the summer months and hence the lower slopes are forested, but the mountains constitute a climatic divide, representing a transition from the monsoon climate of the Indian subcontinent to the dry, continental climate of Central Asia.

**The Ladakh plateau:** Ladakh is the loftiest inhabited region of the world. Most of the surface area of Ladakh is mountainous and uninhabited as it comprises of old deserts and desolate plateaus intervened by difficult passes and valleys. The mountain chain of Ladakh stretches through the region from south-east to north-west with the altitude ranging between 5180-6400 m. Owing to the great aridity of the atmosphere, the climate is extreme, from burning heat of some of the deserts to several degrees below freezing point at night.



## 2. Drainage

The drainage system of Jammu and Kashmir state is of recent origin owing to the mountain building process of late Tertiary age. The drainage system is antecedent in nature which means that most of the rivers are older than the mountains they traverse. The state is drained by river Indus and its tributaries like Jhelum, Kishanganga, Ravi and Chenab and their tributaries. Fresh and transparent water of these rivers and their tributaries form the most significant features of the landscape. These rivers have the perennial flow due to melting of snow in the Himalayas where from they originate. Indus and Chenab have their sources to the north of Greater Himalayas while Jhelum has its origin near Verinag in the Pir Panjal Range.

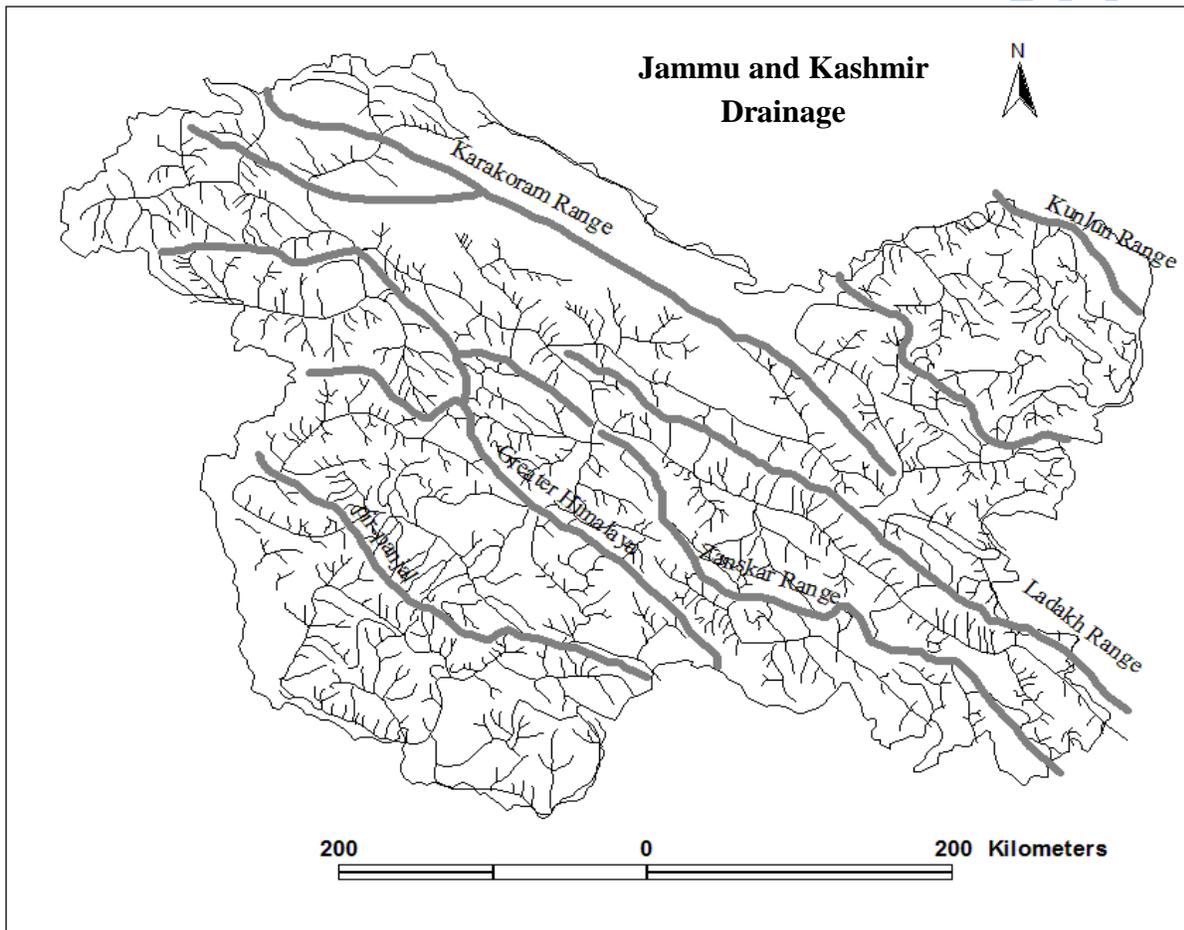
**Indus:** The Indus is one of the largest (25<sup>th</sup>) river systems in the world. The common name of Indus river is Singge-Chhu which means the Lion-River or Sher-Darya. It rises from the northern slopes of Tibet near Mansarowar lake and enters Jammu and Kashmir state near Gartok where it meets Gurtang stream at an altitude of 4245m. The Indus river flows in a north-westerly direction through the trough between the Kailash and the Ladakh range. Hanle, Suru and Zaskar are the left bank tributaries while Shyok, Shigar, Astor and Gilgit are the right bank tributaries. The river has many alluvial fans and river terraces on its either sides stretching over a distance of 30kms. The flow is subjected to extreme variations with the maximum flow in the summer months (June to August) when the snow melt is high. The total length of the river is 2900 kms of which it runs for a distance of 966 kms in Jammu and Kashmir and finally through Pakistan falls in the Arabian sea near Karachi.

**Jhelum:** The river Jhelum rises from Pir Panjal Ranges about one kilometer ahead of Verinag. The river Jhelum is known as Veth in Kashmir valley. When it leaves Kashmir at Baramulla it is called the Kashur Darya and after joining the Kishanganga it is called Jhelum. Jhelum joins the Indus in the Punjab state of Pakistan. The river meanders in the valley, enters the Wular lake, leaves it near Sopore and flows in the narrow Gorge across the Pir Panjal from Baramulla to Muzafarabad (Raza, et al. 1978). In ancient times the river Jhelum served as the most important highway of Kashmir. The famous waterfall of Aharbal (21m) is formed by the stream of Vishav. The Jhelum and its tributaries are the main channels of drainage which sculpture the area during their course. The discharge is maximum during south-west monsoon when heavy and widespread rainfall occurs throughout the length and breadth of the valley. Sandran, Breng, Arpat, Lidder, Harwan, Sind, Erin, Madhumati, Pohru and Viji-Dakil are the right bank tributaries while Vishav, Rambhara, Romushi, Dudhganga, Sukhnag and Ningal are the left bank tributaries.

**Kishanganga:** This is an important tributary of river Jhelum. It has its origin in Kishansar lake located in Drass mountains and hence named as Kishanganga. It drains the Gurez valley and finally merges into Jhelum river at Domel near the city of Muzafarabad. The total length of the river is 288 kms. Throughout the Gurez front, the river is completely frozen over during the winter season. It separates the valley of Kashmir from Pakistan at present.

**Chenab:** This river is formed by two streams of Chandra and Bhaga at an elevation of 4891 m in Himachal Pradesh. The river flows between the Himalayas and the Pir Panjal Range and then takes a turn to the south through a gorge. It flows through Doda, Reasi and Akhnoor. From

Akhnoor the river assumes the plain stage and is navigable. From Tandi to Kishtiwar the river has many gorges, rapids and falls. At Kishtiwar the river receives a perennial tributary known as Wadwan stream and makes a typical gorge about 1000 feet below Kishtiwar valley. The Chenab is about 1180 kms long in the state of Jammu and Kashmir. Important power projects of Salal Hydel Project (345MW) and Dulhasti (390MW) are generating electricity through the waters of river Chenab in Reasi and Kishtwar areas respectively.



**Tawi:** This river arises from Sewajdhar near Badarwah. The river passes through Ram Nagar, Chenani, Udhampur, Nagrota and Jammu before its confluence with Chenab at Akhnoor. It has a total length of 120 kms.

**Ravi:** This river rises from the southern slopes of the Pir Panjal. The river passes through Madhupur and Kathua before entering into Pakistan to meet Indus. Total length of this river is about 65 kms.

### 3. Climate

The climate of the state differs from region to region on account of great variations in altitude, location and topography. The tropical heat of the Punjab and the arctic cold of Ladakh are the extremes, and there are certain places where snow makes the life stagnant for about seven months in a year. The climate of the state varies from tropical in Jammu plains to semi-arctic cold in Ladakh with Kashmir and Jammu mountainous tracts having temperate climatic conditions. The temperature of the state varies spatially. Leh is the coldest ( $-28^{\circ}\text{C}$  average) while Jammu is the hottest. Mean monthly temperature is lowest in January and highest in July except in Jammu where highest temperature is experienced in June. Mean monthly temperature in January varies from  $-17^{\circ}\text{C}$  at Drass to  $14^{\circ}\text{C}$  at Jammu; Kargil and Leh being other stations of below freezing average. Considering the overall distribution of climatic elements, four units become obvious:

1. The windward (Jammu region)
2. The leeward (Ladakh region)
3. The high altitude Kashmir (Himadri, Pir Panjal)
4. The Kashmir valley.

In the winter nights, temperature goes down below zero and very often heavy snowfall occurs during November to February. The annual rainfall varies from region to region with 92.6 mm in Leh, 650.5 mm in Srinagar and 1,115.9 mm in Jammu. In the outer hilly region of the Jammu Province, climate has three main seasons: (i) hot weather from April to June, (ii) a rainy season from July to September and (iii) cold weather from October to March. The altitude of the State rises steeply from 305 metres to 6910 metres above MSL. There are the hot plains of the Jammu Province and the cold dry tableland of Ladakh. The area has different weather conditions at different places because of the lofty mountains like the Pir-Panjal, the Zaskar and the Karakoram that check the moisture-laden winds from entering the valleys.

In summers, the outer plains and the outer hills receive rainfall from monsoon winds while in winters, winds from the Mediterranean cause snowfall and rainfall in the Valley of Kashmir. The moisture-laden winds cause rainfall in the forests on the hills making the temperature to fall in summer; hence, the thickly wooded areas such as Pahalgam and Gulmarg have milder weather conditions than that of Srinagar. Similarly, the climate of the valley of Kashmir is comparatively

milder than that of the Outer Plains as it is on higher altitude therefore making it one of the most liked tourist destinations during summer.

### Seasons of Kashmir Valley

Season	Date	Local Name
Spring	16 March to 15 May	SONTH
Summer	16 May to 15 July	RETKOL
Rainy season	16 July to 15 September	WAHARAT
Autumn	16 September to 15 November	HARUD
Winter	16 November to 15 January	WANDAH
Ice cold	16 January to 15 March	SHISHUR

The climate of the valley of Kashmir has its own peculiarities. The seasons are marked with sudden change and the climate can be divided into six seasons of two months each (Raina, 2002). In the Kashmir Province there is not much rise in the temperature up to and end of May, but in June, July and August the temperature can rise up to 32°C in shade. After August there is a decrease in the temperature and by the end of October it becomes cold and by January cold becomes intense with the snowfall. The snowy period lasts for two and half months beginning December through January to middle of March. During winter Dal Lake sometimes gets frozen, enabling people to skate over it. The distinctive features of Kashmir's climate is the absence of monsoon rain, because the monsoons cannot cross the mountains enclosing Kashmir on the south.

#### 4. Natural Vegetation

The term natural vegetation is used loosely to describe any plant life that is not organized or influenced by mankind. The state is well endowed in forest resources. The forests have great diversity in species and varieties, ranging from the lush green margs (alpine pastures) to evergreen conifers on the gentle slopes of the Middle and the Greater Himalayas, and from scrub jungles of the foothills to the deciduous forests of the Siwaliks and the Pir Panjal Range. The natural vegetation of the state has great altitudinal variations and latitudinal zonation. There is hardly any vegetation at 5550 m above MSL because most of the plants cease growth when the soil temperature drops below 5°C.

There is a great diversity in the natural vegetation of the state as about 4000 species belonging to 1500 genera are found in the state. Some of the important forests of the state consist of deodar, juniper, pine, spruce, fir, yew, alder, elm, sorrel, poplar, birch, maple and mulberry. Being situated at higher latitudes and characterized by undulating and mountainous topography, most of the forest of the state belong to the coniferous category. The lower end of the greater Himalayas are quite rich in timber forest. The state is relatively poor in natural vegetation as compared to the other Himalayan states of India.

During the last 60 years a substantial proportion of forests has been cleared and brought under agriculture and pastures. Forests have numerous productive, protective and bio-aesthetic functions. Forests constitute 14.5 per cent of the state's total geographical area. About 35 per cent of the total forest area lies in Jammu division, the rest being shared by Kashmir and Ladakh divisions. The most valuable timer, that of Deodar (Oak) is mainly found in Baramulla, Anantnag, Doda and Udhampur districts. In order to understand the spatial distribution of different types of natural vegetation, the forests of the state may be classified into the following categories.

#### District-wise forest area, Jammu and Kashmir, 2008-09

S. No.	District	Area under forests (km <sup>2</sup> )			Percentage of total forest area
		Forest area	Wild life area	Total forest area	
1	Anantnag	2068	546.75	2614.75	7.34
2	Pulwama	810	273.25	1083.25	3.039
3	Srinagar	380	311	691	1.94
4	Badgam	477	3.25	480.25	1.35
5	Baramulla	2690	384.75	3074.75	8.63
6	Kupwara	1703	-	1703	4.78
7	Leh	29	13018	13047	36.61
8	Kargil	7	112	119	0.33
9	Jammu	959	256.5	1215.5	3.41
10	Udhampur	2343	42.25	2385.25	6.69
11	Kathua	991	44.75	1035.75	2.91
12	Doda	5555	418	5973	16.76
13	Rajouri	1267	-	1267	3.55
14	Poonch	951	-	951	2.67
<b>Jammu and Kashmir</b>		<b>20230</b>	<b>15410</b>	<b>35640</b>	<b>100.00</b>

Source: Digest of statistics 2008-09, Government of Jammu and Kashmir, p. 138

**Subtropical Forests:** These forests are confined to the Siwaliks and lower slopes of the middle Himalayas. There is great diversity of trees in these forests because of the various edaphic factors and seasonality of rainfall. The dominant species are teak, sal, shisham, papal, tun, silver-pine, and reed. These forests are mainly utilized for fuel wood, timber, agricultural implements and miscellaneous purposes.

**Temperate Forests:** As the latitude and altitude increases towards the north, the subtropical forest are replaced by temperate forests. The slopes of Pir Panjal, Greater Himalayas, Karakorum and Zaskar between 1500 m to 3000 m are dominated by temperate forests. Deodar, pine, silver fir, spruce, alder, cedar, sorrel, birch and hazal are the dominant species.

**Alpine Pastures:** Alpine pastures also known as margs lie between 3600 m to 4000 m above MSL. The climate in these margs is extremely cold over most parts of the year which is supporting only some of the dwarf varieties of birch and junipers making a shrubby appearances. The lush green and nutritious grasses of these pastures are utilized by the Gujjars and Bakarwals who practice transhumance.

Forests are mainly found where the annual rainfall is about 100 cm. However, scrub forests are found where rainfall is less than 100 cm. Forests are one of the most important resources of Jammu and Kashmir. More than 99 per cent of forest area is confined to the province of Jammu and Kashmir only. The forest area of 2008-09 shows that 35640 km<sup>2</sup> of the state's area is under forest which constitutes 35.15 per cent of the total geographical area of the state on this side of the line of Control. Out of this, more than 99 per cent of the forest area is confined to the province of Jammu and Kashmir only, with the largest area of 5973 km<sup>2</sup> in the district of Doda and smallest area of 119 km<sup>2</sup> in the district of Kargil. Leh records the highest percentage of forest area (36.61 per cent) only because of the fact that it has got the highest percentage of the total wild life area (84.47 per cent) of the state. Vegetation is influenced by climate, rainfall soil and altitude. Since these factors vary as the altitude rises from the outer plains of Jammu Province to the loftiest mountain ranges of the Inner Himalayas, it is but natural that the vegetation should vary from the Inner Himalayas to the middle mountains and the outer plains of Jammu region. Over 19,236 km<sup>2</sup> is under coniferous softwood (Pine) and 946 km<sup>2</sup> under non-coniferous softwood. In the coniferous category, fir accounts for 3355 km<sup>2</sup>, kail for 1874 km<sup>2</sup>, chir for 1773 km<sup>2</sup> and deodar for 1122 km<sup>2</sup>.

## Demographic Profile

The state has a population of 12548926 (census of India, 2011) with a density of 124 persons per km<sup>2</sup>. The most striking feature of population is its uneven distribution, which is closely related with relief and climate. The state is one of the least populated state's of India because only 10 per cent of its area is suitable for cultivation.

### 5. Population distribution

The spatial distribution of population in Jammu and Kashmir is highly uneven. The physical factors like terrain, topography, slope, climate, soil, natural vegetation and accessibility have largely controlled the distribution and density of population in the state. In general, about 85 per cent of the total population of the state is occupying the Jammu plain and Kashmir valley (Jhelum floor), 14 per cent is living in the Kandi areas and the side valleys within 2000 m above MSL while the remaining 1 per cent is sprinkled in the high altitudinal zones of the Himalayas, Zaskar, Ladakh, and Karakorum Ranges (Qazi, 2005). Kashmir division constitutes 55 per cent of the total state's population while 42.64 percent is distributed in Jammu division and the rest 2.3 percent population is dwelling in Ladakh division. The population distribution pattern among the districts indicates high concentration in Jammu district followed by Srinagar, Anantnag and Baramulla. These four districts also have maximum concentration of urban population. Least concentration of population is in Leh, Kargil, Poonch, Rajouri, Kathua and Badgam districts.

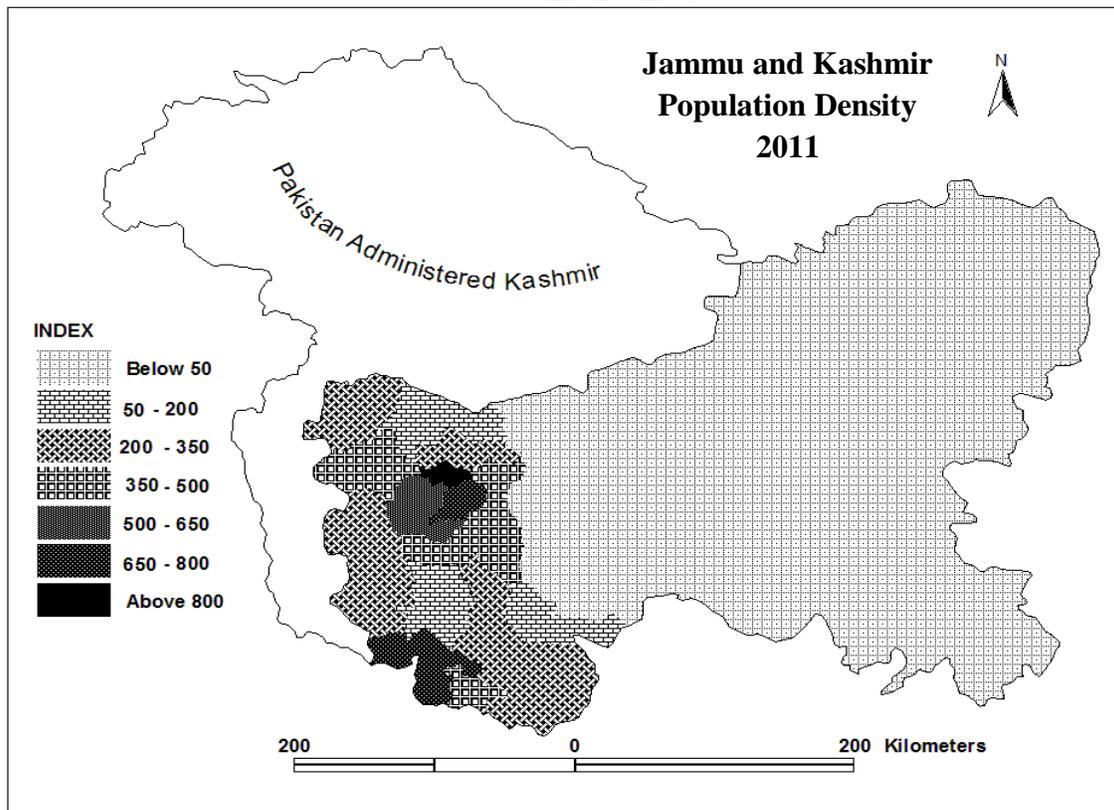
#### Division wise distribution of population, Jammu and Kashmir, 2001 and 2011

S. No.	Division	Population 2001		Population 2011	
		Absolute	Percentage	Absolute	Percentage
1	<b>Kashmir</b>	5441341	54.04	6907623	55.05
2	<b>Jammu</b>	4395712	43.65	5350811	42.64
3	<b>Ladakh</b>	232864	2.31	290492	2.31
<b>Jammu and Kashmir</b>		<b>10069917</b>	<b>100</b>	<b>12548926</b>	<b>100</b>

Source: Census of India, 2001 and 2011.

## 6. Population Density

Density of population in the state is 124 persons per km<sup>2</sup>. Srinagar and Jammu districts recorded high density of population of 2860 and 674 persons per km<sup>2</sup> respectively, mainly on account of being the state's administrative capitals which have made them the hub of socio-economic activities. The lowest population density is found in the Ladakh division with only 3 persons per km<sup>2</sup> in Leh district. The population distribution and density pattern indicates an overwhelming influence of geo-physical disposition across the different regions of the state. In addition to this centralized distribution of small manufacturing and service sectors in few urban centers have also influenced the population density and distribution pattern as well. Since social, economic and technological development are in the early stages, agricultural land capability (growing season, irrigation) and carrying capacity of land (soil fertility) and concentration of non-agricultural economic activities especially service activities has played significant role in population concentration and high density of population in Jhelum Valley Floor consisting of Srinagar, Badgam, Pulwama, Anantnag and Baramulla districts.



## District wise demographic profile, Jammu and Kashmir, 2011

S. No.	District	Area (km <sup>2</sup> )	Population (persons)		Growth rate (per cent)	Density persons/km <sup>2</sup>	sex ratio	Literacy (per cent)
			2002*	2011				
01	Kupwara	2587	667674	875564	31.14	338	843	66.92
02	Badgam	1243	621750	735753	18.34	592	883	57.98
03	Leh	43215	120347	147104	22.23	3	583	80.48
04	Kargil	14843	122477	143388	17.07	10	775	74.49
05	Punch	2187	382513	476820	24.65	218	890	68.69
06	Rajouri	2715	496125	619266	24.82	228	863	68.54
07	Kathua	2983	525044	615711	17.27	206	877	73.50
08	Baramulla	2320	832650	1015503	21.96	438	873	66.93
09	Bandipora	2622	361592	385099	6.50	147	911	57.82
10	Srinagar	444	1046880	1269751	21.29	2860	879	71.21
11	Ganderbal	1402	218415	297003	35.98	212	869	59.99
12	Pulwama	827	453000	570060	25.84	689	913	65.00
13	Shopian	462	216947	265960	22.59	576	951	62.49
14	Anantnag	2559	759995	1070144	40.81	418	937	64.32
15	Kulgam	1181	300198	422786	40.83	358	951	60.35
16	Doda	2124	328765	409576	24.58	193	922	65.97
17	Ramban	935	220655	283313	28.40	303	901	56.90
18	Kishtiwar	8686	195914	231037	17.93	27	917	58.54
19	Udhampur	2654	471695	555357	17.74	209	863	69.90
20	Reasi	2344	254275	314714	23.77	134	891	59.42
21	Jammu	2266	1393135	1526406	9.57	674	871	83.98
22	Samba	788	279780	318611	13.88	404	886	82.48
<b>Jammu and Kashmir</b>		<b>101387</b>	<b>10269852</b>	<b>12548926</b>	<b>24.61</b>	<b>124</b>	<b>883</b>	<b>68.74</b>

Source: Census of India, 2011; \* Digest of Statistics, 2008-09.

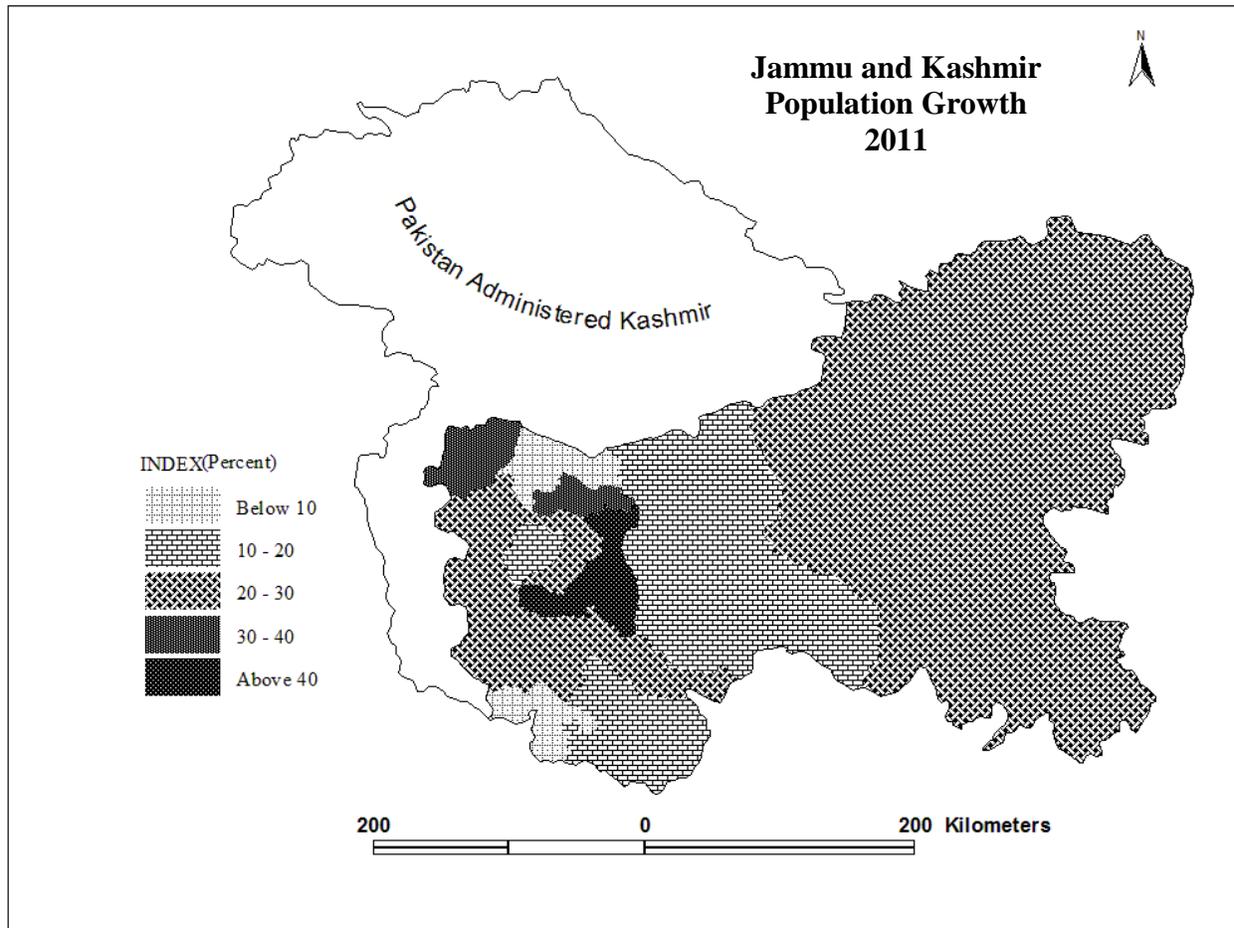
## 7. Population Growth

The size of population and its growth have a direct bearing on the economic development, social well being and political stability of a region. Population growth is, thus, pivotal in the regions demographic dynamism (Chandna, 1992). The population of the state has increased more than two fold in the state during the last 30 years. In the first two decades of the 20th century the population growth was below 10 per cent. After 1931, it was raising at a constant rate of 10 per cent per decade up to 1961, were from it has an unprecedented rise of 29 per cent per decade which is one of the highest growth rates in the country (17.64 percent for India). The districts of Kulgam, Anantnag, Ganderbal, Kupwara, Poonch and Rajouri have registered high decadal population growth rate than the state average of 24.6 percent, while it is very low in the districts of Bandipora and Jammu. Further, it is below the state average in both the districts of Ladakh region. However, decadal population growth was the highest (40.83 percent) in Kulgam district and the lowest (6.5 per cent) in Bandipora district.

### Decadal population growth, Jammu and Kashmir, 1901 – 2011

Year	Population	Density (Persons/km <sup>2</sup> )	Percentage Growth	Urban Population		
				Absolute	Per cent	Percentage Growth
1901	2139362	21	-	158748	7.42	-
1911	2292535	23	+7.16	268518	11.71	+69.2
1921	2424359	24	+5.75	267754	11.04	-0.28
1931	2670208	26	+ 10.14	317805	11.90	+8.7
1941	2946728	29	+ 10.36	386565	13.11	+21.64
1951	3253852	32	+ 10.42	457213	14.05	+ 18.28
1961	3560976	35	+9.44	593315	16.66	+29.77
1971	4616632	46	+29.65	858221	18.58	+44.65
1981	5987389	59	+29.69	1260403	21.05	+46.86
1991*	7803900	77	+30.34	1676914	21.94	+33.04
2001	10069917	99	+29.04	2505309	24.87	+49.4
2011	12548926	124	+24.61	3815585*	30.4	+52.3

Source: Census of India, 2001; \* Projected figures



## **8. Agriculture**

Agriculture is the mainstay of more than 70 per cent people in Jammu & Kashmir and 54 per cent of the total work force directly depends on this sector for their livelihood. Major food crops are wheat, paddy and maize. Barley, jowar and bajra are also cultivated in some parts of the state. Agro-climatic condition of the state support horticulture; about 5 lakh families, directly or indirectly, are related with horticulture activities. Although the net area sown has remained more or less same (7.31 lakh hectare in 1990-91 to 7.38 lakh hectare in 2008-2009), the area under fruit and vegetable cultivation has marginally increased over the same period of time. In respect of fruit and vegetables, it has gone up from 60041 thousand hectare in 1990-91 to 87421 thousand hectare in 2008-2009. Production of food grains has registered an increase of 3.62 per

cent during the year 2008-09 as it has increased to 16275 thousand quintals from 15707 thousand quintals during the year 2007-08 (Economic Survey Report, 2008-09).

Rice, the staple crop, is planted in May and harvested in late September. Maize is the second-most important crop. The best soil for rice is reclaimed swamp and enormous crops are raised from the black peaty land, which lies under the banks of river Jhelum. In the high villages occupied by the Gujjars, very fine crops of maize are grown. In 2008-09 maize was cultivated on 31.14 per cent of the total area under food crops followed by wheat 27.46 per cent and rice 25.41 per cent. Jammu district has the highest area under rice cultivation (18.63 per cent of the total area under rice in the state) followed by Kathua (13.08 per cent), Anantnag (9.82 per cent) and Kulgam (7.1 per cent) while Rajouri has the highest area under maize (14.80 per cent) followed by Udhampur (10.87 per cent), Doda (8.17 per cent) and Jammu (7.45 per cent). Jammu also leads in the area under wheat (29.78 per cent) followed by Kathua (19.14 per cent), Samba (10.5 per cent) and Udhampur (10.25 per cent). The average yield of rice has increased from 16.9 quintals per hectare (Q/ha) in 2001-02 to 21.88 Q/ha in 2008-09 with the highest yield of 24.5 Q/ha in Kashmir Division (Digest of Statistics, 2008-09). The average yield of Maize has increased from 16.48 Q/ha in 2001-02 to 20.05 Q/ha in 2008-09 with the highest yield of 23.58 found in Jammu division. Wheat has also increased its yield from 113.21 Q/ha in 2001-02 to 17.35 Q/ha in 2008-09 with the highest yield of 17.5 recorded in Jammu division. Large orchards in the valley of Kashmir produce apples, pears, peaches, walnuts, almonds, cherries and apricot. Apple cultivation is carried on 65.15 per cent of the area under orchards followed by pear 6.17 per cent, citrus 6.01 per cent and mango 5.26 per cent. The state leads in terms of production of apples, walnuts, pears, saffron, almonds and apricots, and has a huge potential for export of processed food and allied services.

The state of Jammu and Kashmir is the largest producer of saffron in the Indian subcontinent. It is a gifted crop which fetches a fair price in both national and international market. The cultivation of saffron is restricted to the Karewas in Kashmir valley and Kishtiwari district in Jammu division. It has been grown on the table lands of Pampore since last 2500 years and is the world's costliest spice. The Pulwama district with 73 per cent of the total saffron area leads in both area and production. Artificial floating gardens on the lakes are favorable for the cultivation of flowers and vegetables. In Ladakh, there is only one cropping season-Kharif, which extends from March to October. Cultivation in Ladakh is restricted to near the main

valleys of Indus, Shyok and Suru rivers, where apricot, barley, buckwheat, turnips and mustard are grown. Recently, strawberry cultivation has also been introduced in Ladakh. Pastoralism and cattle breeding have long been the vital features of the Ladakh economy. The Kashmir goat raised in the region provides pashmina for the production of fine fabrics.

## 9. Tourism

Kashmir is known as the paradise on earth because of its numerous scenic spots along with other important tourism attractions such as shrines, monasteries, temples and caves in the three regions. Major tourist places are Chashma Shahi springs, Shalimar Bagh and Dal Lake, etc., in Srinagar; Gulmarg, Pahalgam and Sonamarg, etc., in the Valley; various ancient temples, Buddhist sites and scenic beauty in Ladakh; Vaishno Devi temple and Patnitop near Jammu, etc. Tourism is considered to be central nerve of the state economy with both forward and backward linkages and trickle down effects. The tourism sector with a revenue generation of more than Rs 3000 crores, provides employment to about 5 lakh people. It contributes 16 per cent to state domestic product. The sector with its potential for employing people across the skill spectrum and positive externalities for other sectors like handicrafts, handlooms and transport occupies an important place in the development and employment strategy of the state. Tourism as an industry not only preserves the culture and heritage but also conserves the fragile environment of the state. The state is endowed with rich tourism resource and like its power potential tourism too has harnessed only one fourth of potential so far.

### Tourist arrivals to Kashmir valley and pilgrim tourists

S.No.	Year	No. of tourists		Growth in percent	
		Kashmir Valley	Yatris	Kashmir valley	Yatris
1	1980	595117	19578	---	---
2	1985	503614	42000	-15.37	114.53
3	1990	10,722	4824	-97.87	-88.51
4	1995	8,520	60000	-20.53	1143.78
5	2000	11,912	173334	39.81	188.89
6	2005	6,05,382	388000	4982.11	123.84
7	2010	6,01,252	264413	-0.68	-31.85

Source: Department of Tourism, Srinagar.

Tourist arrivals in the valley have waxed and waned in tandem with the security situation. After declining to an all-time low of 27,356 visitors in 2002, it steadily increased to 6 lakh plus in 2010. The number of pilgrims who visited Amarnath had gone up to 5 lakh in 2008 while 81.8 lakh tourists visited Vaishno Devi in 2009. However the total tourist arrivals has decreased considerably in 2010. Though the total tourist arrivals in Ladakh are lower than in the other two regions, it attracted the largest number of foreign visitors. Ladakh's potential to develop as an important international tourist destination in the state is evidenced by the steady increase in foreign visitors whose numbers have risen from 22,000 in 2004 to 30,446 in 2009. Tourism Department alone has earned Rs 73 crore in 2006-07 (Economic Survey Report, 2008-09). The 2009 Performance Review of Jammu and Kashmir Economy stresses that developing, expanding, and upgrading tourist infrastructure is a priority in the initiatives being pursued in the state and national development plans. Fifteen development authorities have been established, more than tripling the previously existing total of four. They are specifically charged with developing tourist infrastructure in new areas while upgrading facilities in popular tourist destinations. Directorate of Economics & Statistics Jammu and Kashmir Economy survey report for 2008-09 mentions that the revenue earnings made under the public sector in tourism sector from 2004-05 till 2007-08 was about rupees 103.62 crore. The percentage increase has been 10.48 per cent for the year 2007-08 as compared to 2006-07. The economic and social impacts on the local community depend on how much of the income is generated by tourists go to the host communities. In most all-inclusive package tours more than 80 per cent of traveller's fees go to the airlines, hotels and other outside companies, not to local businessmen and workers.

In a way the state is economically dependent upon the tourism to a larger extent. State Govt. has also been prioritizing the importance of the state tourism. Jammu & Kashmir tourism Development Corporation (JKTDC) is looking after the interests of tourists coming from outside state and country. The said corporation does make necessary and proper arrangements for providing all sort of adequate facilities to the tourists and the kind of facilitation includes transport, lodging, boarding etc. The corporation provides various types of tour packages to the visitors all the time. Similarly, there are numerous travel agencies operational in the State to look after the best interests of the tourists by providing adequate facilitation of transportation, lodging, boarding etc to them.

## 10. Hydroelectric Power

The Jammu and Kashmir state possesses a huge potential of hydel power resources. The state power development corporation has assumed a potential of 20000 MW and identified about 16000 MW for the four rivers in the state- Chenab (10853.81 MW), Jhelum (3141.30 MW), Indus (1598.7 MW) and Ravi (417.00 MW). Despite the fact that the state could be among the frontline states owing to huge hydel power potential but it is presently facing an acute shortage of energy resources as the current generation is only 1658.59 MW where as the current demand on account of domestic, industrial, agricultural and other demands is estimated about 2000 MW. This acute deficiency in energy sector has impeded not only the industrial development but also the other ancillary sectors of the state. If the power sector is fully developed, the state would certainly attain the status of power exporting states. The hydel power is harnessed through state and central sectors as indicated in the following table.

### Installed capacities of power houses under the State and Centre sector

State Sector				Centre Sector	
S.No	Name of the Power House	Installed Capacity (2008-09) (MWs)	Energy Generated (2008-09) (MUs)	Name of the Power House	Installed Capacity (2008-09) (MWs)
<b>Thermal</b>				<b>Hydel</b>	
1	Gas Turbine Pampore- I	75.00	0	NHPC -Salal	690.000
2	Gas Turbine-II	100.00	0	NHPC- Uri-I	480.000
3	Diesel	20.74	16.64	NHPC- Dulhasti	390.000
	<b>Total</b>	<b>175.74</b>	<b>16.64</b>		
<b>Hydel</b>					
A	<b>Jhelum River Basin</b>				
1	LJHP*	105.00	491.872		
2	USHP-I	22.6	84.86		
3	USHP-II	105.00	244.34		
4	Ganderbal	15.00	22.20		
5	Karnah	2.00	2.633		
6	Pahalgam	3.00	6.63		

	<i>Sub-Total</i>	<b>252.60</b>	<b>852.535</b>			
<b>B</b>	<b>Chenab River Basin</b>					
7	Baghliar	450.00	707.63			
8	Chenani-I	23.30	57.10			
9	Chenani-II	2.00	2.81			
10	Chenani-III	7.50	11.13			
11	Baderwah	1.00	0			
	<i>Sub-Total</i>	<b>483.80</b>	<b>778.67</b>			
<b>C</b>	<b>Ravi River Basin</b>					
12	Sewa-III	9.00	7.68			
<b>D</b>	<b>Indus River Basin</b>					
13	Satakna	4.00	5.59			
14	Sumoor	0.10	0.05			
15	Bazgoo	0.30	0.55			
16	Hunder	0.40	0.58			
17	Iqbal Bridge	3.70	7.98			
18	Haftal	1.00	0.18			
19	Marpachoo	0.75	0.15			
20	Igoo Marshelong	3.00	10.09			
	<b>Sub- Total</b>	<b>13.30</b>	<b>25.17</b>			
	<b>Gross Total (Hydel Power Generated)</b>	<b>758.70</b>	<b>1692.530</b>	<b>Total</b>	<b>1560.000</b>	
	<b>Intermediate Consumption (Baglihar+Auxiliary Consumption)</b>		33.940			
	<b>Net (Hydro Power Generated)</b>		<b>1658.590</b>			

Source: Economic Survey Report, Jammu and Kashmir, 2008-09