Chapter 2

The Study Area

2.1 Location and Extent

The state of Jammu and Kashmir (32°17’ to 36° 30’ N latitudes and 73° 26’ to 80° 36’E longitudes) is the northernmost state of the Republic of India. It is bordered by the scenic Himalayan mountain ranges and shares its boundaries with the People's Republic of China to the north and east, the states of Punjab and Himachal Pradesh to the south; and Pakistan to the west and north-west (Fig. 2.1).

![Fig. 2.1 Location map of the study area](image-url)
The valley of Kashmir extends over a length of 110 kms and its width is about 100 kms. The area covered by this basin shaped valley is approximately 15,520.3 km². The total area of the state of Jammu and Kashmir is about 2,22,236 sq. kms and is divisible into three natural divisions namely, Jammu, Kashmir and Ladakh. The mean altitude of this picturesque and densely inhabited valley is 1,850 mts above MSL. However, the mean altitude of the bordering Pir Panjal mountain range is 5,000 mts.

The present study area around Wular lake lies between latitudes 34°12’ and 34°36’ N and longitudes 74°26’ and 74°56’ E. The altitudinal range of the study region varies from 1570 meters to 5148 meters above MSL. The study area is divided into various physiographic zones characterised by varying altitude, slope and vegetation (Fig. 2.2). The low lying alluvial plains, the Karewas, foothills and the high altitude mountains form the main physiographic divisions of the Wular catchment. The Lesser Himalayas around the Wular lake are formed of Pir Panjals and an off shoot, called Ratan Pir.

![Fig. 2.2 Physiographic map of the study area](image-url)
Since the River Jhelum enters in the study area from its southern side and empties into Wular Lake, there is no clear cut divide on this side of the catchment and forms a continuum. Hence, the alignment of the mountain ranges is such that the whole Kashmir valley forms the catchment of Wular Lake. On the eastern side, the Wular catchment is separated by the drainage system of Sind River while the Pohru catchment forms its western boundary. The landscape around the Lake Wular is mountainous and rugged on the north-eastern side, while it is mostly plain towards south and south-west. Due to vast expanse of the Kashmir valley, the study area has been restricted only to the direct catchments of Wular, fed by the streams of Jhelum, Madhumati and Erin.

2.1.1 River Jhelum:

The Jhelum is the main waterway of the valley and is the life line of Kashmir. Its entire basin is full of wetlands, ranging from glaciated lakes within the hills to floodplains, lakes and marshes within the valley. These lakes are, directly or indirectly, connected with the River Jhelum. The Jhelum basin extends to an overall area of 33,300 sq.kms within India and Pakistan and covers 3% of the overall area occupied by the Indus Basin.

2.1.2 The Wular Lake:

The Lake Wular is the largest freshwater lake within the Jhelum basin (Fig.2.1) and plays a significant role in the hydrography of the Kashmir valley by acting as a huge absorption basin for its flood waters. The word ‘Wular’ comes from the Sanskrit word ‘Ullola’, which means stormy, high rising waves. The origin may also be attributed to the Kashmiri name ‘Wul’, which means a ‘gap’ or a ‘fissure’.
The lake Wular is located 34 km northwest of the Srinagar city. It is elliptical in shape with a maximum length of 16 kms and breadth of 7.6 kms. The lake covers an area of about 86.71 sq kms and has a maximum depth of 5.6 mts.

As per the toposheets of Survey of India (1911), the initial area of lake was 217.8 sq kms which includes 58 sq kms of associated marshes. Studies have shown that during 1911 to 2007, it has reduced from 157.74 to 86.71 sq kms.

2.2 Climate:

The Kashmiri proverb ‘Kashmir, pankha postin’ (Fan and fur are a must in Kashmir) illustrates sudden climatic variations within the valley. Hence, the climate of the valley varies according to the altitudinal location and it comprises of three distinct climatic regions: cold-arid desert areas of Ladakh, temperate climate of Kashmir valley and the humid sub-tropical region of Jammu. However, the climate of the region around Wular mainly resembles that of the valley but is altitude dependant. Towards the southern Kashmir, in and around the Jammu city (elevation 379 mts above MSL), it is typically of sub-tropical type while in the northern Kashmir it is almost similar to semi-arctic type. In and around the Wular Lake, the water temperature varies between 3.1°C and 25°C.

The 4 main seasons in the valley are Spring (March–May), Summer (June–August), Autumn (September–November) and Winter (December–February). The seasonality in the study area has been locally defined on the basis of some specific characteristics like precipitation, temperature, harvest, etc. The locally identified seasons, according to Bhat (2005), are given in the Table 2.1.
Table 2.1 Seasonal calendar of the Kashmir Valley

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<tbody>
<tr>
<td>II</td>
<td>Sheshur</td>
<td>Severe cold</td>
<td>15 Jan. – 15 March</td>
</tr>
<tr>
<td>III</td>
<td>Sonth</td>
<td>Spring</td>
<td>15 March– 15 May</td>
</tr>
<tr>
<td>IV</td>
<td>Gresham</td>
<td>Summer</td>
<td>15 May – 15 July</td>
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<tr>
<td>V</td>
<td>Wahrat</td>
<td>Rainy</td>
<td>15 July – 15 August</td>
</tr>
<tr>
<td>VI</td>
<td>Harud</td>
<td>Autumn</td>
<td>15 August– 15 Nov.</td>
</tr>
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This nomenclature reveals that each season of the year is of two months duration. The winter season experiences a heavy snow fall and the frost is so severe that the River Jhelum and Wular Lake are often frozen over. Such sporadic frozen conditions have been recorded at least eight times in the recent history. The winter in 1759 A.D. was so prolonged that the River was frozen as late as 31st March. The spring is however, wet and pleasant, the summer is hot and the autumn is dry and healthy. Thunder storms also occur in rainy season and are characterized by the presence of strong winds called *chang*.

The region has also suffered from famines, not due to summer drought, but as a result of too mild winter and heavy seasonal precipitation. The records between 958 and 1899 A.D. reveal a string of 18 major famines in the valley (Pandit, 1978).

Another peculiar characteristic of Wular climate is unusual rains caused by south-west monsoon. This creates heavy floods in the valley, after the clouds cross the mountain barriers from the peninsular India. Recently, during the first week of September, 1950, a similar spell of torrential rains hit the valley resulting in a heavy run-off and severe floods.
Mean monthly temperature is lowest in January and highest in July except in Jammu where highest temperature is experienced in June. Mean monthly temperature in January varies from \(-17^\circ\text{C}\) at Drass to \(14^\circ\text{C}\) at Jammu; Kargil and Leh being other stations of below freezing points.

The annual average temperature for the valley reads about \(11.04^\circ\text{C}\), with a mean maximum temperature of \(16.40^\circ\text{C}\) and a mean minimum of \(5.2^\circ\text{C}\). The lowest average annual temperature of the valley has been recorded in January \((1.3^\circ\text{C})\) while as the highest mean annual temperature has been recorded as \(21.4^\circ\text{C}\) during July. The average rainfall for the valley is \(96.2\text{ cm}\). The lowest rainfall has been recorded as \(1.81\text{ cm}\) during the month of December and the highest is recorded as \(12.2\text{ cm}\) during March.

Precipitation patterns within the basin vary with orography. The Pir Panjal range being in the direct pathway of the south west monsoons has more rainfall in its southern slopes than the valley facing the northern slopes. Contrary to it, the valley facing slopes of Himalayas receive more rainfall as compared to inner slopes. The higher altitudes of the basin, in general, receive more rainfall than lower altitudes. The region experiences high humidity throughout the year and it does not decrease below \(70\%\).

The palaeoglacial studies have also revealed that there are at least 4 major episodes of palaeoglacial conditions recorded in the region, which alternated with interglacial periods with warmer conditions and intense fluvial activity. However, the data is insufficient to suggest their presence in the proximity of the Wular Lake.