

CHAPTER I

GEOGRAPHICAL PERSONALITY OF KASHMIR VALLEY

“*Agar Firdoos Barooy-e-Zameen ast, Hamin astoo Hamin astoo Hamin ast*”

(If there is paradise on Earth, It is here, It is here, It is here)

(*Mughal Emperor, Jahangir*)

1.1 Introduction

Kashmir Valley has rightly been called as the “Paradise on Earth” and “Switzerland of Asia”. Bernier, the first European traveler to enter Kashmir, wrote in 1665 that “In truth, the kingdom surpasses in beauty all that my warmest imagination had anticipated” (Young-husband, 1911)¹.

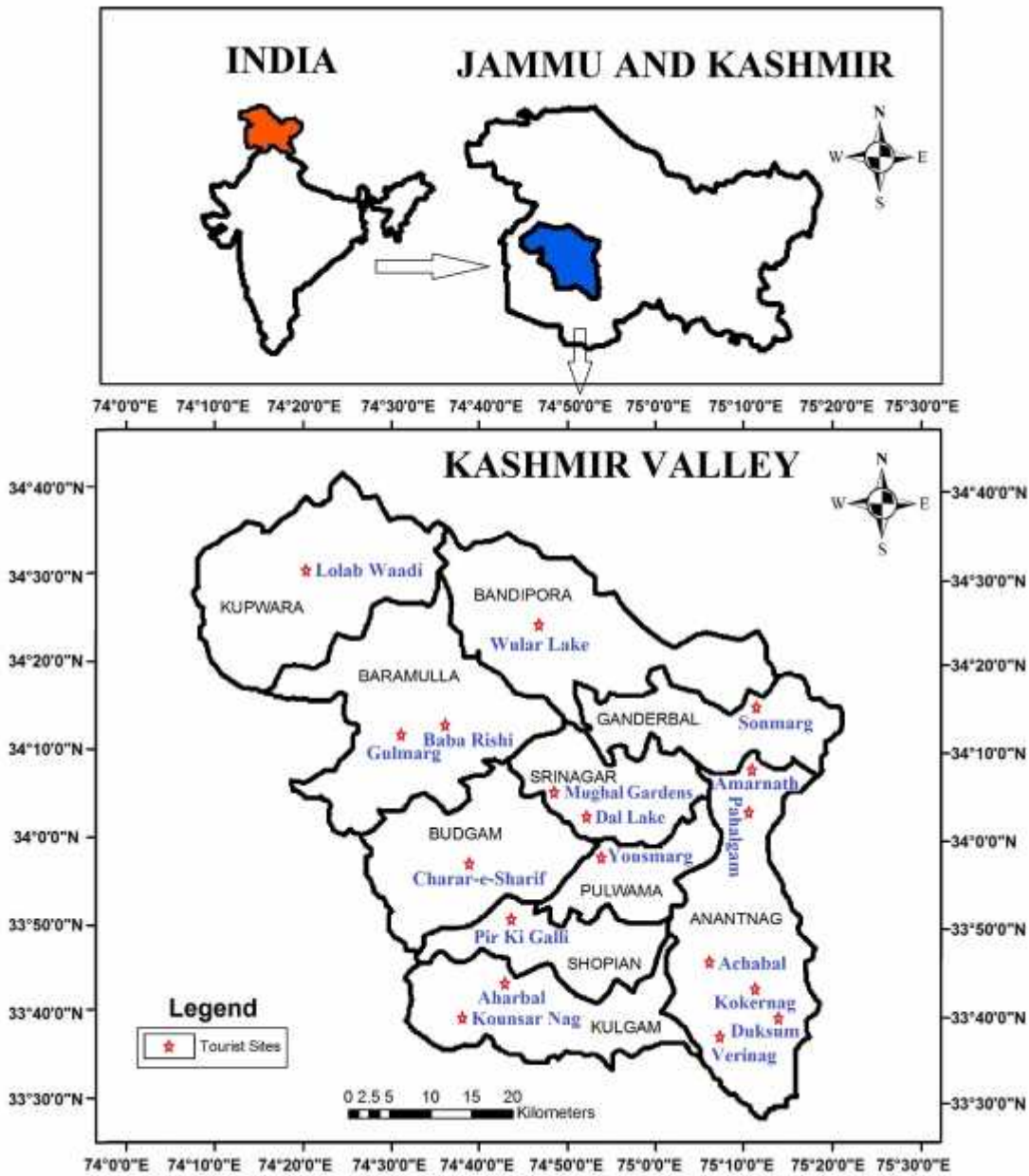
Geographically and climatically, Kashmir is the core of mighty Himalayas receiving in abundance its grace in the form of captivating scenic beauty, lush green pastures and lofty glistening snow covered mountain peaks which capture the changing hues of the brilliant sun, in many ways, the enchanting rivers and rivulets and the great lakes of mythological fame. In her valleys grow the rarest of trees and herbs, including the most precious of all flowers - the *Zaafraan* (Saffron). In her forest are found the best pines and deodars. From her orchards come apples, apricots, pears, walnuts and cherries of different kinds. On her green meadows graze the lambs bearing the most exquisite wool. Her Dal lake and her house boats, Gulmarg and her glaciers have made her an international tourist spot. What to talk of her temples, the dream of every devout Hindu - the Holy Amarnath where lakhs of pilgrims trek every year, regardless of inclement weather and a host of other dangers; the Shiva temple, the Khir Bhawani, all with their lofty associations with great masterminds and the impeccable Shaivite philosophy (Sadhu, 1984)². Surely the name of Kashmir should conjure up a thrill in all Indians.

Kashmir Valley, a separate geographical entity, is one of the three Meso regions (Jammu, Kashmir and Ladakh) of the state of Jammu & Kashmir which are separated by the Himalayan mountain ranges from one another. These divisions have been referred to as a three-storey building in the middle of which lies Kashmir Valley

1 Younghusband, S. F. (1911). *KASHMIR*. Adam and Charles Black: London.

2 Sadhu, C. L. (1984). *Kashmir- The Crown of India*. Vivekananda Kendra: Kanyakumari.

having half closed Ecosystem (Raza, et.al,1978)³. The oval shaped valley (figure-1.1) extending between latitudes 33°30' N to 34°40' N and longitudes 73°45' E to 75°35' E stretches over an area of



Source: Cartographed by the Researcher

Figure 1.1

3 Raza, M., Mohammad, Ali., & Ahmad, A. (1978). *The Valley Of Kashmir- A geographical Interpretation- The Land*. Vikas Publication: New Delhi.

15,853 km² (out of 1,12,387 km² area of J&K), giving the appearance of an old lacustrine bed.⁴The Jhelum which rises at the southern end of the valley near Verinag (Anantnag district) flows approximately through its middle, receiving numerous tributaries before it enters the Wular Lake out of which it flows again through a gorge at Baramullah. On the left bank of the river, roughly west, lies the Pir Panjal range from the slopes of which numerous mountain torrents rush to swell its waters. The mountains surrounding the Jhelum Valley have an average height of 3,636 meters but many peaks exceed 4,242 meters. At the southern end of the valley, they dip to about 2,727 meters where the Banihal pass gives an exit to the Jammu region. The main Kashmir valley averages about 1,666 meters with Srinagar (1,576 meters) at its Centre. North of the valley are situated the Great Himalayan Ranges and the well-known Zaskar range. A number of attempts have been made in the past to delineate Kashmir valley. Ptolemy's work is the only classical one which furnishes an idea of delimitation of Kashmir Division, but he included major parts of the present Punjab, North West provinces and central India to it. The Ptolemy's work indicates that the present Kashmir Region or Valley was subject to great foreign dominion. Spate and Learmonth treat it as second order region of Kashmir Region which is further sub divided into the Jhelum Plain, The Karewas (terrace) and The Rimlands (Spate,1972)⁵.

Historians say that Kashmir Valley was originally known as 'Kashyapmar' or the Abode of Kashyap Rishi-a saint, who once went on a pilgrimage to Kashmir. On reaching Naukabandan near Kausarnag via Rajouri, he killed Bahudev, The Giant of Satisar at the request of people and let the water of the lake flow out near Baramulla. The land, therefore, came to be known as Kashyapmar, which afterwards changed into kashmar and from kashmar to Kashmir. But some historians are of the opinion that when the people of "Kash" caste settled here permanently the valley came to be known as Kashmir. Kashmir is known by many other names also. The Greeks called it Kaspeiria, while the Chinese named it Shie-in or Kia-shi-lo. The Tibetans called it Kanapal and Dards named it Kashart⁶.

4 Retrieved from http://www.jammu_kashmir/geography

5 Spate, O. H. K., & Learmonth, A. T. A. (1972). *India, Pakistan and Ceylon- the Regions*. B.I Publications: New Delhi. pp.407-409

6 Retrieved from <http://www.peacekashmir.org/jammu-kashmir/geography>

Geologically, Kashmir Valley is tectonic in origin (Krishnan, 1968)⁷. Some geologists even believe that about 100 million years have passed when Kashmir Valley was formed. Subsequently, it was called “Satisar”, the lake of goddess Sati, and came into present form.

The Valley of Kashmir presents an interesting morphology and the various regions on the criterion of geographical configuration include:

1.1.1 The Valley Floor

Like all sedimentary basins the Valley floor has a queer combination of depositional and erosional features. The low lying areas which are either waterlogged or subjected to recurrent inundation go on receiving layer after layer of fine silt and coarse gravel. The numerous affluents of the Jhelum which fall down the slopes of the bordering mountains bring tons of detrital material to the Valley floor, building levees and deltaic fans over extensive areas at their confluences. The Valley floor includes the flood plains and Bahil (loamy) tracts and sprawls from Khanabal (Anantnag) in the South-East up to Baramulla in the North-West. The region has rich deposits of alluvium that are deposited by the Jhelum and its tributaries. Consequently, it is known as “The Rice Bowl of Kashmir”. The Valley is densely populated and is the hub of economic activities. The agricultural landscape is dominated by paddy and orchards. The Valley floor has an elaborate road transport system and enormous potential for tourism development. Almost all the urban places of Kashmir valley are situated in the Jhelum Valley Region.

1.1.2 The Karewas (Wudars)

The Karewa formation is a unique physiographic feature of the Valley of Kashmir. Karewas are flat topped or undulating surfaced mounds on the sides of Jhelum flood plain, flanking the surrounding mountain precipices. These are lacustrine deposits and sprawl over an area of about 13 to 26 kilometers (Hussain 1998)⁸ on the left flank of Jhelum. However, on the right hand side of the river, they are not contiguous and have the shape of tableland. The dry and bare surfaces of these table lands have been subjected to intensive sub aerial erosion ever since their emergence. In fact, the

7 Krishnan, M. S. (1968). *Geology of India and Burma*. Higginbotham Pvt. Ltd: Madras.

8 Hussain, M. (1998). *Geography of Jammu and Kashmir*. Rajesh Publications: New Delhi. pp 9-12

prolonged erosion has reduced them to a highly dissected mass with a confusing network of ravines and inter twingled gullies.

The karewa formations cover a wide area on the southern periphery of the Valley all along its longitudinal extent. The Karewas of Pampore, Mattan, Bijbehara, Nagam, Tral, safapore, Kulgam, Badgam and Bandipora are famous. Karewas are also found in Handwara and Sogam in the shape of isolated tracts. The karewa series differ vastly in their surface characteristics and are divisible into two main types- the sloping karewas and the flat topped karewas. The former, however, are the dominant type. Their gently sloping surfaces towards the Valley floor have been cut into deep ravines ranging from 50-150 meters in depth. The level topped Karewas are few and farther apart, found mainly in Pampore, Payech and Anantnag. Karewas have deep underground water table and owing to undulating terrain, they are not adequately irrigated.

The Karewas have great economic and agricultural importance. Commercial and cash crops like almond, walnuts, apples, pears, peaches and saffron flourish luxuriously on the Karewas. The higher reaches are generally under maize cultivation, while the flat topped levelled areas are devoted to saffron, oats, wheat, mustard and rapeseed. Saffron is a perennial cash crop which on the average gives returns for about fifteen years. Inter culture of saffron and orchards are an emerging pattern of crop land use in the Karewas.

1.1.3 The Side Valleys

The Valleys of the major tributaries of Jhelum have been termed as the side Valleys. These Valleys have relatively steep gradients owing to which the insolation rate is low and winters are severe. The soils are immature and deficient in humus content. Paddy cultivation is confined to the flat irrigated fields while undulating terraces and *kandi* tracts are devoted to the cultivation of maize. Side Valleys like Sindh , Naranag, Liddar and Daksum are occupied by *Gujjars* who are largely dependent on pastoral activities.

1.1.4 The Mountain Ranges

The Valley of Kashmir is surrounded by an unbroken ring of mountains which give it the character of an enclosed feature. While the Pir Panjal forms quite a formidable

barrier on the South and Southwest, separating it from Jammu region, the Great Himalayan and the North Kashmir ranges shut it off from the frost bitten plateau deserts of Ladakh and Baltistan.

The Pir Panjal is a lofty mountain chain with many of its peaks rising above the perennial snowline. Some of them rising above 3,500 meters and are capped with extensive glaciers which project their tongues down the slopes. The highest of these peaks, Tatakuti and Barhma Sakal, rise above 4,500 meters. The Pir Panjal descends through a long gentle slope towards the Valley of Kashmir as opposed to its sharp escarpment-like ascent from the plains of Jammu. This gentle and graded nature of the slope on the northern flank makes it ideally suited to the accumulation of snow. Practically all Pir Panjal glaciers rest on the northern slopes.

Two distinct sections are usually recognized in the Pir Panjal range, as is evident from its alignment into two different axes. In its West-East axis the range extends for over 48 kilometers, ultimately originating in Rupri ridge. The head streams of all important left bank affluents of the Jhelum rise in this precipitous ridge. The other section of the range, having a North- North west to south- south East axis, runs for about 64 kilometers upto the Jhelum gorge at Baramulla. Moreover, the passes of Pir Panjal range assume special significance. Of these, the Pir Panjal (3,491m), Budail Pir (4,216m) and the Banihal pass (3,224m) have been the most important. The Banihal marks a low passage in the range and offers a natural line of communication into the Valley.

The Great Himalayan Range, a massive topographic barrier, extends uninterruptedly for over 150 kilometers from West to East and has a maximum width of 40 kilometers. At a point near Zoji-la, the range takes a bend towards southwest and is often described as North Kashmir range. Some of the highest peaks of this stretch include Harmukh (4,876 meters), Shutiyani (4,371 meters), Kutbal (4,344 meters) and Viji (3,622 meters) etc. the Harmukh precipice is a vast snow field that feeds the Madhumati and the Erin river systems which flow into the Wular Lake. To the Northwest of Baramulla the Kazinag ridge of the North Kashmir range describes the Western boundary of Kashmir Valley. A striking feature of the Great Himalayan range is the asymmetrical development of slopes on the two flanks in sharp contrast to the gentle slope towards Ladakh, the descent from the Zoji-la to the Kashmir Valley is very steep.

The drainage of the Great Himalayan range is antecedent with remarkable development of terraces on either flank of the stream channels. These narrow upland valleys offer interesting contrasts in cultural features and human geography.

Recent account on the delimitation of Kashmir Valley is given by Raza and his colleagues who treat the valley as the land which lies within the two mountain ridges from crest to crest and from its watershed. On this basis, the valley includes all the land lying within the water divides formed by Pir Panjal range in the south Kashmir and the Great Himalayan ranges in the north and encircles the great synclinal trough occupied by Jhelum, the main channel of drainage. The flat alluvial basin measures only 150 kilometers from South-East to North-West and 42 kilometers from South-west to North-East. However, the transverse ranges of the surrounding mountain ramparts on the south-east and the north-west are located on an average distance of 220 Kilometers when measured from crest to crest.

In its administrative setup, Kashmir Valley consists of 10 Districts of Anantnag, Badgam, Bandipora, Baramullah, Ganderbal, Kulgam, Kupwara, Pulwama, Shopian and Srinagar which are further sub-divided into lower administrative units called 'Tehsils' (41 in number). Out of the total area of the valley, nearly half is under Karewa soil formations and an area of about 260 sq. kilometers is under various water bodies. Physiographically, Kashmir Valley consists of a sizeable depression with an almost flat basin nestled in the heavily eroded mountains and bounded on the East, South, South-West and North-West by the districts of Udhampur, Rajouri and Poonch of Jammu Division and on the North-West and North by PoK (Pakistan occupied Kashmir). On the North-East, it is surrounded by the Kargil district of Ladakh Division (Raza, et.al. 1978)⁹. Of the physical features of Kashmir, mountains are the predominating features and have affected the history, habits and agriculture of the people.

1.2 Climate of Kashmir Valley

Sir Walter Roper Lawrence writes in his book, "*The Valley of Kashmir*" that in latitude Kashmir corresponds with Peshawar, Baghdad and Damascus in Asia, with Fez in Morocco and South Carolina in America, but it presents none of the

⁹ Raza, M., Mohammad, Ali., & Ahmad, A. (1978). *The Valley Of Kashmir- A geographical Interpretation- The Land*. Vikas Publication: New Delhi.

characteristics of those countries. People have linked the climate of Kashmir to that of Switzerland until the end of May and of Southern France in July and August. But it is impossible to speak of Kashmir as possessing any one climate or group of characteristics. Every thousand feet of elevation brings some new phase of climate and vegetation. In fact, climatic variations are found even at micro-level (Lawrence, 1967)¹⁰. The main factors governing the climate of Kashmir Valley include:

1.2.1 Factors Governing Climate of Kashmir Valley

1.2.1.1 Relief

The surrounding mountains with their snow clad peaks exert an overriding influence on the local weather making processes. They protect the Valley from the blasting cold of the north as well as the scorching heat of the south and contribute significantly to its notable temperate character. This, however, does not nullify the fact of its continental climate, though it certainly distinguishes the Valley climate from the extreme continental quality of the climate of the plains of North India, south of the Pir Panjal.

1.2.1.2 Monsoon Winds

The role of the Himalayas as a major determinant in the climate of Kashmir Valley can hardly be over emphasized. The southern arm of the mountains certainly acts as an effective barrier to the summer monsoon- the chief barrier of moisture in the sub-continent. The summer rainfall of the Valley clearly reflects the shadow effect. The Greater Himalayas, however, exercise little obstructive influence on the influx of the westerly troughs which frequent the Valley from the west and the North- West during winter.

1.2.1.3 Altitude

The location of the Valley at a high altitude in the North-Western nook of the continent and enclosed within high mountain ranges gives it a distinctive character with its own climatic peculiarities. Within the Valley, interesting variations in weather are witnessed, largely owing to the variations in altitude and aspect. This diversity is well observed in the side Valleys of Kashmir and in such parameters of weather as

10 Lawrence, W. R. (1967). *The Valley Of Kashmir*. Kesri Publishers: Srinagar. p.23

radiation, annual and daily ranges of temperature, humidity, snowfall and rainfall. Despite the fact that all visitors to Kashmir, particularly to its upper Valleys, such as Sind Valley, Liddar Valley and the Lolab Valley are well aware of these contrasts, the climatic diversity remains largely notional.

1.2.1.4 Forests

Forests influence winds, rainfall and temperature. The moisture laden winds cause rainfall in the forests on the hills making the temperature to fall in summer. Thus, Pahalgam and Gulmarg, which are at higher altitude and rich in dense forest cover have comparatively milder climate than that of Srinagar or Sopore.

Kashmir weather has a marked seasonality. The Valley has rather a longish, fairly cold and showery weather extending from March through April into half of May. Summers are much less rainy than spring and quite warm. In Srinagar, the mean daily maximum temperature in July may be as high as 31° C with a diurnal range of 12.5°C. The total rainfall received during the South-West monsoon period is only three-fifths of the spring rains. As usual the behavior of the summer rainfall is highly erratic and an unequal distribution within different parts of the Valley is a norm rather than an exception. Both the daily maximum and the minimum temperatures start falling by August and are quite low by October. Although radiation from the earth is rapid in the latter months, September and October have the highest diurnal ranges. Although the Valley normally receives the first snowfall only in December, the surrounding mountains may get it earlier any time by the middle of October.

By the end of December, snow is almost universal and for two months, up to middle of February, the Valley remains under the grip of a “Cold dampness” with snow covering the ground almost completely and a perennial fog hanging over it. Kashmir weather is, however, only a “dreary monotony” during the winter and not exceptionally rigorous as the minimum temperature in January rarely goes below minus 5°C. The snow generally disappears from the Valley by the end of February but not the dampness with rains replacing the snow almost everywhere in the following spring.

1.2.2 Seasons of Kashmir Valley Climate

On the basis of general characteristics of Weather, the year can be divided into the following four Seasons:

1.2.2.1 Winter Season (Mid-November to Mid-March)

In the Valley of Kashmir, the winter season lasts from November to February. The mean maximum and mean minimum temperatures in November read about 14°C and 1.5°C. In December, there is a further decrease in temperature, the mean minimum being about -1.40°C and the mean maximum 8°C. Consequently, most of the lakes including the Dal and Wular freeze and become the playgrounds for the adventurous sportsmen of Srinagar.

January is the coldest month of the year in Kashmir which is locally known as the period of *Chilla-kalan* (a long period of forty chilly days). Occurrence of heavy snow in the Valley in this month is a common feature. The non- occurrence of snow and precipitation leads to various epidemic diseases and scarcity of water in the rivers during the subsequent seasons. The maximum snow occurs in the month of January. On an average, the three months of December, January and February receive about 120 centimeters of snow, out of which about 50 centimeter (42 per cent) is recorded in the month of January alone.

In winters, Kashmir Valley rainfall occurs from the western disturbances, also known as the temperate cyclones. These disturbances as stated at the outset have their origin in Mediterranean Sea. The rainfall generated by these cyclones is fairly widespread. There are, however, variations in the rainfall recorded at the different stations of the Valley.

In general, the Valley has highly monotonous winters with very little sunshine. The relative humidity is generally over 90 per cent during this season. To combat cold, the people use *Pheran* (a loose woolen garment), *kangri* (Earthen fire pot) and *Bukhari* (indigenous room heater). In winters, the consumption of *zalan* (fuel wood) is enormous. The Kashmiris spent a substantial portion of their earnings in the purchase of fuel wood and coal to be used in winter season. During this period the agricultural activities remain suspended, leading to unemployment. Consequently, many of the laborers and small farmers out migrate from the Valley to the relatively warmer parts

of the country like Punjab and Himachal Pradesh to seek employment and to pass their gloomy winters.

1.2.2.2 Spring Season (Mid-March to Mid-May)

At the advent of March, the weather starts improving and the temperatures start moving up steadily. The snow starts melting in March. In March, the day temperature fluctuates between 10°C to 16°C. Wide variations in temperatures are, however, observed from place to place and year to year. The mean minimum temperature remains around 3°C as a result of which the nights are cooler. The weather becomes further inclement at the occurrence of snow and rains.

The day temperature in April and May shoots up abruptly. The night temperature also registers a steady increase. In May, the mean maximum and mean minimum temperatures read about 25°C and 12°C respectively. About 30 to 40 percent of the total annual rainfall is recorded during spring season.

In this season, with the steady increase in temperature, lush green grass develops over the surface and leaves appear on the dormant vegetation. Leaves generally appear on willow and poplar trees as early as the last week of March and on *Chinar* (Maple) in the first week of April. This is the period when the Valley is in full bloom and the almond, apple, peach and pear flowers add more fragrance to the fresh air of the Valley. Agricultural activities which remain suspended during the long winters are again started in April and May. The seeds of vegetables are germinated in the *Radhs* (floating gardens) of the Dal Lake and the *Demb* (marshy) fields. Ploughing of paddy fields and sowing of rice nurseries also commence in the early parts of May.

1.2.2.3 Summer Season (Mid-May to Mid-September)

This season extends from Mid-May to Mid-September in Kashmir Valley. The mean monthly temperature of June at Srinagar reads about 22°C. July is the hottest month in which the absolute temperature on a particular day may shoot up to 37°C. The mean maximum and mean minimum temperatures in this month being about 30°C and 15°C respectively. Under clear skies and rarified atmosphere this temperature is very oppressive. July and August are the months when electric fans are needed and the well-off residents of Srinagar plan their outings for Gulmarg, Pahalgam and other hill stations which record relatively low mean maximum temperatures.

June to September is the period of summer monsoon in the sub-continent of India, but the Valley of Kashmir receives relatively less quantity of rainfall during this season. The Pir Panjal range obstructs the inflow of monsoon winds in the Valley. Consequently, less than one-fourth of the total rainfall is recorded in this season.

The high temperature of June and July helps in the rapid sprouting and development of paddy and vegetable crops. These conditions also help in the ripening of *Glaas* (Cherry), Peach, Pears and early varieties of apples.

1.2.2.4 Autumn Season (Mid-September to Mid- November)

September and October are the months of autumn season in the Valley. These months mark a transition from the warm sub-tropical summers to the temperate winters. Autumn is characterized by least disturbed weather. In this season, the skies generally remain clear, the duration of sunshine is longer and very little precipitation is recorded. It is perhaps the most enjoyable weather in the Kashmir Valley which attracts large number of tourists from within and outside of the country.

In September, the mean maximum and mean minimum temperatures read about 25°C and 11°C. At the occurrence of clouds, the temperature, however, slumps abruptly. In October the diurnal range of temperature is quite pronounced.

The cool nights and warm days of September and October help in the ripening of walnut, almond, apples and the latter parts of October are conducive for the emergence of Saffron flowers. It is the period when the people collect and purchase *Zalan* (fuel wood) for ensuring the winter requirements and harvest the numerous varieties of apples. The farmers of the Valley generally arrange the wedding of their children in autumn after the harvest of paddy, saffron and orchards.

1.2.3 Kashmiri Nomenclature of Seasons

The Kashmiris recognize the following six seasons of two months each in a year as: (1) *Sonth* (Spring)- Mid-March to Mid-May (2) *Grishim* (Summer)- Mid-May to Mid-July (3) *Wahrat* (Rainy)- Mid-July to Mid-September (4) *Harud* (Autumn)- Mid-September to Mid-November (5) *Wandh* (winter)- Mid- November to Mid- January (6) *Sheshur* (Severe Cold)- Mid January to Mid-March

The Kashmiri nomenclature is more expressive of the typical weather conditions that prevail in different parts of the year, although the periodization of the year into seasons is of notional value only. There is, for example, no specific *Wahrat* (Rainy season) in Kashmir and the *Wandh* (winter) certainly subsumes the *sheshur* (Ice cold weather).

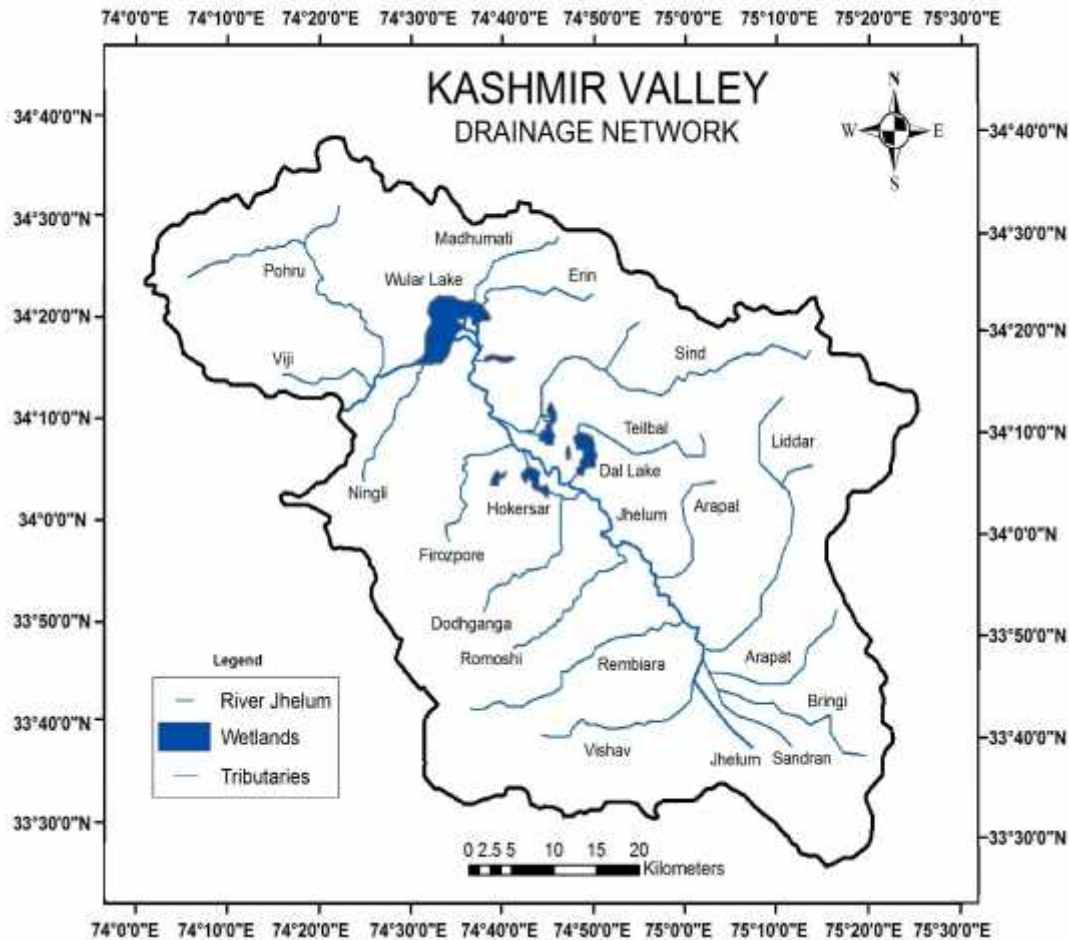
It is difficult to classify the Valley of Kashmir in a specific climatic regime as sharp variations are observed from year to year and the climate swings between temperate Sub-Mediterranean in all its variants from single (unixeric), double (bixeric), triple (trixeric) to quadruple(quadrixeric) dry periods in a year. However, at best it can be classified as an irregular type with no specific affinity with the standard climatic regimes of the world. A mild summer, a not too vigorous winter and an absence of a regular rainy season are the three distinctive features of the climatic regime of the Kashmir Valley.

1.3 Drainage Network of Kashmir Valley

The Jhelum and a host of streams that drain the bordering mountain slopes together constitute the drainage network of Kashmir Valley. Set within the frame of disparate geomorphic and geological locales, the Kashmir fluvial systems have distinctive characteristics of their own. They have evolved in the course of a chequered history marked by stupendous changes in level, rejuvenating at one time and at others becoming sluggish or even choking their channels with their own debris with consequent diversions and the ever threatening process of mutual piracy.

River Jhelum has a paramount importance in the regional structure of Kashmir Valley. It has a binding force that gives coherence to the Kashmir region (Stein, 1978)¹¹.

11 Stein, M. A. (1978). *Kalhan's Rajtarangini- A chronicle of the kings of Kashmir*. Motilal Banarsidas: Patna, Bihar.



Source: Prepared by the Researcher

Figure 1.2

1.3.1 River Jhelum

This river, mentioned in most reliable and ancient volumes of history, is known by different names. In Sanskrit, it is called “Vitasta”, in Greek as “Hydapses”, and Ptolemy called it as “Biduspes” (Koul, 1977)¹². Al Biruni named it as “Jhelum” that continues till today.

The source of river Jhelum is a spring at an altitude of about 3000 meters above mean sea level at Verinag in Dooru tehsil of Anantnag District. After its origin from the spring in the form of a nullah or rivulet, it flows towards North-West. Near Khanabal, a village in Anantnag district, the water of ‘Sandran’ and ‘Bringi’ streams from South-East and that of ‘Arapat’ stream from North-East join with this nullah and thereafter the Jhelum takes the shape of a River. It then flows to the North-West,

12 Koul, A. K. (1977). *Evolution of Kashmir Landscape*. Inquiry: Srinagar, p.5

gradually swelling as it goes on receiving the water from its tributaries on either bank. Ahead of village Khanabal, the river receives the water from 'Liddar' stream flowing from pahalgam glacial zone. Below the town of Bijbehara, at 'Sangam' village the river is joined by the streams of Vishaw and Rambiar. Below Awantipora, the river assumes a zig-zag course exhibiting a good topography of meanders. From Khanabal to Awantipora , River Jhelum flows along the boundary of Bijbehara, Kulgam, Pulwama and Tral tehsils. The River leaves Pulwama tehsil at Pampore and enters Srinagar tehsil where its flow is reduced considerably due to the carving out of a few channels from it to distribute its water. The boat population of Srinagar city resides along the banks of these canals which rejoin the main river in the city itself at Chattabal.



Photo Plate 1: Verinag Spring- Source of River Jhelum

Below Chattabal, the river is joined by the Doodhganga and Shaliganga streams. After leaving Srinagar Tehsil, the river flows through extreme north of Budgam tehsil for a short distance and enters Sonawari Tehsil near village Mirgund. From here it is joined by 'Sindh' river at Shadipora village wherefrom it enters into Wular Lake. From Khanabal to Wular lake (113kms) the river is fully navigable. In the days when surface transport was not plying in Kashmir, the Jhelum used to offer the transport link between the North and South Kashmir (Mayer, 2007)¹³. The settlements have come into existence all along this river where the land is flat. After leaving the Wular, the river takes the south –west direction and is joined by river Pohuru at a place called Doabgah , near Sopore. Below Baramulla the nature of Jhelum entirely changes from

13 Mayer, I. A. (2007). *Medical Geography*. A.P.H Publishing House: New Delhi.p.57

sluggish to roaring torrent, passing over rapids and steep slopes of Baramulla Gorge (Bates, 1980)¹⁴. In Uri Tehsil, the Jhelum changes its direction from South-West to West and then leaves the Kashmir Valley. Thus, every fiber of Kashmir is woven by Vitasta.

All along its course in Kashmir Valley the Jhelum is characterized by two main features- A sluggish flow (merited to be described as a “sleeping lion”) and a highly levelled nature of the Valley floor.

In its course from Khanabal to the Wular, the fall of the river is 18 meters in 113 kilometers or 1: 6,250 meters. The river makes some of the finest meanders over this stretch and lays down a good deal of its suspended load along its banks. The alluvial deposits of the Valley offer the best scope for such undercutting and deposition on the outer and the inner bends, which have grown into big meander loops. The Srinagar lakes, as one would tend to agree, may be regarded as the “enlarged old oxbows and abandoned courses of the Jhelum”. This is certainly not true for Wular, whose connections with the original deluge of Kashmir seem to be quite intimate.

In a very broad manner, the drainage network of Kashmir Valley can be classified into two main categories as the Himalayan Drainage or the Right bank tributaries of River Jhelum and the Pir Panjal or the Left bank tributaries of River Jhelum.

1.3.1.1 The Himalayan Right Bank Tributaries of River Jhelum

The Himalayan Drainage includes all those tributaries which flow from Dooru in Anantnag District to Karnah in the Kupwara District. All these tributaries meet the Jhelum from the right and are therefore also known as right bank tributaries. These include The Sandran, The Bringi, The Arapat, The Liddar, The Arapal, The Harwan, The Sind, The Erin, The Madhumati and The Pohru rivers. The drainage of Great Himalayan Slopes is dendritic, though in certain areas it tends to be linear and even irregular. Perhaps the best example of a dendriform is seen in the Pohru River System which makes a huge Banyan tree like canopy with its trunk attached to the Jhelum near Sopore. Another notable feature of this drainage arm of the valley is its antecedence, typical examples of which are seen in the Sind and the Liddar river

14 Bates, C. E. (1980). *A gazetteer of Kashmir and the adjacent districts of Kishtwar, Badrawar, Jammu, Naoshera, Punch and the valley of the Kishen Ganga*. New Delhi: Light & Life Publishers. p.4

valleys. Around Kolahoi one notices the radial nature of the drainage while the bowl of the Wular Lake stresses the centripetal character of the rivers. The main tributaries of Himalayan Drainage include:

1.3.1.1.1 The Sandran: The Sandran rises in the Pir Panjal, below the Kakut Peak. From its source to a point close to Verinag, the river passes through a deeply carved channel studded with big boulders. Below Verinag its wide sandy bed is aligned parallel to that of the Jhelum, Southeast-Northwest. As it debouches into the plain, the river sheds its load and divides itself into a number of channels which later unite to form a main stream. The Sandran has a perennial flow of water only in its lower reach of about 8 kilometers before its merger with the Bringi. The combined waters of Bringi, Sandran and the Arapat Kol merge with the Jhelum a little above Khanabal, near Anantnag. The Sandran has a small catchment area extensive over only 291 Square Kilometers. From source to its confluence with the Bringi river, it has a total length of 51 kilometers.



Photo Plate 2: River Sandran at Village Nipora

1.3.1.1.2 The Bringi: The headstreams of the Bringi catch the snow melt from over a wide area in the Pir Panjal close to the source of the Sandran. After the Anlan and the Razparyin unite above the village of Wangom, the river after the confluence is called Bringi. Thereafter, the stream takes a West- Northwest course flowing for some 25 kilometers up to south of Anantnag where it unites with the Sandran.

1.3.1.1.2 The Arapat kol: Before merging with the Sandran, the Bringi receives the waters of the mountain torrent known as Arapat Kol. It has a small catchment area

below the Niltup and Astanbal peaks in the Great Himalayan Range and drains the Kuthar Valley.

1.3.1.1.3 The Liddar: In Liddar the Jhelum has the first of its major right bank tributaries. It has a long and picturesque Valley which is surpassed only by that of the Sind. Rising at the base of Kolahoi and Sheeshnag snow fields, its two main upper streams- The West and the East Liddar unite at Pahalgam. The western branch, after having received the Liddarwat, an upland torrent from Tarsar, flows for 30 kilometers before its merger with the East Liddar. The latter collects the snow melt from the Sheeshnag and traverses a course of little over 24 kilometers before reaching Pahalgam.

Before Pahalgam the Liddar passes through a narrow Valley, studded with massive boulders and overlooked by dense forests till it debouches into a wide alluvial fan. At the head of its delta, the main stream divides itself into a number of channels, braiding being a common characteristic of all the rivers in the Valley, which fan out to form a wide alluvial plain and merge with the Jhelum between Khanabal and Gur.

Between Pahalgam and Gur, the Liddar falls from 2,129 meters to 1,591 meters or about 14 meters in 1 kilometer. The gradient between the source and the confluence is, however, far more steep.

1.3.1.1.4. The Arapal: The Liddar and the Sind hold between themselves the entire drainage of the southern and southwestern slopes of the Great Himalayan Range, leaving little scope for any other stream to survive. The two tiny streams- the Arapal and the Harwan- are tightly interposed between the two major affluents of the Jhelum in an outer fringe of the ridges skirted by the Pambagai and the Nao Gul heights. The Arapal, besides getting its water supply from the famous Arapal Nag (Spring), also drains the Wusturwan before its confluence with the Jhelum above Awantipora.

1.3.1.1.5 The Harwan: All the drainage from the slopes of Harwar, Burzakut, Mahadeo and Sarbal escapes into the Dal Lake through the Harwan and a number of other mountain torrents. Some of the feeders of the Harwan originate as high up as the glacial tract west of Tarsar.

1.3.1.1.6 The Sind: The Sind, with a course of about 100 kilometers and a basin area exceeding 1,556 square kilometers, is perhaps the most well developed side

Valley of the Jhelum. Its upper most feeders rise below the lofty peaks near Zoji-la, as a number of other head streams join from the Amarnath, Kolahoi and Panjtarni snow fields. At Sonamarg, the gushing torrent flows through a narrow channel with deeply incised caves in the bordering rocks on either bank. Further down, the river bed deepens more and more to assume the character of a gorge below the steep banks filled with virgin stands of silver fir, junipers and birch. Below Kangan, the Valley widens out, although the incised tongue of the arable reaches as far up as Wangat (1,989m) in the Wangat Valley and Gund (2,437m) in the Sind Valley. The Sind receives the Kanaknaz or Wangat on its right bank a little above Dragti-yung. Flowing on the northern flank of a boldly projected ridge culminating in Harawar (3,449m), the river makes a knee bend above Ganderbal before entering into a wide flood plain. As the river sheds its load, its own channels choke with debris and the main stream bifurcates into a number of channels over an extensive deltaic core. One of the branches escapes into Anchar Lake while the others merge with Jhelum near Shadipur.

Up to Kangan, the Sind falls 3,433 meters in about 69 kilometers or 50 meters in 1 kilometer. From Kangan to Shadipur, the gradient is gentle- 6 meters in 1 kilometer.

1.3.1.1.7 The Erin: Both the Erin and Madhumati belong to a larger group of tiny streams which feed the Wular lake. The Erin rises from the western flank of Harmukh. After pursuing a course of about 24 kilometers through a neatly cascaded valley, it falls into the Wular, south of Bandipora. The stream serves as an important artery of transport for timber. The Erin is characterized by a steep gradient. It falls 88 meters in 1 kilometer.

1.3.1.1.8 The Madhumati: Farther north, the Madhumati or the Bod Kol, drains the northern slopes of the Harmukh precipice with its feeder streams spread over a vast area between Narmarg in the west and Sarbal Nag in the east. From a point a little above Bunakut, the valley starts opening up laterally, forming an alluvial triangle which lends itself to intensive exploitation. The Madhumati empties itself into the Wular lake near Bandipora after traversing a course of 39 kilometers. Like the Erin, the Madhumati also falls steeply, the average fall being 103 meter in 1 kilometer.

1.3.1.1.9 The Pohru: The Pohru with its network of confluent streams, perhaps ideally dendritic in pattern, occupies the northwestern corner of Kashmir Valley.

Consisting of a number of sizable tributaries such as Lolab, Kahmil, Talar and the Mawar, the Pohru has a series of palm- leaf shaped valleys with their interesting mosaic of land uses. Almost all the tributaries have their origin at high elevations in the crest of the North Kashmir Range which divides the waters of Pohru from Kishenganga system.

The Lolab, perhaps the most fascinating and the picturesque of the Himalayan valleys in Kashmir, has its sources in Nagmarg and Bagalsar heights, north of Wular. Below Khumarial it receives the tribute of an upland affluent flowing from Kalarosh and takes a southerly bend to merge with the Pohru, a little below Rainpura. The mainstream of the Lolab has a length of 23 kilometers only.

At almost the same point where the Lolab flows into the Pohru, the Kahmil joins from the west. It drains a wider plain and has a longer course with a general South-West to North-East trend. The headstreams of the Kahmil draw their water from a series of ridges between the Shams Abri in the west and Phishaitong in the north. A little above Handwara, the Pohru receives the waters of its winding tributary Talar on its right bank, while the Mawar joins 17 kilometers downstream. The Mawar drains the northern flank of the Kazinag range and passing through Lingayat merges with the Pohru below Khohanu. From its confluence with the Lolab and the Kahmil, the Pohru flows for 56 kilometers before its merger into the Jhelum, below Achhibal.

The Pohru is a highly tortuous stream all through, though meandering is most marked between the confluence of the Talar and the Mawar. This is largely due to the level nature of the plain with a gentle slope. From Rainpura, near the confluence of the Kahmil and the Lolab to its merger with the Jhelum, the Pohru falls over 23 meters in 54 kilometers, between Handwara and Siul, above a distance of about 30 kilometers, the fall is only 4 meters.

1.3.1.1.10 The Viji: The Viji, a tiny stream flowing from the northern slopes of the ridges culminating in Viji Peak(12,111m), merges with the Jhelum just below Dobagh, close to the confluence of Pohru. The Dakil joins the Jhelum 5 kilometers downstream at Ludur. The Viji and Dakil together drain a basin area of about 140 square kilometers.

1.3.1.2 The Pir Panjal Left Bank Tributaries of River Jhelum

It constitutes all those streams which drain Pir Panjal chain of Mountains from Dooru Tehsil to Uri Tehsil and joins the river Jhelum from the left bank. Its main tributaries include The Vishav, The Rembiara, The Romshi, The Doodhganga, The Sukhnag, The Ferozepore and The Nigal Rivers. The drainage of Pir Panjal offers a sharp contrast to that of the Great Himalayan Slopes. The Northern flank of the Pir Panjal Range is less extensive in width and does not seem to promote the lateral development of stream channels- the short lateral course of the Vishav being the only exception. The streams come down the mountains in parallel and often irregular lines. In the upper reaches they have a dendritic pattern, lower down their courses are aligned parallel to each other. As the streams cut across the Karewa beds, they develop braided channels- braiding and constant shifting of channels being caused by rapid deposition of sand and gravel in the stream beds. This inter Karewa beds have all added to the complexity of the drainage along the southern flank of the valley. The main tributaries of this branch of drainage include:

1.3.1.2.1 The Vishav: The source of Vishav lies in the Southeastern corner of Kashmir Valley, close to that of the Jhelum. The river drains the entire northern face of Pir Panjal between Sundartop and Budil Pir and thus has an extensive catchment area which reduces the upper Jhelum to a tiny rivulet. In fact, the Jhelum draws heavily on Vishav feeders in the initial stage. While passing through the volcanic strata in the Pir Panjal Range, the Vishav forms the famous cataracts of Aharbal. Near Dani Hunzpur, the Vishav receives a lateral stream from the side of Sundertop, the united stream forming a wide sandy bed occupied by a number of braided channels. It merges with the Jhelum about 12 Kilometers below Kulgam. One of the bifurcated channels of the Vishav, however, continues farther north, merging into the Rembiara near Nyaiyun village not far from the latter's confluence with the Jhelum.

The Vishav falls from 3,975 to 1,568 meters or 41 meters in 1 kilometer. The fall in the lower reach between Kulgam and the confluence is, however, very gentle.



Photo Plate 3: River Vishav near Kongwatan, Aharbal

1.3.1.2.2 The Rembiara: The Rembiara rises in the Rupri Ridge of Pir Panjal. Its main feeders originate from Rupri Peak and the Bhag Sar Lake, on the one hand, and the Pir Panjal and the Naba Pir passes, on the other. Above Shopian, the river divides itself into a large number of channels, two of them being well marked and called Rembiara and the Sasara. While the Rembiara merges with the Jhelum near Nyaiyun, the Sasara loses itself into the marshy land west of Awantipora before finally merging with the Jhelum. The Rembiara alone has a course of 60 kilometers and the Sasara branch flows for another 40 kilometers.

From its source to the confluence, the Rembiara registers a fall of 2,466 meters or 41 meters in 1 kilometer which is similar to the gradient of Vishav.

1.3.1.2.3 The Romoshi: The headstreams of Romoshi or Kachgul draw their waters from the snowy peak of Kharmarg (4,603m) near Naba Pir pass in the Pir Panjal. The upper torrents unite near Pakharpur to give rise to a sizable stream which passes through a wide sandy bed in the Karewa slopes. The Romoshi merges with the Jhelum near Wudipur, below Awantipora. In all it traverses a course of 51 kilometers and its bed below Pakharpur has an average gradient of 16 meters in 1 kilometer.

Table 1.1 Characteristics of Drainage of Kashmir Valley River Basins

S. No	Drainage Basin	Area (Sq.Kms)	Drainage Length (Kms)	Number of Streams
1	Sandran	258	82	63
2	Bringi	595	317	176
3	Arapat Kol	362	255	96
4	Liddar	1,243	679	281
5	Arapal	571	355	119
6	Harwan	395	144	102
7	Sind	1,556	766	342
8	Erin	321	210	96
9	Madhumati	476	397	157
10	Pohru	1936	1,130	470
11	Viji	143	96	30
12	Vishav	828	448	163
13	Rembiara	751	373	130
14	Romishi	459	262	70
15	Doodhganga	580	236	87
16	Sukhnag	932	411	203
17	Ningil	538	232	76
	Jhelum	12,262	6,697	2,704

Source: Raza, M., Mohammad, Ali., & Ahmad, A. (1978). *The Valley Of Kashmir- A geographical Interpretation- The Land*. Vikas Publication: New Delhi. p.59.

1.3.1.2.4 The Doodhganga: Rising below the Tatakuti peak in the Pir Panjal Range, the Doodhganga flows North to Northeast to finally merge in the marshy land west of Srinagar. Near Bagh Sahib Ram the Shaliganga joins the Doodhganga before the united stream loses itself into Nambal , a few kilometers below. A good amount of the discharge from the river is never allowed to pass into the Jhelum as it is diverted

towards the west into marshy land. The Doodhganga traverses a course of 50 kilometers and has an average gradient of 63 meters in one kilometer.

1.3.1.2.5 The Sukhnag: The slopes of the Pir Panjal Range between the Nurpur and the Chinamarg passes are drained by a multitude of torrents unifying themselves into the Sukhnag and the Firozpora. Between themselves the two streams take care of the drainage of Toshamaidan and Gulmarg respectively. Descending from the mountains, the Sukhnag passes through a sand choked bed across the Karewas, finally merging into the marshes of Rakh-e-Arat, west of Hokersar. The Firozpora empties itself through myriad channels into the Haigam Jhil and the Sultanpurich Rakh. Both the marshes are connected by a spill channel constructed to drain out the flood water. With a total length of just over 51 kilometers, the Sukhnag has a fall of 56 meters in 1 kilometer.

1.3.1.2.6 The Ningil: The Ningil is the last major stream in Kashmir Valley that joins the Jhelum on the left bank. The upper feeders of the Ningil rise below the Khan Pathri (3809m), and Agharwat (4141m) peaks of the Pir Panjal above Khilanmarg. Flowing for about 38 kilometers in a northeasterly direction, the Ningil pours itself into the Jhelum immediately after the latter's deboucher from the Wular Lake.

1.4 Landforms and Scenic Beauty of Kashmir Valley

In his introduction to the *Rajatarangini*, Kalhana says about the Valley of Kashmir:

“It is a country where the sun shines mildly, being the place created by Kashyapa as if for his glory. High school-houses, the saffron, iced water and grapes, which are rare even in heaven, are common here. Kailasa is the best place in the three worlds, Himalaya the best part of Kailasa, and Kashmir the best place in Himalaya” (Agarwal and Agarwal, 1995)¹⁵.

The scenic valley of Kashmir is well known throughout the world for its Natural beauty. Here, nature has been prodigal enough in crowning this ancient land with all its splendor and glory. Gulmarg, Pahalgam and Mughal gardens attract visitors from all over the world. Its lakes, green meadows, dancing and foaming streams, majestic forests full of Fir and Pine, snow-capped peaks are common attractions to the outsider

15 Agarwal, J. C., & Agarwal, S. P. (1995). *Modern History of Jammu and Kashmir: Ancient times to Shimla Agreement*. Concept Publishing Company: New Delhi.

as well as to the native. Some of the landforms depicting the scenic beauty of Kashmir Valley are discussed as under:

1.4.1 Srinagar- The Lake City

Located in the heart of the oval shaped Valley of Kashmir at an average elevation of 1,730 meters above mean sea level, between 74°56' and 75°79' East Longitude and 33°18' and 34°45' North Latitude, Srinagar as well as its hinterland is bounded by natural wall of mountains (Sub-mountain branches of Pir Panjal Ranges and Zaskar mountains). In the east, it is bounded by Zabarwan Mountains with lush green vegetation, locating famous Dachigam Sanctuary and Mughal Gardens and is environed by the shallow and swampy lakes of Dal and Nagin with the eminence of hillocks of Takth-i-Suliman in the east and Kohi-Maraan (Hariparbat) in the center adding to its beauty and making surroundings of the city invigorating. Because of its locational advantage, it has acquired greater degree of centrality despite the constraints which the surroundings and physiography of the region pose to the physical growth of the city. Being the center of economic, commercial and other activities. It also acts as major tourist destination and terminating center in Kashmir Valley.

The city enjoys a sub-Mediterranean type climate with severe winters and moderate summers associated with relatively higher humidity throughout the year varying from 78 per cent to 91 per cent (minimum 45 per cent). Normally, the temperature ranges between 29°C to 34°C, occasionally touching the highest 39°C in summer and in winter temperature varies from 5°C to 10°C. Rainfall in the city is almost spread over throughout the year varying from 15 to 21 centimeters. During winter season, it is in the form of snow and sleet while as in the rest of the year it is in the form of rains and hail.

River Jhelum which enters Srinagar in the south-east flows through the city in serpentine manner with a number of meanders, leaving it in west after dividing the city into two parts. It is around this river that the city has initially evolved and prospered, as a result Kashmir is often referred as “Water Civilization”. Special features in the form of places of scenic beauty, buildings and monuments attributed to the invigorating surroundings and important events occurring in city’s socio-political life distinguish the city from the rest. Because of the rich historical past and bountiful natural setting, Srinagar is endowed with a number of such heritage areas that lend the city a place of pride. The city of Srinagar has been known as “Venice of the East” and

was eulogized as a charming and beautiful as garden cities with its beautiful gardens, lush green mountains, charming lakes, magnificent parks, rich cultural heritage, grandeur of salubrious climate and perennial rivers.

1.4.1.1 Dal Lake

World famous Dal Lake is one of the most beautiful tourist destinations of the valley of Kashmir. This lake measuring about 13.4 km² is an intricate waterway divided into 3 parts viz Gagri Bal, Lokut Dal and Bod Dal by a series of causeways. Two smaller islands, Sona Lank (Gold island) and Rupa Lank (silver island) –also known as ‘Char Chinar’- are the popular picnic spots within the Dal lake. Tourists most often enjoy ‘Shikara’ rides and stay and experience Kashmiri hospitality onboard numerous House-boats on Dal. Besides, water sports like water skiing, water scooter, canoeing and other sports can also be enjoyed in this lake.



Photo Plate 4: Dal Lake, Srinagar

1.4.1.2 The Mughal Gardens

The beautiful Mughal gardens with terraced lawns, cascading fountains and bright flowerbeds with the panorama of Dal lake in front of them presents a mesmerizing concept of the Mughal Emperors Concept of Paradise. There are numerous large and small gardens/Baghs in the valley of Kashmir. Prominent Mughal Gardens include The Shalimar, The Nishat and Chashm-e-Shahi.

1.4.1.2.1 The Shalimar Garden

Shalimar Bagh is the most beautiful of Mughal Gardens. Built in 1616 by Emperor Jahangir for his beloved wife 'Nur-Jahan'. It is divided into 4 terraces of Gardens, one above the other decorated with beautiful fountains and mighty Chinars on the sides. The topmost of the 4 terraces called the 'Abode of Love' was reserved for the emperor and the ladies of court. There is a huge tank and about 150 fountains dazzling with their beauty and splendor inside the garden.



Photo Plate 5: Shalimar Garden, Srinagar

1.4.1.2.2 The Nishat Bagh: The Garden of Joy

Nishat Bagh, considered to be second only to the royal Shalimar Garden in size and significance, is found on the eastern side of the Dal Lake in the vicinity of Srinagar within the Vale of Kashmir. This "Garden of Delight" is reputed to be the work of Nur Jahan's elder brother, Asaf Khan. The garden is rectangular in shape, 544 meters long by 329 meters wide, and is oriented east-west; its eastern side is higher in elevation, and its western side touches the edge of Dal Lake²⁵. A central water stream, nearly 4 meters wide and 20 centimeters deep, flows down from the top of the garden through a channel decorated with fountains and occasionally divided into fountain pools¹⁶. Chadars, stone ramps engraved with wave patterns to render the flowing water more beautiful, transfer water between the various terraces. In several places, stone benches cross the axial water stream near a chadar, and serve as seating platforms for the visitor's enjoyment.

16 Nishat Gardens. Retrieved from <http://www.smc.org/Nishat Gardens>



Photo Plate 6: Nishat Garden, Srinagar

1.4.1.2.3 Chashm-e-Shahi: The Royal Fountain

Close to Srinagar lies the smallest of all Mughal Gardens. This garden set in beautiful surroundings in 1632 is attributed to Mughal Emperor Shah Jahan. This is a beautiful garden laid in terraces which commands a magnificent view of Dal Lake below and surrounding mountain ranges. The cool water of this spring is highly refreshing and has digestive properties. (Villiers, 1913)¹⁷



Photo Plate 7: Chashm-e- Shahi, Srinagar

1.4.1.3 Tulip Garden

This wonderful Garden of Tulip flowers lie in the foothills of Zabarwan Mountains on the eastern side of Dal lake. This garden spreading over 5 hectares of land grows

¹⁷ Villiers, S. (1913). *The Gardens of The Great Mughals*. Adam and Charles Black: Soho Square, London.

about 1.2 million Tulips of 60 varieties. Its foundation has been laid by Shiraz, a General in Dogra army around 150 years back. This garden earlier known Shiraz Bagh has recently been renamed as Indira Gandhi Tulip Garden.



Photo Plate 8: Tulip Garden, Srinagar

1.4.1.4 Pari Mahal (Abode of Fairies)

Located on the spur of a hill overlooking the beautiful lake city of Srinagar, Pari Mahal is part monument and part garden. Originally a Buddhist monastery, Mughal emperor Shah Jahan's eldest son Dara Shikoh¹⁸ converted it into a school of astrology in the middle of 17th century. This garden comprises of six terraces. In the upper most terrace, there are the ruins of two structures resembling a baradari and a reservoir. In the middle of second terrace, it is a large tank. The façade of the retaining wall is ornamented with a series of twenty one arches built in descending order. The third terrace has the main entrance. This terrace consists of spacious rooms on either side of it. The fourth terrace has the remaining of the tank. The fifth terrace has an arcade retaining wall with pigeon holes. The sixth terrace has a rectangular tank in the middle and octagonal bastions at its ends. Fragments of earthen water are still to be seen in this structure¹⁹

18 Pari Mahal. Retrieved from <http://www.smc.org/pari-mahal>

19 Retrieved from <http://www.asisrinagar.com/kashmir-valley.html>



Photo Plate 09: Pari Mahal. Srinagar

1.4.2 Wular Lake

Wular Lake, the largest fresh water lake in India, lies at a distance of about 34 kms North-West of Srinagar. It is one of the beautiful lakes located at an altitude of 1,530m above msl between 34°20' N latitude and 70 ° 24' E longitudes. It is elliptical in shape with a maximum length of 16 kms and breadth of 7.6 kms. The lake is surrounded by high mountainous ranges on the northeastern and northwestern sides, which drain their run-off through various *nallahs*, prominent being Erin and Madhumati .On the eastern and southern sides are the low lying areas of Sonawari and on the western side in the Sopore-Watlab section, lowlying areas have also been brought under paddy cultivation. On the eastern side of the lake is an island which was raised and shaped by a famous ruler of Kashmir, Zainul-Abidin, who ruled Kashmir from 1420- 1470AD.



Photo Plate 10: Wular Lake at Laharwapora, Bandipora

Wular Lake, plays a significant role in the hydrography of the Kashmir valley by acting as a huge absorption basin for floodwaters. The lake with its associated wetlands is an important habitat for migratory water birds within Central Asian Flyway and supports rich biodiversity. It is a major fishery resource in the valley supporting a large population living along its fringes. The wetland also generates revenue to the state government through fisheries and auctioning of water chestnut, fodder, and other economically important species. The catchment of the lake supports coniferous forests, and Alpine pastures adding to the natural beauty and biodiversity of the wetland area. Recognizing importance of the wetland for its biodiversity and socio economic values, the Wular Lake was designated as a Wetland of International Importance under Ramsar Convention in 1990 (Action Plan for Wular Lake,2007)²⁰.

1.4.3 Pahalgam (The Valley of Shepherds)

Pahalgam ,situated at the confluence of Sheshnag lake and The Liddar river, is one of the most beautiful tourist resorts of Kashmir which remains cool even in the summer heat and the temperature rarely touches 25° Celsius here²¹. This is extremely popular among tourists for its outdoor activities like fishing, Horse riding, Golf and Trekking. It also serves as a basecamp for many expeditions and excursions like Kolahoi Glacier, Sheeshnag, Sonmarg and the Amarnath Yatra. Under the shadow of tall pine trees with the flow of crystal clear water, Pahalgam offers several tourist attractions like Baisaran meadow and Beetab Valley which are the dream of every tourist visiting Kashmir.

20 Comprehensive Management Action Plan for Wular Lake, Kashmir. (2007). Final Report prepared for the Department of Wildlife Protection, Govt. of J&K, *Wetlands International, South Asia*. Retrieved from <http://www.wetlands.org>

21 Retrieved from <http://www.trekibex.net>



Photo Plate 11: Pahalgam, Anantnag

1.4.4 Gulmarg (The Meadow of Flowers)

Gulmarg, the mountain resort of exceptional beauty, is located at a distance of 56 kilometers North-west of Srinagar at an altitude of 2,690 meters above msl. Originally called as ‘Gaurimarg’ by the shepherds, this world famous winter tourist spot was named Gulmarg by Sultan Yusuf Shah in 16th century, who was inspired by the sight of its grassy slopes adorned with wild flowers. Gulmarg was the favorite haunt of Emperor Jahangir who once collected 21 varieties of different flowers from here.



Photo Plate 12: Gulmarg

Flowers blooming in this meadow include Bluebells, Daisies, Forget-me-Nots and Buttercups etc. Picturesque Gulmarg Biosphere Reserve and The Alpather Lake add attraction to this tourist place. The prime tourist attractions to the tourists travelling to Gulmarg include skiing, golf and Gondola lifting. Besides, it serves as a trekking base for Khilanmarg, Nanga parbat and Pir Panjal range.

1.4.5 Sonamarg (The Meadow of Gold)

Sonamarg, one of the popular hill resorts of Kashmir valley, lies at a distance of 84 kms from Srinagar on the Srinagar-Ladakh Road at an elevation of 2,740 metres above msl. Sonamarg is famous for its scenic beauty. In fact, it is popular throughout the world for its alpine flowers, Sycamore, Silver Birch and Pine trees. The famous Sind River



Photo Plate 13: Sonamarg

flowing through the heart of this meadow offers ample opportunities for fishing to the tourists. Besides, Sonamarg is also an important trekking base for Vishansar lake, Kishansar lake, Gadsar, and Gangbal making it an interesting place to visit.

1.4.6 Kheir Bhawani (Mysterious Holy spring)

Kheir Bhawani which is widely known to change its color from time to time lies towards the north of Srinagar at a distance of about 14 kms and can be reached within an hour by bus. The main spring dedicated to Goddess Kheir Bhawani has an irregular septagonal shape with its apex called Pad (feet) to the East. The northern and the southern sides are longer than the western side which is called Siir (Head). The water of the Spring changes various hues like red, pink, orange, green, blue and has often light green, red rosy and milky white shades (Sadhu, 1984)²². Any shade of black color is supposed to be inauspicious for the inhabitants of the valley. This color was prominent in the year 1947 when the Pakistani raiders attacked the peaceful valley.

22 Sadhu, C. L. (1984). *Kashmir- The Crown of India*. Vivekananda Kendra: Kanyakumari.



Photo Plate 14: Kheir Bhawani Temple, Tulamula

To conclude with the scenic beauty of the landforms of Kashmir Valley, it is worthwhile to mention here that Kashmir is a land of fabled beauty and eternal romance. It is blessed by nature with beautiful scenery, wondrous fertility and salubrious climate. It is rightly described as one of the finest countries upon which the sun shines and “the sub-Alpine region of Asia’s Italy”. Unsurpassed land for its scenery, Kashmir is verily “the terrestrial paradise of the World. A fairy land, where each mountain fold presents a grand picture and every horizon a new scene, each leaf a distinct lesson and each flower a new book.

Thus, The poetic description of Kashmir as a garden land of picturesque scenery, lovely landscapes, unrivalled vistas, majestic forests, green pastures, shimmering waters of vast silent and transparent lakes and rivers, perennial snows, mighty Chinars of snow-clad mountains rumbling cataracts and roaring waterfalls stands justified.

1.5 Altitudinal Zones of Kashmir Valley

Vertical zonation of natural features in the mountains is a well-known and frequently described phenomenon. It describes the natural layering of ecosystems that occur at distinct altitudes due to varying environmental conditions. Temperature, humidity, soil composition, and solar radiation are important factors in determining altitudinal zones, which consequently support different vegetation and animal species²³. The notion of altitudinal zonation is used to account for the discontinuities associated with altitude in mountain areas²⁴.

23 Altitudinal zonation. Retrieved from http://en.wikipedia.org/Altitudinal_zonation

24 Retrieved from http://www.hypergeo.eu/Altitudnal_zonation

Representatives of various disciplines tend to build their own classification schemes dealing with the zonation of natural environment. For instance, climatic (Hess, 1974), geo-ecological (Kotarba, 1987), vegetative (Pawłowski, 1927), landscape (Kondracki, 1967, Kalicki 1989) and hydrographic (Witjowski, 1974) zones have been distinguished. In most cases, the boundaries between individual zones coincide with either disappearance or appearance of different types of ground coverage: forests, dwarf pine, alpine vegetation, rocky terrains and permanent snow line (Marcin and Pawe, 2014)²⁵.

The valley of Kashmir, covering an area of 15,853 km², has a unique geographical personality. Nestled in north-western folds of the Himalayas, the Valley is surrounded on almost all sides by mountain ranges characterized by snow covered lofty peaks. The mountain ranges rising to a height of 5,550 meters on the north east side dip down to about 2,770 meters in the south, where the Banihal-pass (Jawahar Tunnel) provides an exit from the valley. The only outlet for rivers is the Baramulla gorge, where the placid Jhelum River leaves the smooth grassy banks and hurries headlong down its rocky course to the plains of the south. The oval shaped valley is filled with thick deposits of alluvium, which has blanketed even the lower slopes of the surrounding ranges (Malik, 2012)²⁶. On the basis of Stratigraphy and altitude, the valley of Kashmir may be divided into following five altitudinal zones:

1.5.1 Zone I (1,250-1,850 meters)

This is a zone of low relief consisting of low lying plains and flat lands. It lies between 1250 to 1850 meters and is characterized by depositional features laid down by numerous streams of river Jhelum. It is divided into two sub-zones:

1.5.1.1 Between 1250-1650 meters

This zone is conterminous with the flood plain of Jhelum where the average slope remains within 5°. Here, average annual temperature ranges from 7.39° Celsius to 19.02° Celsius and average rainfall is 5.87 centimeters. This tract of land consists of

25 Marcin, G., & Pawe, S. (2014). Applying geometrics to determination of landscape altitudinal zones in the mountains. *Landform Analysis*, 11, 25–32.

26 Malik, M., Imran. (2012). Spatio-temporal analysis of urban dynamics in Kashmir valley (1901-2011) using geographical information system. *International Multidisciplinary Research Journal*, 2 (8), 21-26.

17.2 per cent of the total area of the Valley and is predominantly devoted to the cultivation of rice in Kharif season and wheat over drier parts in Rabi season. It is an area of level plain, by and large, but the alluvial levees with pronounced slope are also not uncommon and have been sufficiently terraced for paddy cultivation. The level nature of terrain also rules out erosion, though siltation is a serious menace all along the lower course of the Jhelum in the Valley.

1.5.1.2 Between 1,650-1,850 meters

This zone with gentle slope (5°-10°) is mostly found in higher parts of the valley floor and along the Karewa lands. It is less fertile but known for 'Saffron' cultivation. The important flat topped Karewas occur at Pampore, Bijbehara, Handwara, Awantipora, Martand, Tral, Saffapura, Ganderbal, Bandipora and Sogam. Average annual temperature of this zone ranges from 6.37° Celsius to 18.5° Celsius and average rainfall is 10.5 centimeters. This zone covers about 19.8 per cent of the total area of Valley.

Most of the existing Tourist resorts and Wetlands like Nishat Bagh, Shalimar, Harwan, Wular Lake, Dal Lake, Nageen Lake etc. are located in Zone-I and the topography of the Valley has permitted only this zone to develop good transport facilities both in terms of traffic flow and Road network. This zone has fairly good socio-economic setup wherein almost all the villages are connected by the roads.

Flowing through the heart of the Valley in this zone is the river Jhelum, which has many tributaries and forms the main source of irrigation in this region. The Valley shows considerable topographical, altitudinal and climatic variation, resulting in great habitat diversity. Lakes, rivers and nullahs, springs, floating gardens, marshes and swamps, cultivated fields and orchards, plantation sites, graveyards, roadsides and Karewa lands are the main characteristic features of this zone.(Dar and Khuroo,2013)²⁷.The climate of this zone is predominantly temperate with wet and cold winters and relatively dry and hot summers. It is marked by well-defined seasonality, with four seasons a year: winter (December-February), spring (March-May), summer (June-August) and autumn (September-November) (Husain, 2001)²⁸.

27 Dar, G. H., & Khuroo, A. A. (2013). Floristic Diversity in the Kashmir Himalaya: Progress, Problems and Prospects. *Sains Malaysiana*, 42 (10), 1377-1386.

28 Hussain, M. (2001). *Geography of Jammu and Kashmir*. New Delhi: Rajesh Publications.

So far as the Rainfall pattern is concerned, Kashmir Valley receives precipitation both in the form of rain and snow. It has been noted that the rainfall has a peculiar distribution pattern through the year. It is overwhelmingly concentrated in the winter and spring months in all parts of the Valley. The share of the winter and spring rainfall is, however, more than three- fourths of the annual total in the northwest (e.g., Handwara, Baramulla, Langet and Sopore), while it is only about one-third in the central and the southeastern parts of the Valley (e.g., Srinagar, Pulwama, Anantnag, Kulgam and Ganderbal). The annual rainfall shows a regular increasing trend from Badgam and Srinagar in all directions. It is the lowest at Budgam (579mm) and increases towards the northwest from Srinagar (663mm) through Sopore (756) Langet (873) to Handwara (1,005mm); and towards the Southeast from Pulwama (592) through Kulgam (898) to Dooru (1,195).(Indian Meteorological Dept., New Delhi, 2004).

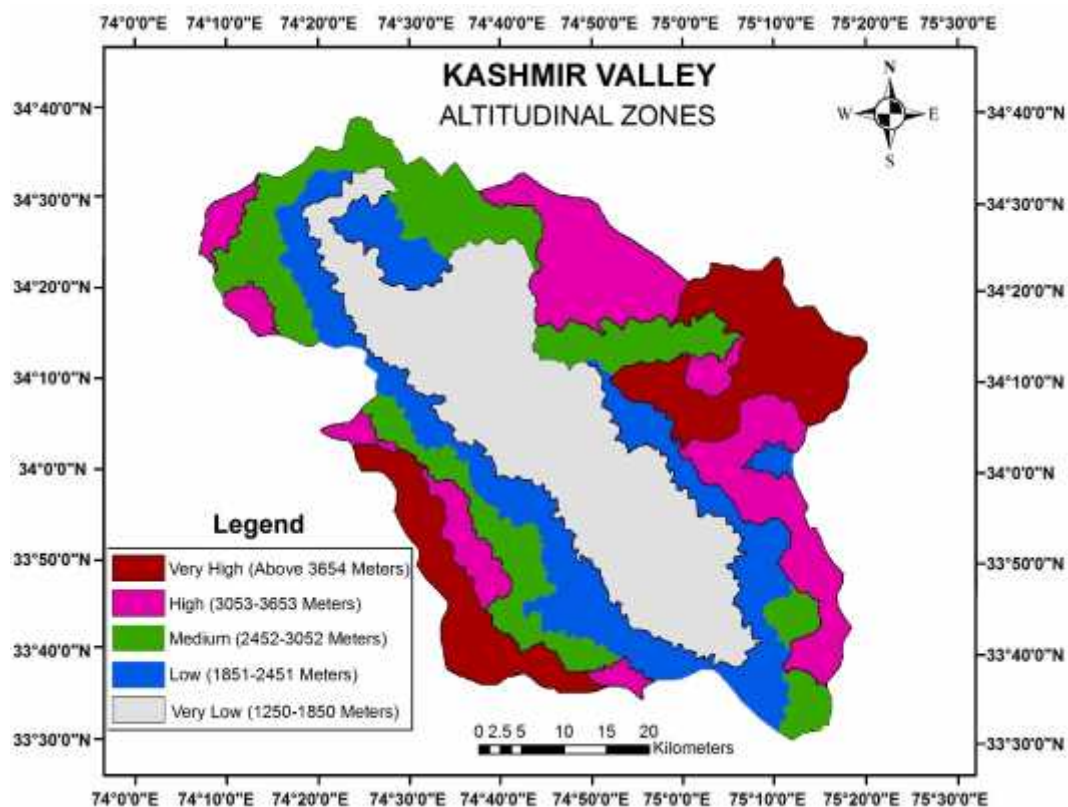
Another interesting feature of the rainfall of Kashmir Valley is its low average intensity per rainy day. An analysis of the Fifty-Year Data (1950-2001) by Nawaz and Taseem has indicated that the average intensity varies from 5.08mm to 26.27mm. Dooru has a consistent record of highest intensity throughout the Valley which remains well above the other recording gauges in as many as nine months in a year. The rains are usually heavy in the southwest monsoon period in the central parts and in winter or Spring in the rest of the Valley. There is a high expectancy of heavy rainfall in august or September which is often caused by a sudden cloudburst and is invariably followed by widespread floods in the Jhelum.(Nawaz and Taseem,2013)²⁹

The river systems of the Valley are fed both by rain and snow. Naturally, the flow is poor during winter months as most of the precipitation comes in the form of snow. The quantum of surface run-off increases with the onset of summer when the snow melts, and with the rain, generates a higher run-off. Normally, not less than three-fourth of the total annual discharge of the Jhelum flows during the summer months, April to August. In winter the discharge falls down substantially-only ten percent of the annual discharge passes down during November-February, and not more than fifteen percent during October-February. The streams rising in the Pir Panjal have a lesser share of the snow melt and their supplies are augmented by summer rains. The

29 Ahmed, N., & Ahmad, T. (2013). Problems of water resource management in Kashmir Valley. *IOSR journal of Humanities and Social Science*, 12 (3), 76-82.

streams of the Greater Himalayan Range, on the other hand, are dependent more on snow than on rain. This produces interesting contrasts between the flow pattern of the Pir Panjal and the Himalayan Rivers. The discharge of Pir Panjal Rivers is not only low; it is highly variable as the quantity of rainfall is the major component.

Besides, this is the zone of diverse floristic wealth because of heterogeneity in habitat—both terrestrial and aquatic ones. The aquatic vegetation abounds in a variety of habitats, including lakes, wetlands, marshes, swamps, rivers, hill streams and springs. The lakes occur from the bed of the valley to the alpine zone and are usually classified as Valley, Forest and Glacial Lakes. All these freshwater habitats, except the alpine lakes, support a wide array of vegetation, including various forms of hydrophytes, rushes, sedges and reeds. A significant component (About 15 per cent) of the Kashmir flora comprises shrubs and trees. According to Ara et al. (1995)³⁰ the overall arboreal flora in this region is represented by 295 species of trees and shrubs (both indigenous and exotics), distributed over 120 genera and 60 families.



Source: Prepared by the Researcher from Topographic Maps and Geo- Eye Imageries.

Figure 1.3

30 Ara, S., Naqshi, A.R., & Baba, M. Y. (1995). Indigenous and exotic trees and shrubs of Kashmir Valley, Indian. *Journal of Forestry*, 8, 233-272.

This zone is the major producer of agriculture which is the mainstay of more than 60 per cent of population of valley of Kashmir. The major field crops in the Valley are rice, wheat, maize, mustard and barley. Some interesting food crops (pseudo-cereals) are occasionally grown in some hilly areas; these include buckwheat, grain amaranths and millets. Because of the assured irrigation facilities, timely rainfall, levelled nature, fertile soils and easy availability of H.Y.V seeds, chemical fertilizers and pesticides this zone exhibits the belt of high productivity (Andrabi and Zamir,2012)³¹

Zaafraan or Saffron (*Crocus sativus*), the pride crop of Kashmir, is grown in this zone. Saffron, a perennial herb belongs to Iris family Iridaceae is the most expensive spice in the world known for its aroma and color and used for flavoring and coloring in medicinal and pharmaceutical industries. It is derived from the dry stigmas of the plant popularly known as the “Golden Condiment”. It contains crocin, picrocrocin and saffranal which are very important constituents for both medicinal and aesthetic purpose. Due to very high crocin content and rich aroma, the Kashmiri saffron is famous worldwide and commands a premium price over the saffron available from Spain or Iran. It is a legendary crop of Jammu and Kashmir produced on well drained karewa soils of Kashmir and Kishtawar where ideal climatic conditions are available for good growth and flower production. It grows at an elevation of 1,500-2,000 m above msl. Photoperiod and temperature exerts a considerable influence on the flowering of saffron. An optimum period of 11 hours illumination and moderate temperature of about 18-20° C during flowering is found optimum. Unusually low temperature coupled with high humidity during flowering season affects flowering. Spring rains boost production of new corms. Slightly acidic to neutral, gravelly, loamy, sandy soils are suitable for saffron cultivation. The plants are bulbous, perennial with globular corms, 15-20 cm high. It has 6 to 10 leaves present at anthesis, one to two flowers with a lilac-purple color with perianth segments of 3.5-5 cm and style branches of 2.5-3.8 cm arise directly from the corms. Flowers have trilobed stigma, which along with the style top forms the commercial saffron. These stigmas along with their styles are dried to form the most precious spice.

31 Andrabi, A., Zamir, R., (2012). Regional Variation in Food Crop Production in Kashmir Valley. *The Geographer*, 59 (1), 102-112

In Kashmir, the saffron cultivation begins first by the preparation of the fields in early July. The earth is tilled with the traditional hoe or tractors and from the loosened earth raised beds of convenient size formed which provide good soil aeration and drainage on which corms are planted. By October end the blossoms are in full bloom. The stigmas are bright orange-red and are clearly visible among the Lilac flowers. The harvesting is done regularly once the blossoms reach maturity to get the stigmas in their prime. The flowers bloom only in the morning making early picking necessary. Traditionally, planting, harvesting, separation of the stigma from the flower, drying of the saffron is done by all the members of the family. Timing of harvest and speedy processing is very important, as there can be rapid loss of quality, particularly in the coloring and aromatic properties of the saffron. Simultaneously, while the crocus blooms are being collected, the stigmas are separated from the flowers. The stigmas are naturally and slowly dried, where the stigma shrinks to one fifth of its original size and enhances its bright red color. Stigmas are either dried under sun or by using blower dryers for fast drying. People prefer sun drying under partial shade to preserve the shiny color of the saffron. Rigid, dry and stigmas without wrinkles are preferred for use. About 1,50,000 fresh flowers yield about one kilogram of stigma. In the world, Iran, Greece, Spain and India are the major saffron producing countries with, Iran occupying the maximum area of 43,408 hectares with a total production of 174 tons, and productivity 4.00 kg/ha, contributing about 88% to world's saffron production. Though, India occupies the 2nd largest area of 3,265/ha but the production is only 7.50 tons with an average productivity of 2.30 kg/ha. Spain, however, with 600 ha of land is the 3rd largest producers with an average productivity of 8.33 kg/ha which is highest in the world³².

The leading saffron growing countries like Iran, Spain and Greece with intensive production technologies are able to achieve higher production and productivity (4-8kg/ha) which is much higher than our productivity and posing great threat to our saffron industry as imports are increasing every year. Thus, there is a need to increase production by bringing more area under cultivation and double the average productivity by adopting intensive production system, efficient processing and marketing to make it globally competitive and remunerative to growers.

32 Saffron present status and future strategies. (2012, November2). Retrieved from <http://www.kashmirlife.net/saffron-present-status-and-future-strategies>

Unfortunately, from the last few years, both area and production in J&K has come down from 5707 ha area in 1996-97 to 2742 ha during 2003-04 and the production from 15.95 MT to just 5.15 MT. After 2003-04 with the coming of Horticulture Technology Mission (MM-I and MM-II), the crop got the technological boost and incentives for area expansion and production with the result area since then increased from 3143 to 3785 ha and production from 6.86 to 9.46MT by 2009-10.

The productivity of saffron is very low mainly because saffron is grown as rainfed, so soils are thirsty and unfertile and overloaded with pathogenic fungi and rodents. Irrigation and nutrient management, corm rot and rodent control shall be the crucial factor to achieve high productivity. The traditional method of long planting cycles of 10-12 years are not good to manage as there is low plant population due to corm rot, no irrigation, hardly any manure and fertilizer application resulting in too many nonproductive corms. To improve production and productivity, the weaknesses in our production system need to be upgraded and replaced with new elite high yielding clones and intensive production and protection technologies including the large scale production of quality flower bearing corms and its post-harvest management so that that the production and productivity is doubled.

1.5.2 ZONE-II (1,851-2,451 meters)

This Zone of undulating slope (10-20)° embraces about 30 per cent of the total area of Valley. Being a transitional zone between the Hills and the Valley Floor, it displays an intermingling of the land use characteristics of both. While a good proportion of area is given to crops, an equally sizeable area lies under forests or is used as grazing land. Areas characterized by less steep slopes are normally preferred for cultivation, which give way to grazing as the angle of slope finally rules it out. “Locally called as “Margs” or “Bahks”, grasslands or meadowlands are a common feature of this zone which over the years have evolved into species rich communities and provided the ecologists and botanists with many opportunities for the ecological research. Beyond this academic interest these ecosystems have also served as potential summer pastures and cattle grazing areas for low lying populace since ages, wherein the people seasonally migrate to the higher Alpine areas to graze their livestock.³³

33 Retrieved from <http://www.Kashmirdispatch.com>

It is evident that carrying capacity of the grasslands in the mid altitudes in the Himalaya is low, the primary reason being their excessive exploitation by unlimited number of herbivores throughout the growing season. It is also evident that these grasslands can recoup remarkably once the biotic factor, i.e. the grazing animal is deferred and the grasslands protected, the rate of recovery depending on the soil and climatic factors. The nutritional quality of the herbage from the higher altitude grasslands is superior to that of the lower altitude, which comprise mainly of tropical and sub-tropical species and are devoid of legume component. Carrying capacities of these grasslands can be increased further by split application of 80 kg/N/ha (Sharma and Ghosh, 2012)³⁴. Excepting the Alpine pastures, there are no true grasslands in India. Intermixed with forest vegetation are found at times fairly extensive stretches of grasslands in different altitudes in the Himalayan ranges. Some of these grasslands have existed since the recorded history of pastoralism in India. Examples of such grasslands are "Margs" in Kashmir and "Bughiyals" in Uttar Pradesh. With the increase in population pressure, more and more forests are being felled and these areas are being converted into grasslands.

Higher up the forest seems to be the only conceivable land use. This zone includes the side valleys of River Sind upto Wangat and Sonamarg, River Madhumati, Erin.Pohru and other affluent tributaries of Lolab Valley. Tourist spots like Kokernag and Tangmarg and few religious places like Charar-e-Sharif are located in this zone (Naik,2008)³⁵.

1.5.3 ZONE-III (2,452-3,052 meters)

This zone of moderate to steep slope (20-30)° extends over 16.4 per cent of the total area of Valley. With increasing altitude, the forest becomes sparse, leaving summer grazing as the only option. These grazing lands attract nomadic tribesmen with their herds of sheep and goats from far and near. More than half of the geographical area of the state is alpine grasslands and under permanent snow. The alpine grasslands of Jammu and Kashmir account for 77% of the total alpine grassland area of 1,71,464

34 Sharma, J. R., Ghosh, A. N. (2012). Grassland Productivity in the Himalaya and Performance of Introduced Temperate Forage Species in Cold and Semi-Arid Environment, Temperate and Tropical Grasslands, Session 21. Retrieved from lib.icimod.org/record/2217/files/5-parks.pdf

35 Naik, A. B. (2008). *Tourism Potential in Ecological Zones and Future Prospects of Tourism in Kashmir Valley*. An unpublished Ph.D. thesis: Dept. of Geography, A.M.U-Aligarh.

km² of the Indian Himalayas (Lal et al. 1991)³⁶. These grasslands, which are regarded as the outcome of forest regression, are characterized by a large number of herbaceous communities with varying proportions of tussock-forming grasses and sedges (Rawat and Rodgers, 1988)³⁷. Besides being essential and integral to the bovine economy of the state, the grasslands play a vital role as a storehouse of various important medicinal plants (Dhar and Kachroo, 1983)³⁸. The climate of these grasslands is temperate with four usual seasons a year. The grassland remains snow-free from late April to late October, which determines movement of nomads. The mean monthly air temperature during this growing season ranges from 11°C in September to 29°C in July. Frequent winds, cloudiness, drizzling mist and fog are common in the first part of the growing season, while clear sky with longer duration of sunshine is prominent in the latter part. Besides sheep, goat and cattle, some wild animals such as Himalayan black bear, Brown bear and Common leopard are seen in these grasslands. The grassland comprises following broad zones; flat undulating valley, lower slope and upper slope.

1.5.3.1 Flat valley

This zone is a flat and long area of the grassland, which is comparatively exposed to no arboreal element. In this zone *Sibbaldia cuneata*, a tussock-forming grass, with woody stems grows well as a dominant species. The other species include *Cirsium wallichii*, *C. falconeri*, *Malva neglecta* and *Sambucus wightiana* besides *Rumex nepalensis*.

1.5.3.2 Lower slope and Upper slope

The zone of lower slope adjoins a forest and is comparatively rich in shrubs. Because of the medium slope, grazing animals use the zone evenly. The upper slope zone represents the highest elevated area of the grassland. Steep slopes, rock boulders, stone crevices and passes that lead to the other higher areas are the major features of this zone. To explain the differences in the floristic composition among these zones of

36 Lal, J. B., Gulati, A. K., & Bist, M. S. (1991). Satellite Mapping of Alpine Pastures in the Himalayas, *Int. J. Rem. Sens.*, 12, 435-443.

37 Rawat, T. (2010). *Mountain Tourism: Research and Development*. Sarup Book Publishers Pvt. Ltd: New Delhi.

38 Dhar, U., & Kachroo, G. (1983). *Alpine Flora of Kashmir Himalayas*. Scientific Publishers: Jodhpur. pp.1-28

the grassland, it is necessary to consider both environmental conditions (e.g. microclimate, topography, number of habitats and grazing intensity and frequency) and characteristics of plant species in the individual zones.

Among these zones, snow melting starts earliest and occurs fastest in the flat valley, while it usually starts at the end of May and takes 2–3 weeks to complete in the lower and upper slopes. The flat valley is, thus, available for grazing at the earliest time and some shepherds camp in and around this zone with their animals before ascending to the higher alpine grasslands. The alpine grasslands of Kashmir Himalayas have been subjected to various threats (Bhat, 1987)³⁹. In recent years, overgrazing has occurred in these mountain grasslands due to a decrease in grazing area and an increase in livestock population. While the decrease in grazing area is attributed primarily to the widespread land conversions at lower elevations, political instability has restricted the availability of high-elevation grasslands to herders through the use of the grasslands as military barricades. The increase in livestock population reflects what we commonly observe as a ‘cattle boom’ in particular areas. The end result of such changes has been an alteration in the structure and life forms of the alpine grassland ecosystem. Since Species richness and diversity decrease with increasing degree of disturbance, thus, the degree of human interference is most severe on the flat valley zone, while the upper slopes experience a light to moderate grazing due to steep slopes and high elevations. Although the species richness is highest in the upper slope Zone

World famous places like Gulmarg (2,690 metres) and Khilanmarg (3,100 meters) are the main spots of tourist attraction in this zone. The Gulmarg is believed to have been called '*Gurimarg*' in ancient times and the modification of the original name is said to have been made at the instance of 15th Century Kashmiri king Sultan Yusuf Shah Chak, who was enamored with the place. If it were historical endorsements that Gulmarg sought, then the visits of the Mughal emperor Jahangir established the measure of its worth⁴⁰. The resort was a great attraction for several British officials posted in India and their families made Gulmarg their home for the summer months. The presence of these holiday makers was also responsible for the foundations of the

39 Bhat, G. A. (1987). Analysis of animal Community in Dachigam Pasturelands. *M.Phil. Thesis, University of Kashmir, Srinagar.*

40 Kuchay, N.A., & Bhat, M. S. (2013). Tourist Flow and Tourism Potential Regions of Gulmarg in Kashmir Himalayas. *Global Journal of Human Social Science Research, 13* (4).

two activities that Gulmarg today is best known for golf and skiing, initiation of both dating back to the early twentieth century.

Gulmarg is located 46 km from Srinagar city, geographical coordinate's 34.05°N 74.38°E. It has an average elevation of 2,690 m above mean sea level. The average temperature varies from its minimum of -4°C in January to maximum of 31°C in the month of July Gulmarg has a long history of tourist activities as it has remained a favourite destination of early Muslim rulers like Yusuf Shah Chak and the Britshers ruling India. Gulmarg is an all-weather resort with refreshing summer meadows and pastoral scenes and deep powder, long-run skiing and snowboarding during winters. Therefore, tourist flow to this all season tourist destination continues throughout the year.

1.5.3.2.1 Tourism Potential Regions

Gulmarg is a multiple attraction tourist place and offers a varied range of tourist related attraction, therefore to analyze the different areas of tourist interest it has been divided into following tourist regions.

1.5.3.2.1.1 Gulmarg Gondola Region

Gulmarg Gondola is the world's second highest and Asia's highest and longest operating cable car since the closure of the Mérida cable car of Venezuela in 2008. The gondola operates in two stages – first stage is from Gulmarg base to the bowl of Kangdoori and the second stage is from Kangdoori to Ararat peak. The two-stage ropeway ferries about 600 people per hour to and from the gondola main station in Gulmarg to Arara summit

1.5.3.2.1.2 Gondola Lift to Gulmarg to Kangdoori

Gondola car is one of the main attractions of the place. The first of two sections of the cable car rises from the cable station at Gulmarg at an altitude of 2,700m to bowl shaped Kangdoori at an altitude of 3,100 m –a vertical rise of 400m.

1.5.3.2.1.3 Gondola Lift to Kangdoori to Afarwat

The second stage of the Gulmarg-Afarwat cable car project connects Kangdoori station at 3,100 m with the heights of Afarwat peak at 3,979 m – Afarwat is the mountain that looms over Gulmarg and is the magnet for serious skiers.

1.5.3.2.1.4 Golf Course Region

Gulmarg Golf Course is the world's highest golf course. The 18-hole, par 72 Gulmarg golf course is quite hilly. The Golf club itself was built in 1904 by British residents. It also offers table Tennis and Billiards. Temporary membership can be bought for the duration of stay. Course remains open from April to November, after which it is covered in a blanket of snow. This Government Golf Course was the second to be built by the British in India after the Royal Calcutta Golf Club. By the 1920s the resort had two 18-hole courses, the 'Upper Course' and the 'Lower Course' and one 9-hole middle course (the "Rabbits Course"). The only course to survive, however, exists where the Upper Course used to be. It was redesigned in 1970s by Peter Thomson. At an altitude of 3,730 m, Gulmarg Golf Course is among the highest and most beautiful green golf courses in the world.

1.5.3.2.2 Gulmarg Skiing and Snow-Boarding Region

While Gulmarg is an all-weather resort with refreshing summer meadows and pastoral scenes, the main reason to come here, at least in winter, is the long-run skiing and snowboarding. The Himalayan resort of Gulmarg is one of the newest and increasingly popular ski destinations. Due to its geographic location Gulmarg gets some of the heaviest snowfalls in the Himalayas and it has earned the distinction of being the best ski resort in the Himalayas. Skiing was first introduced to Gulmarg by two British Army officers who established the first ski club in 1927 although it wasn't until 7-8 years ago when Gulmarg's name really first started to appear on the cognoscenti's hot list. Some of the best slopes in the country for beginners and intermediate skiers are available at Gulmarg. Skiing equipment is available on hire from the Ski-Shop. In winter Gulmarg's natural slopes and inclines turn into the country's premier skiing resort. Not all tourists who visit in winter come for skiing – some simply are there to watch the skiing or to enjoy a holiday in the snow. Among the multitudes of slopes, there are a few which are serviced by ski lifts. Most of the skiing becomes centered on these slopes, which are specially suited to beginners and intermediate level skiers, with ski runs ranging from 200 m to 3kms, instructors are available for both levels. With the operation of the Gulmarg Gondola Cable Car, it has become all the more convenient for advanced skiing enthusiasts, as they can gain a ski

run of nearly 3 km with the help of this cable car which goes through Kangdoori to Afarwat.

1.5.3.2.3 Other Attractions

This includes Khilanmarg, Alpathar Lake and some religious shrines which are elaborated as under:

1.5.3.2.3.1 Khilanmarg

A path of some six kilometers and an ascent of about six hundred meters from Gulmarg take to the little highland dale of Khilanmarg. The narrow bridle path is lined by grassy knolls and a variety of trees and shrubs that include masses of daises, mulberry, berberis and walnut among others.

1.5.3.2.3.2 Alpathar Lake

At a distance of about 13 kilometers from Gulmarg, at an altitude of around 3,840 m is the little lake of Alpathar. Like many other high-altitude lakes in the mountainous parts of the western Himalayas, this lies in a shallow mountain bowl and is surrounded by limited plant growth.

1.5.3.2.3.3 Religious Shrines

There are four main religious shrines in and around Gulmarg. A few kilometers from this glade, is the tomb and '*Ziarat*' (shrine) of the noted Muslim saint *Baba Rishi* built in 1480AD. Other important religious sites include Rani temple, dedicated to *Lord Shiva*, and the old St. Mary's Church built by the British holiday-makers. Also in Gulmarg's vicinity is the Avanti swami temple that dates back to the ninth century and is dedicated to *Lord Vishnu*. Thus Nestled with stunning peaks in the Himalayan ranges, Gulmarg is a spectacular picnic spot attracting all kinds of tourists with its lush green backdrop, beautiful landscapes, flowering gardens, serene lakes and pleasant climate during the summers and falls. This imposing hill station was a pleasure resort for kings and royal family members and a summer retreat for the British officers during the British rule in India. Gulmarg Gondola, one of the highest cable cars in the world, reaching 3,979 meters. Gulmarg is the heartland of winter sports in India. Due to its steep terrain, the region is popular amongst advanced and extreme skiers from around the world and has been visited by a number of ski

professionals. Gulmarg golf club is the highest green golf course in the world. There are a few places of religious importance near the resort. The summer is equally busy. With temperatures ranging from 25 to 30 °C, Gulmarg attracts outdoor sports fanatics with its world class golfing, trekking, mountain biking, horse riding, water skiing, and fishing. It has been observed that the tourist flow is highly imbalances vis-a-vis the various tourist regions and different seasons of the year. During the summer months certain regions remain over crowded, beyond their carrying capacities which is a great threat to the fragile ecological setup of the region. Therefore, there is an urgent need to regulate the tourist flow across the different tourist regions and different seasons of the year through proper marketing, infrastructure development and better accessibility. This in turn will help in minimizing the adverse environmental impacts, maximizing the economic gains and over all sustainable development of the region.

1.5.4 ZONE-IV (3,053-3,653 meters)

This altitudinal zone lies higher-up in the hills where the angle of slope ranges between 30°-40°. It can't be put into any productive use. The slopes facing the river beds are, however, occasionally used for grazing purposes. The land is devoid of any vegetation cover except a variety of poor grasses which don't invite much grazing activity. However, the migration from one particular altitude to another is necessitated by various factors like availability of additional area and the inherent quest of the human mind to explore and know new areas. Thus, the migratory flocks of *Gujjars* and *Bakerwals* accompanied by both male and female members of the family disperse towards these alpine and sub-alpine pastures in summers. However, the females don't go beyond the subalpine areas where most of the Gujjars have constructed their summer huts of mud. The women stay here till the return of flocks from alpine areas. Buffaloes and cows are not taken for grazing in alpine areas because of the steeper slopes and they remain here during summer. There are no dwellings in the alpine areas and the grazers have to brave the rains and cold climate in open, sitting under a rare tree or a rock cliff. Every flock of sheep has 2-3 goats who act as guide for grazing. The sheep always follows the goat for foraging. Besides the goats, every flock has 2-3 ferocious dogs that guard the sheep during night. The night dwellings for the sheep and goat are well marked and can be easily identified being a flat, circular patch of bald land. In most of the pastures the grazers earmark certain grazing areas and do not use these for grazing. These preserved areas are opened for grazing

before downward migration. The *Gujjars* believe that grazing in these areas fattens the sheep and goat and it helps in withstanding the arduous journey to the lower hills. Some of the important grasslands of this zone are as:

1.5.4.1 Matri (Mantri Gali)

Located too close to district headquarters of Bandipora, this is the only grassland site which falls outside Gurez valley and is grazed for relatively longer periods than others. It extends between 34°30'N - 34°31'N and 74°46'-74°47'E, with altitude ranging from 3,100- 3,500 m above sea level. Soils are mostly hill type with brown to black at surface and brown in sub-soil. Enroute to higher alpine areas; it acts as a main grazing base, with relatively little variation in slope and habitat types compared to others. The nomads and pastorals from both nearby and far off places use this area as a first summer grazing ground and a resting place for their livestock. Users are mostly Kashmiri Chopans and Gujjars whose livestock consists mostly of sheep, goat, few cattle and horses but no buffaloes. The adjacent forest has *Pinus wallichiana* and *P. roxburghiana* on drier slopes while *Cedrus deodara* occurs occasionally deep down the area. While patches of *Juniperus wallichiana* are found scattered towards its lower elevations, a few trees of *Pinus* are also found scattered towards higher slopes which possibly appear as remnants of an old forest patch. Himalayan Black Bear and Common Leopard were commonly sighted here.

1.5.4.2 Viji (Viji Gali)

Extending between latitudes (34°33 - 34°34 N and 74°43 - 74°45 E) and altitudes (3,668 to 4,170 m above m.s.l.), this grassland exhibits a typical alpine topography with a distinct landscape. Relatively high soil wetness, total absence of tree species in and around its immediate periphery and occurrence of big sized rocks and stony boulders over its vast tracts are few of its important topographical features. Soils are coarse, well drained but acidic all over. It remains snow bound for almost seven months a year from late October to early May. During summer, days are warmer and temperatures range from 12°C (early June) to 27°C (July) during the growing season. But nights are cool with high speed cool winds blowing across the grassland. Grazers comprise mostly of *Chopans* and *Bakerwals* while *Gujjars* are very less. The area is grazed mostly by sheep, goat, few cattle and horses, while brown Bear, Himalayan black bear, common leopard and long tailed marmot are notable wildlife of the area.

1.5.4.3 Minimarg

Located at a distance of 16 kms from the headquarters (Dawar) of Gurez Valley, on its eastern side, this grassland extends between 34°31' - 34°33' N and 74° 51' -74°53' at an altitude of 3,100 meters above m.s.l and is accessible only by foot on a steep path. The diverse topographic features offer many habitats and microhabitat types for a variety of herb species to grow in main grassland area while woody *Pinus*, *Oak*, *Betula* and *Cedrus* grow in nearby adjacent forest. A few *Betula* trees are also scattered in main grassland, which is traversed by a stream running across it. With the melting of snow, vegetation starts growing from late April and comes to its full bloom during July to September and starts dying out by the end of October. At its lower altitudes, grazing starts in early June and reaches a maximum in July-August when its higher altitudes are also grazed and stops by early October. The area is also important as all three ethnic communities (nomadic Bakerwals, semi nomadic Gujjars and semi-sedentary Kashmiri Chopans) utilize it, with Gujjars almost equal in number as *Bakerwals* while *Chopans* are least. Besides domestic livestock, some wild animals like Himalayan black bear, barking deer and Marmot (*Marmota himalayana*) are also common in this area.

1.5.4.4 Patalwan

Extending between 34°31' N- 34°35' N latitude and 74°49' E-74°51' E longitudes and altitudes at 3,190 meters above m.s.l., this grassland also occurs on the eastern side of Dawar in Gurez valley. Users are a mix of all three ethnic tribes with Bakerwals dominating, followed by Chopans with Gujjars the least. The grassland is characterized by boulders of varying size and has a big stream originating from higher mountain reaches and flowing across on its eastern side. The slope shows marked fluctuations with rocky outcrops and cliffs being present at many locations across the grassland. The area is traversed by numerous human tracks and trails which people use to visit Gurez. A patch of *Betula utilis*, most of them growing in a tilted fashion exist on the relatively steep slope on its north western side while a small patch of forest also grows on the main grassland, within which small herbaceous patches occur in an interspersed fashion. The lower reaches of the area (not included in the grassland) are heavily forested. Forest also grows on the main grassland, within which small herbaceous patches occur in an interspersed fashion. The lower reaches of the

area (not included in the grassland) are heavily forested. The wild life and the pattern of grazing are similar to Minimarg.

In the recent years migratory grazing is declining at a faster rate in the case of the Gujjars because of their sedentary agricultural practices but the Bakarwals still practice it and the sub-alpine and alpine pastures are still a matter of concern. The high stocking rates and poor management have rendered these pastures as low producers of herbage biomass. A considerable amount of research and development inputs are required to manage these pastures so that their real potential is exploited.

1.5.5 ZONE-V (Above 3,654 meters)

This constitutes the topmost altitudinal zone of the Kashmir Valley which is suitable for Adventure Tourism like Trekking, Skiing, Rock climbing and Shooting etc. It is the steepest (slope above 40°) and the coldest zone where winters are very severe and temperatures even dip to -20°C (Ara, 1994). At these higher elevations, vegetation is rather sparse and dotted mostly with moraines, boulders and slopes of varying steepness with few important shrubs like *Cassiope fastigiata* and *Rhododendron* growing as extensive patches. The reported wildlife includes endangered snow leopard (*Panthera uncia*), Hangul deer (*Cervus elaphus hangul*), barking deer (*Muntiacus muntjak*), musk deer (*Moschus moschiferus*), Himalayan black bear (*Selenarctos thibetanus*), Himalayan brown bear (*Ursus arctos*), common leopard (*Panthera pardus*), markhor (*Capra falconeri*), ibex (*Capra ibex*) and long tailed marmot (*Marmota caudata*) besides few reptiles like *Mabuya carinata*, *Agama himalayana* and *Gloydius himalayanus*. A number of glacial lakes which remain frozen for most part of the year are also found in this zone. Thus, with the increase in the gradient and altitude, land remains covered with perennial snow and it is these snow fields which feed all the rivers and are the ultimate source of all the life in Kashmir Valley. Because of prolonged persistence of snow which inhibits its formation and development, soil appears thin, highly unstable, poor and less productive here. This zone comprises the hillocks and mountains surrounding the main valley and the side valleys. Some of the important mountain ranges include following:⁴¹

41 Peace Kashmir. Retrieved from <http://www.peacekashmir.org/jammu-kashmir/geography.html>

1.5.5.1 Pirpanjal Range

It separates Kashmir valley from the outer Himalayas and is about 2,621 Kms in length and 50 Kms in breadth. Famous Banihal pass (2832 meters) lies in the shape of a tunnel on its peak; it remains covered with snow during winter making it impassable. At a height of 2,200 meters above sea level 'Jawahar Tunnel' has been constructed. The tunnel is 2,825 metres long and it was opened for traffic on 22nd Dec. 1956. On the other end of this range lie Baramulla pass (1,582 metres) and Hajipir pass (2,750 metres). Hajipir joins Poonch and Uri.

1.5.5.2 Harmukh Mountain

This is a range of the Himalayas and is situated at a height of 5,141 meters above sea level towards Bandipore between the rivers Jhelum and Kishan-Ganga valley.

1.5.5.3 Amarnath Mountain

This is famous for its holy Amarnath Cave, at a height of 5,372 meters above sea level, which thousands of pilgrims visit every year on *Rakshabandan* (Festival). They have to pass Mahagunas pass on their way to Shri Amarnathji. Gwasharan (5,450 metres) is situated in the Liddar valley towards Pahalgam; on it lies the famous glacier Kolahi. Sheeshnag mountain also spreads in this valley. It is called Sheshnag as its peaks resemble the heads of seven big snakes.

1.5.5.4 Toshmaidan

Toshmaidan (4,270 meters) and Kajinag (3,700 meters) mountains lie in the Inner Himalayas. They remain clad with snow throughout the year, but during summer when the snow melts, the water flows down into the Jhelum River.

To conclude with the above discussion, it can be rightly noted down here that while making a vertical ascent from the floor of the Kashmir Valley towards the mountains, the clear cut changes in the geographical phenomena become distinctively visible; e.g., in case of the settlement patterns and density which are of linear type along River Jhelum and denser in and around the valley floor comprising the first altitudinal zone of our study and keep on becoming sparse and dispersed towards upper zones by decreasing in their number and increasing their inter-spatial distance because of the relatively steeper slopes. Secondly, the Valley Floor is much fertile bearing huge

potential to produce agricultural crops mainly Rice, wheat and mustard which decreases and paves way to maize and barley etc. towards the upper zones because of the decreasing water availability and thin layer of the soil. Thirdly, the valley floor zones are rich in the diversity of forest cover but under huge pressure due to deforestation activities and other human encroachments these are getting depleted. Thus, forest cover increases because of lesser degree of disturbances and then decreases towards the steeper mountain slopes in the upper zones. On the other hand grassland cover which is almost negligible in the Valley floor zone, because of dense settlements and vast agricultural land, increases quite drastically towards the upper zones and shows a rapid decrease in the uppermost zone because of the barren topography. Lastly, the lower zones are the areas of high density of transportation and communication networks and other infrastructural facilities which become lesser in proportion towards the upper zones because of the undulating topography and rugged terrain especially the steeper slopes.

1.6 Natural Vegetation of Kashmir Valley

The character of natural vegetation in a region is the outcome of various environmental factors viz- lithology, slope, altitude, climate, soil and Rainfall. Kashmir Valley presents a highly varied picture in this respect. It has its own distinctive type of vegetation cover which is different to that of middle mountains and forms one of its greatest charm. The delightful pine trees, the magnificent walnuts; the endless willows, the poplars and the elms, the countless orchards of apples, pears and apricots give the valley the appearance of a well-wooded park (Lawrence, 1967)⁴²

Besides being highly variegated, the natural vegetation of Kashmir Valley is luxuriant and well developed or stunted in tracts where edaphic and climatic factors thwart its growth. The primordial vegetation has, however, been substantially modified by climatic change and millennia of human interferences, as evident from intensive exploitation, clearance of forest cover for agriculture and indiscriminate felling and overgrazing.

There is some paleontological evidence to show that the vegetal cover of Kashmir Valley underwent a stupendous change from tropical and sub-tropical to temperate

42 Lawrence, W. R. (1967). *The Valley of Kashmir*. Kesri Publishers : Srinagar.

types during the glacial phase of the Pleistocene. While recurrent glaciation destroyed the original vegetation completely, the uplift of the Pir Panjal also played a key role in this climatic and floral transformation by preventing the South West monsoon from penetrating the Valley. This expedited the disappearance of the broad leaved species which were once predominant in the low lying areas in the Valley and their replacement by coniferous types, such as Deodar, became a smooth affair.

In fact, a classification of the natural vegetation is quite possible according to their habitat and based on compositional variations which are caused by locational factors. While the ecological and locational factors generate variations in the character and composition of plant communities at any level, far more interesting is the zoning of vegetation in the vertical plane which is explained by locational factors like terrain, slope and soils, altitude and aspect. Although altitude and aspect play an important role in determining the availability of heat, moisture and humidity, structure and soils exercise a far greater influence than altitude or climate.

The following belts may be identified as a generalized expression of the altitudinal zoning of vegetation as (1) A low altitude temperate forest occurs in the Kashmir basin between 1,525 meters and 2,286 meters consisting of mixed vegetation of broad leaved varieties such as poplars, walnuts, elms and conifers, mainly blue pine and deodar. (2) Above 2,135 meters, the broad leaved varieties are outnumbered by conifers. This is the zone of the coniferous forests par excellence. The elm is, however, known to occur up to an elevation of 2,745 meters. The chief coniferous varieties which occur between 2,100 and 3,200 meters include blue Pine, fir and low level silver fir. (3) The next zone consists of the alpine forests usually above 3,200 meters. Initially, at altitudes of 3,200 to 3,660 meters, occurs the white Birch, the most common species. Above it, between 3,660-4,110 meters, the most common tree is the stunted Juniper. (4) The alpine forest is often associated with alpine meadows in which temperate species such as Poa, Glyceria and Fescuta are predominant.

The vegetation of Kashmir Valley may be broadly classified into two categories as:

1.6.1 Forests

Forest Ecosystems have a much greater significance for man than is revealed by mere statistics. In the first place, they play a crucial role in the maintenance, preservation

and reservation of the gamut of land resources. They enrich the soil by providing much needed organic matter and enhance its water holding capacity. Equally important is their role in checking soil erosion and excessive run off from hill slopes and other areas susceptible to erosion. In fact, they are a vitally important component in man's environment and are inextricably linked with all other ecosystems.

Forests spread over 51 per cent area of Kashmir Valley (Dar and Khuroo, 2013)⁴³ mostly where the annual rainfall is about 100 centimeters. However, scrub forests are found in the areas receiving even less than that amount. Baramulla and Anantnag districts have 71 per cent and 60 per cent of their areas under forests respectively. The Valley of Kashmir has deciduous vegetation. The Chinar, Poplar, Deodar, Fir, Pine, Kail, Mulbery, Walnut as well as the fruit trees grow throughout the Valley.

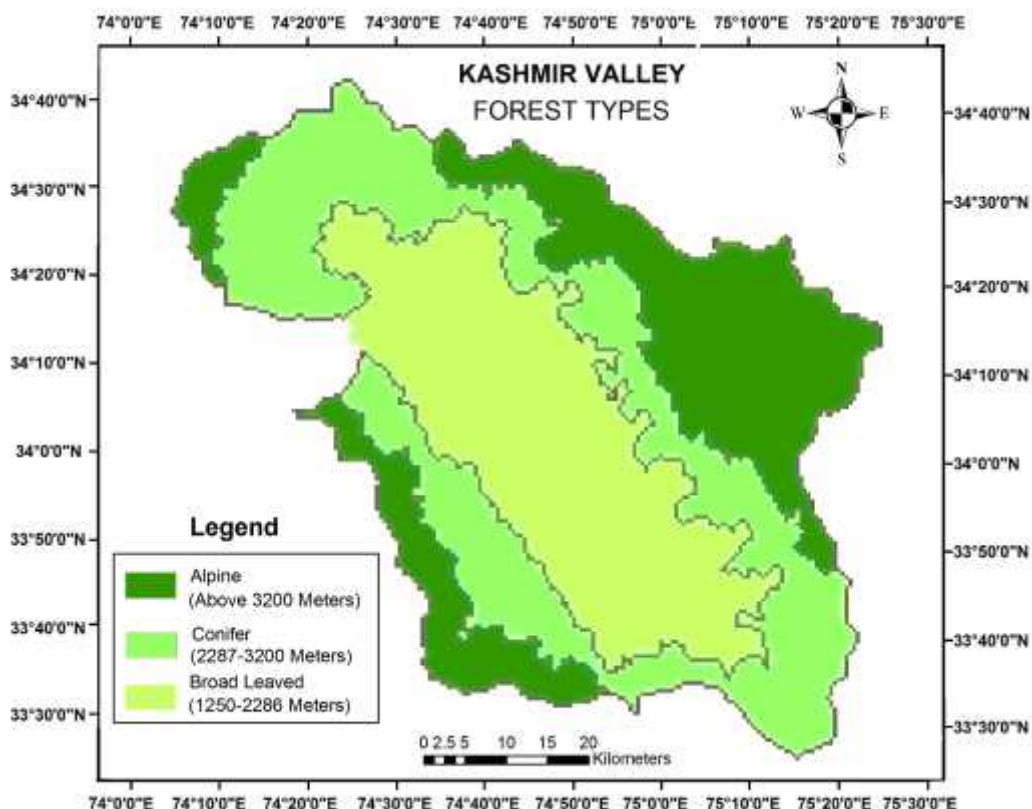
Table 1.2 - Most Common Trees found in Kashmir Valley Forests

Common Name	Local Name	Botanical Name	Characteristics
Deodar	Deodar	Cedrus deodara	Evergreen
Himalayan Blue Pine	Kairu (Kail)	Pinus excels	Used as timber
Himalayan Silver Fir	Budal	Abies webbiana	Provides timber
Yem	Posthal	Taxus baccata	Medicinal use
Elm	Brenn	Ulmus wallichiana	Rare species
Walnut	Dun	Juglans regia	Anti pest
Italian Poplar	Phrast	Populus nigra	Used as timber
White Poplar	Dudh phrast	Populus alba	Used as timber
Maple	Kanar	Acer spp.	Commercial use
Willow	Vir	Salix tetrasperma	Used for bat making
White Birch	Burza	Betula utilis	Rare species
Plane	Boin (chinar)	Platanus orientalis	Cooling effect

Source: Department of Forests and Wild life, Srinagar, Jammu and Kashmir

43 Dar, G. H., & Khuroo, A. A. (2013). Floristic Diversity in the Kashmir Himalaya: Progress, Problems and Prospects. *Sains Malaysiana*, 42 (10), 1377-1386.

On the basis of their genetic characteristics, forests of Kashmir valley are classified into Montane, Temperate and Alpine. The Montane and Temperate forests are usually found between 1,500 and 3,200 meters. They have a lower zone (1,500-2,100 meters) in which the broad leaved varieties are preponderant and a higher zone (2,100- 3,200 meters) in which the conifers predominate. The Alpine forests occur at an average elevation of 3,200 meters and above. The main features of the flora of Kashmir Valley include (1) Absence of Oaks as a climax species and of Laurels and low level Rhodendrons (b) A preponderance of Fir, and (c) Negligible occurrence of Spruce.



Source: Forest Department, Srinagar, Jammu and Kashmir

Figure 1.4

1.6.2 Grasslands

Climatic and edaphic conditions, particularly in the surrounding highlands, favour the growth of a variety of temperate and alpine species of grasses. These pastures are of immense economic significance to the Gujjars and Bakerwals whose transhumant pastoral economy is based on them. However, they play a far more important role in thwarting run-off and soil erosion from the steep slopes with a thin soil cover. An abundant supply of sunshine and moisture are the only necessary conditions required

for the growth of grasses in these highland meadows called “*Margs*”. These pastures cover extensive areas on the periphery of glaciers on tracts having glacial moraines and other deposits providing the soil base for the rapid regeneration of grasses under optimal climatic conditions. (Raza, et. al, 1978)⁴⁴.

The grasslands of the Kashmir Valley are a temperate variation of the mesophiclons group. They are recognized as bio-edaphic communities. Puri has noted the growth of a variety of species of grasses mixed with other forms of vegetation in two main types of Alpine meadows: Glacial moraines and other types of soils in situ or transported by snow melt (Puri, 1960)⁴⁵. The grasslands occupy about one tenth of the total area in the Valley. The main pastures have been depicted in figure below. They are subjected to intensive grazing by Gujjar pastoral groups who cross the Pir Panjal Range with their herds of goat and sheep during summer. The Gujjar transhumant economy, like that of the Kirghiz in the Tien Shan, is an interesting phenomenon of great social significance.

Summary

This chapter has tried to make a brief attempt to understand the geographical personality of Kashmir Valley in the light of its climate, drainage pattern, landforms, scenic beauty, altitudinal zonation and natural vegetation. It has been highlighted that Kashmir Valley, a separate geographical region, is the core of mighty Himalayas. It includes all the land lying within the water divides formed by Pir Panjal Ranges in the South and Himalayan Ranges in the North Kashmir and encircles the great synclinal trough occupied by River Jhelum.

In its administrative setup, Kashmir Valley consists of 10 districts and 41 tehsils. This flat alluvial basin measures only 150 kilometers from South-East to North- West and 42 Kilometers from South -West to North- East. Out of the total area of the Valley, nearly half is under *Karewas* and an area of around 260 square kilometers is under water bodies. River Jhelum that passes through the heart of Kashmir Valley has a paramount significance in its regional structure. It acts as a binding force to give

44 Raza, M., Mohammad, Ali., & Ahmad, A. (1978). *The Valley Of Kashmir- A Geographical Interpretation- The Land*. Vikas Publication: New Delhi. Vol (1).

45 Puri, G. S. (1960). *Indian Forest Ecology: A comprehensive survey of vegetation and its environment in the Indian subcontinent*. Oxford Book & Stationery Company: New Delhi.

cohesion to the Kashmir Valley. The lakes of Srinagar may be regarded as the enlarged ox -bows and abandoned courses of this river.

In latitude, Kashmir Valley corresponds with Peshawar, Baghdad, Damascus, Fez and South Carolina. Here, every thousand feet of elevation brings some new phase of climate and of vegetation to it. The Valley is well known throughout the world for its natural beauty. Its lakes, green meadows, dancing and foaming streams, majestic forests full of fir and pine and snowcapped mountains are common attractions to the outsiders as well as to the native.

The Valley floor is much fertile, highly dense and urbanized with better levels of transportation and communication than the surrounding hilly areas of the region. This is also the area of largest number of wetlands and water bodies as well as the huge tourism potential.