

2.1. SPATIAL FRAMEWORK

Dal Lake Watershed is situated between 34° 5’ 20” to 34° 13’ 40” N latitude and 74° 48’ 35” to 74° 08’ 32” E longitude, at an altitude of 1583 m to the North-East of Srinagar (Fig. 2.1). One of the significant features of Dal Lake is its vast and diverse watershed, which spreads over an area of about 331 Km².

![Location of Dal Lake Watershed](image)

Source: Generated from IRS P6 LISS-III, 2010

Fig.2.1

2.2. PHYSIOGRAPHY AND RELIEF

Physiography entailing physical characteristics and morphological conditions of a watershed plays an important role in hydrological characteristics, water regime and vegetation covers. The physiographic characteristics of a watershed and its location, give a good quantitative and qualitative assessment of the hydrological system of the watershed. These factors have direct effects not only on the hydrologic regime, annual water production, flood volumes and soil erosion, but also affect the climate, ecological conditions and vegetation cover. The Dal Lake watershed is fan
shaped and broadens in the Westward direction. Topographically, the watershed has evolved out of outwash apron of the Dachigam creek and has assumed the shape of a triangle. The stretch of the watershed is a diagonal extension from North-East to South-West. The Western watershed limit is by and large, a flatter area except for 4.5 km. length along which the average elevation is 2000 m. The watershed limits rise high towards the North and East of the watershed. On the whole, the Dal Lake watershed represents varied topographic features. The general relief of the watershed is a basin which comprises the Dal Lake situated at an altitude of 1580 m approx. and a steep escarpment at an elevation of 4390 m located along Northern watershed.

The mountain range that rings the Dal Lake from East to North and North-West like an amphitheatre constitutes its watershed area and is vital to its hydrography. It contributes water to the lake through surface flow or from recharged aquifers. Its topography and relief affects; the drainage system, land, soil, vegetation, settlement pattern, occupation and type of land use, all of which have profound impact on the lake ecosystem.

The topographical characteristics of Dal Lake Watershed present a varied landscape which has been identified by LAWDA (Lakes and Waterways Development Authority, Govt. of J&K) in which the broad identifiable geomorphic units are:

a) Great Himalayan Front

b) The Piedmont

c) The Karewa Terrain

Besides, these major topographical features there are isolated hillock of Shankaracharya with temple top at 1855 m and Hari Parbhat (1750 m) and the swamps bordering the water body of the Lake which is of considerable significance in the ecosystem.

a) Great Himalayan Front

This covers the Eastern portion of the Dal Lake Watershed. Here contours rise sharply around 1700 m culminating in summits among which are Mahadav peak with an elevation of 3933 m. This is drained by Dachigam nallah which is a perennial stream originating from Glacier Lake of Marsar. Dara sub-watershed and the area West of it
are mostly barren hill sides drained by Dara and numerous other hill torrents which fall directly in the lake. These are dry for most part of the year but turn into flashy flows during rains and are major contributors of silt into the lake.

b) Piedmont Zone

The Piedmont zone (1700 m - 1900 m) constitutes the alluvial fill of the Quaternary age which occurs in depressions and foot slopes of the Himalayan Front. Various springs are spread over in this zone which is important for settlements and number of villages clustered around them. The Mughal gardens are also situated in this zone. Much of the area is under rapid process of urbanization and numerous rills and gullies that emanates from the zone find their way into the lake.

c) The Karewas

This is present in Western part of the watershed, mostly flat table land and an average elevation of 1610 m eaten into by great bluffs at many places. These are mostly under paddy cultivation and wherever irrigation does not reach are under dry land agriculture.

2.3. SUB-WATERSHEDS OF DAL LAKE

The watershed of the Dal Lake is not only highly diverse but also covers a huge area of 331 Km² which is nearly 18 times more than the lake area. It exhibits a varied topography with altitudinal range of 1580-4360 in. This area is surrounded by Sindh basin in the North and Jhelum basin in the South. The watershed area of Dal Lake can be broadly divided into five sub Watersheds:-

2.3.1 Tealbal- Dachigam Sub-watershed

Tealbal- Dachigam is Dal Lake's largest watershed, which is further divided into the Tealbal- Dara (87Km²) and the Dachigam National Park (143 Km²) sub-watersheds. The mountain range in the East is a part of the Panjaltrap, at many places agglomerate slates are also present. It is believed that the agglomerate slates are a joint product of glaciating and limestone. There is ample evidence of glaciating along with the presence of glacial moraines in different parts of the watershed. But freshly deposited alluvium is mostly observed in the Northern part of the surrounding area. Dachigam is the largest in area and comprises mainly the Dachigam Reserve and
South facing slopes. The Dachigam Reserve is a restricted area and has good forest and ground cover but the South-facing slopes have been denuded of forest cover due to overgrazing of cattle and in the past by burning off. It is evident that denudation of this area is resulting in significant contribution of silt to the Dachigam Nalla which drains this watershed area. Soils of the Dachigam National Park sub-watershed are dominated by undifferentiated brown soils, lacustrine sediment, moraine tongues, and parcels of recent alluvium (AHEC, 2000). While most of the Dachigam National Park is forested, some gentle slopes at lower elevations have been deforested for agricultural purposes. Grassland areas in the areas are overgrazed by nomadic livestock. The reserve is drained primarily by Dachigam Creek (perennial flow), which splits into four smaller streams in its lower reaches namely Boutkul Creek, Tealbal Creek, Pishpav Creek and Meerakshah Creek. These streams enter the Hazratbal basin of the Dal Lake from the North-Northeast. The Tealbal- Dara sub-watersheds consists of the South facing slope of the lake and is mostly treeless barren landscape) with soil characteristics being undifferentiated yellow podsolic to distinct podsolic.

### 2.3.2 Lake Hill side Sub-watershed

Lake Hillside watershed (46) Km$^2$ rises from 1582 m to 2924 m above mean sea level. It is composed of weathered rocks with underlying brown/yellow to grey soils (AHEC, 2000). High elevations in this watershed are mostly barren, except for the sparse stands of Pilaus, Deodar and Kail located on the ridges and along Southern slopes. Its lower slopes are being rapidly developed for residential use, and hotels, restaurants, and shopping malls with associated parking lots have been constructed in riparian areas adjacent to the lake. Both the dwellings and commercial establishments lack septic system facilities and any other treatment, thus this watershed is a major source of both municipal sewage and diffuse urban runoff. The Lake Hill side watershed drains into Dal Lake via a number of small streams around the East and South sides of the lake. Around the lake shore, the lower land slopes of this watershed have been utilized for rice cultivation, orchards and gardens. Beyond this, the land rises very steeply to 1000 in above the lake. The steep exposed slopes do not support any vegetation, and in some areas overgrazing has contributed to denudation.
2.3.3 **Srinagar North Sub-Watershed**

The Srinagar North watershed comprises mainly outer suburbs of Srinagar City and is extensively used for paddy cultivation. Residential development in this area is relatively recent and yet only a small percentage of dwellings have septic systems. The topography is very flat and drainage is via slow flowing canals and open drains which in parts are badly contaminated with sewage and rubbish. This watershed covering an area of 23 Km² drains into the Dal Lake and directly into the Nallah Amir Khan which is an outlet of Dal Lake via Nigeen Lake. The watershed contains suburbs of Srinagar city and comprises of gardens and paddy fields. The sprawl of population in the watershed has expanded the city towards the peripheral areas.

2.3.4 **Srinagar Centre Sub-watershed**

Srinagar centre (14 Km²) drains into the South-East corner of Dal Lake via a number of canals. The topography is very flat. This watershed is fully urbanized as it is situated in core city area. The area is densely populated by the city dwellers. Major sections of downtown Srinagar city are in Srinagar centre watershed, in which there are negligible areas of undeveloped land. High density residential areas within the watershed are without septic systems, and roads and lanes constructed from tarmacadam. The Srinagar City watershed is fully urbanized and densely populated and in most parts it drains via the Brari Nambal (a large swampy area which is grossly polluted with sewage and rubbish) that in turn drains into Dal Lake via a canal.

2.3.5 **Lake Interior**

This is comprised of the Dal Lake itself and includes open water, floating gardens, and marsh and land masses within the lake. More than 40,000 people live directly on the surface of Dal Lake, mostly in what can be described as the floating hamlets and permanently anchored boats. These dwellings are mostly concentrated in the Bod Dal basin. Except for night soil, which is used as a source of organic manure on floating gardens, most of the kitchen and laundry wastes are being directly disposed into the lake (Sohin and Wanganeo, 2008).
2.4. DRAINAGE

The Dal Lake is believed to be fed by a number of underground springs and steams but the main source is the Dachigam Creek (Nallah) that enters into the lake on the Northern side after originating from the Marsar Lake, high up in the mountains and draining the Dachigam Reserve Forest. The Creek having a flow length of 39 km approximately is perennial in nature and enters the Hazratbal basin from the Northern end. Boutkol Creek drains the water mainly from the Northern and Northwestern watershed including the waters from the Sind Extension Canal, irrigation overflows and oozing in the lower green belt (Fig. 2.2). Besides, a number of other small streams e.g., Meerakshah and Pishpav streamlets etc. carry water entering the Hazratbal basin of the lake. In addition, innumerable springs arise from the lake bed.

2.4.1 Northern Drainage Basin

These include the Bran Nar, Dagwan Nar, Mayun Nar, Drog Nar, Mahadeo Nar, Mal Nar and Waghat Nallah basins.
2.4.2 Southern Drainage Basin

Water flows out of the lake through a weir and lock system on the Southwest side, via Dalgate into Tsunthkul - a tributary to the river Jhelum. There is also another exit i.e., Nallah Amir Khan connecting the Nagin basin with Anchar lake via Khushalsar Lake. The drainage pattern in the study area is a combination of "Trellis" and "Dendrite" patterns with the general flow direction being from East to South-West. Besides Dal Lake, the other water bodies of the watershed are the Marsar (glacial/snow fed Lake) and the Nagin Lake. Haman reservoir is artificially created mini water body situated near Harwan and is meant for domestic water supplies. Marsar lies in the extreme East and Nagin to the West of the Dal Lake watershed.

2.5. CLIMATE

Due to the large variations in altitude from 300m in the South to 8500m in the North, the climate of the state of Jammu and Kashmir varies from tropical to arctic (ENEX, 1978). According to Bagnouls and Meher-Homji, (1959) the climate of Kashmir falls under Sub-Mediterranean type with four seasons based on mean temperature and precipitation. However, Kaul and Qadri, (1979) maintained that the climate of Kashmir is highly variable and does not conform to any definite type. However, in the Vale of Kashmir in which Srinagar and Dal Lake are located, it can be described as temperate for most of the year.

The entire Dal Lake watershed remains covered with snow during winter months from December to March with minimum temperatures reeling below zero. The top crust of the lake has also been observed to freeze during winters. Early spring and summer are the wet periods when maximum rainfall occurs. The average annual rainfall is 650 mm at Srinagar and 870 mm at Dachigam. It is in this season that the snow thaw in the higher reaches of the watershed results in the maximum discharge in Dachigam and Dara Nallah. An average of 600 mm of snow falls in Srinagar during the winter but the snowfall on the higher slopes is much heavier. The temperature varies between a monthly mean maximum of 31 °C in July and a minimum of -4 °C in January with an average of 13 °C. The maximum daily humidity ranges from 80% to 90% throughout the year and drops to approximately 70% at night during the winter.
and 40% during the summer. The sheltered and inland nature of the Kashmir valley means that strong winds are very uncommon and at Srinagar the wind strength seldom exceeds 5 km/hr.

The Dal Lake watershed is situated in temperate region and experiences the precipitation through both rainfall and snow fall. Some parts in the East of the lake watershed remain under snow throughout the year and the entire watershed remains snow covered during winter months of December to March with minimum temperature reaching below zero degree celsius. Local relief also gives rise to some peculiar climatic effects in the region. The differences in exposure due to insulation created by aspect effects number of associated parameters with South facing slopes being considerably hotter than North facing slopes, which creates soil moisture deficit in South facing slopes.

2.6. SOILS

Soils in the Dal Lake watershed have developed under the influence of topography, past vegetation and hydrothermal regime. The classification of the soils has been done by LAWDA. Some of the major types are:-

2.6.1 Mountain soils

At the top of the watershed the entire range is covered by mountain ridge tops where nascent soil caps are developing through weathering under pioneer wild grasses and bushes. Relict conifers are present in upper watershed singly or in patches.

2.6.2 Mountain meadow soils

These are formed below the top ridge area and are moderately developed. With low organic matter (OM), they support thick cover of grasses, herbs and shrubs. The upper area of Dachigam (above the timber line) has this type of soil. Thick cover of grasses and herbs make them stable and resistant to soil erosion except where high incidence of grazing and trampling of soil makes them vulnerable to accelerated erosion.
2.6.3 Podsols

Podsols cover large part of the Batpur-Dara segment (Fig. 2.3). These range from undifferentiated yellow grey podsolic to distinct podsols. These support conifers and their associate species.

2.6.4 Brown soil

These are formed in drier parts of the watershed and support deciduous plant communities. This type is prominent in Shalimar-Nishat belt and so also in Harwan - Dachigam belt. Further sub divisions are as under:-

a. Shankaracharya – Chashma Shahi Belt:
   i. Nascent soils on weathering rocks
   ii. Underlying brown / yellow or grey soils
   iii. Reclaimed marshes

b. Shalimar - Nishat Bren
   i. Nascent soils on ridge tops
   ii. Undifferentiated brown and yellow grey soils
   iii. Alluvium marsh soils

c. Harwan – Dachigam
   i. Nascent soils on ridges
   ii. Undifferentiated brown soils
   iii. Lacustrine sediments
   iv. Moraine tongues
   v. Parcels of recent alluvium

d. Batpur – Tealbal - Dara
   i. Nascent soils on mountain tops
   ii. Flat topped podsolised and undifferentiated Karewas.
   iii. Unrelenting lacustrine fossili ferous sediments/ brown soils.
   iv. Recent alluvium.
Soil characteristics of Asthanpur, Saidpur and Hodura micro-watersheds forming part of the lake watershed is described as under:

### 2.6.1.1 Asthanpur Micro-Watershed

Major land uses prevailing in this micro-watershed are natural forest, grasslands, agriculture and horticulture. However, forest and grasslands present a poor cover and do not protect the soil from erosion in the watershed. Biotic interference such as unplanned grazing and removal of vegetative cover leave the soil on high precipitous slopes exposed to vagary of erosion. Terraced fields under agriculture and horticulture manifest soil erosion to a moderate degree, as the fields are nearly level and bunded. The upper mountainous tract is rocky and bouldry. In the mid and lower reaches of this tract thin soil deposition is observed. The soil is coarse textured, having medium to shallow depth. Terraced land under fruit gardens is quite permeable and sub surface drainage is good. As per the taxonomical classification, these soils fall under Aqualfs, Aquepts and Udalfs according to the seventh approximation.

### 2.6.1.2 Saidpur Micro-Watershed

The soil of this micro-watershed is made of ancient deposit of medium to fine textured soil materials and this type of soil occupies about half of the Kashmir valley. These soils are locally called Karewas or table lands. This soil has matrix made of typical alluviums. Karewas are presently under different land uses such as agriculture, fruit gardens and forest. Under agriculture, these lands have been transformed into bunded and well maintained terraces, and as a result of good management, soil erosion is within moderate limits. Some sites are also quarried in the watershed for fine textured soil for various purposes by the local population. Such exposed faces of the soil are continuously eroded by rain coupled with biotic interference and contribute substantially to soil erosion and heavy sediment load in the stream during rainy season. Snow melt is also a major cause of erosion in the Karewa belt. The soils are moderately erodible, primarily due to preponderance of silt and low clay content. Soil fertility is low as regards nitrogen and potash, but phosphorus content is medium. As stated earlier, the quarry sites and the faulty tillage practices in fruit/agricultural fields are a potential cause of soil erosion.
2.6.1.3 Hodura Micro-Watershed

Soils in this micro-watershed are characterized in two groups - soils in the upper reach of the hill and mountain ranges and the soils of the adjoining piedmont plain of the valley. In the upper reach the soils are heavily denuded due to erosion being a perpetual phenomenon. By and large, the top soil has been removed in the form of a thick sheet and the bouldry/gravely matrix is distinctly exposed in the subsurface. The mechanical composition consists of high boulder and gravel content and coarse particle size consists of fine and coarse sand. The soil is developed primarily on glacial tills where at present only boulder and gravel are predominant which are carried down the slopes through fluvial movement. In the piedmont plain the phenomenon of deposition as well as erosion is noticed. The fruit garden and the agriculture fields are drained carrying heavy sediment load mainly due to poor soil texture and unscientific land management practices.

Source: Generated from All India Soil and Land use Survey, Ministry of Agriculture, New Delhi

Fig. 2.3
### Table 2.1: Soil Type in Dal Lake watershed

<table>
<thead>
<tr>
<th>S.No</th>
<th>Soil Type</th>
<th>Area in Sq. Kms</th>
<th>Percentage Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shallow loam with Dominantly Rock outcrops</td>
<td>51.64</td>
<td>15.60</td>
</tr>
<tr>
<td>2</td>
<td>Coarse Loam-Medium Deep</td>
<td>133.88</td>
<td>40.45</td>
</tr>
<tr>
<td>3</td>
<td>Coarse Loam-Deep well Drained</td>
<td>99.90</td>
<td>30.18</td>
</tr>
<tr>
<td>4</td>
<td>Fine Silty &amp; Fine Loam-Moderate to well Drained</td>
<td>19.33</td>
<td>5.84</td>
</tr>
<tr>
<td>5</td>
<td>Fine Loam-Deep well Drained</td>
<td>26.25</td>
<td>7.93</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>331</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Computed from All India Soil and Land use Survey, Ministry of Agriculture, New Delhi

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2.7. NATURAL VEGETATION

Of the entire five sub watersheds of the Dal Lake, the Dachigam National Park represents an area of rich biodiversity. The Park constitutes more than half of watershed, besides forming the major hydrologic and precipitational watershed to the lake. It provides a home to the remnant biological diversity and threatened and endangered species of Kashmir forming part of Northwestern Himalayas. The general vegetation of the area has been dealt with in detail by Singh and Kachroo, (1976). They have recognized a number of vegetation types based on habitat, form and density of dominant species, though the vegetation patterns are controlled by such
factors as habitat, slope, exposure to sunlight and altitude, besides biotic factors. Whereas, the mountain slopes sustain mostly natural vegetation, the plain valley with ravines supports both natural and planted vegetation. The authors further divided the vegetation complex of the area into thirteen types, each in turn being subdivided into two or more communities of their own. As per the studies of Bhat et al. (2002), the prominent vegetation types comprised evergreen scherophyll forests (Pinuswallichiana and Abiespindrow), deciduous forests communities of Robiniapseudoacacia, Salix, spp., Quercusrober, Fraxinushookeri, Ulmusvillosa, Ivforusalba, Juglansregia, Ailanthus altissima and stands or isolated patches of Betulautilisat higher elevations), deciduous scrub (Parroptiopsis jacquemontiana, Coryluscolurna, Isodonplectranthoides, Rosa webbiana, Berberis spp., Viburnumfoetens, Lonicerasp.), evergreen scrub (Dephneolesides, Contan Easternamuullaria and Rhododendron spp., and Juniperusrecurva at higher elevations), Savanna (mid grasses like Thernedaanathera, Stipasiberica, Daetylisglometrata, Phraginitiscominunis with scattered trees or scrub plants), grasslands (Chrysopogonecinulatus, Cynodoncactylon, Themedaanathera, Bothriocloapertusa, Pennisetumspp. etc) and broad-leaved herbs (Anemonebiflora, Germaniumspp. Fritillariaimperialis, Sambucuswightiana, Ferula jaeschkaina etc). The conspicuous absence of such higher sub alpines and alpines as Betulautilis, Rhododendron, spp., and Juniperusrecurves is attributable to the difference in altitude and climate which is a noteworthy feature of the park.

As per (Anonymous, 1985), six major biotypes have been identified in the park as:

- Riverine forests (confined in the plain valley)
- Grasslands (2000-3000 m)
- Broad-leaved woodland (2000-2800 m)
- Coniferous forests (2000-3000 m)
- Rock faces and alpine pastures(hill tops)
- Scrub (3300-3600 m).
Starting from the edge of the water body is the transitional belt or the eco-tone zone which provides a unique habitat for flora and fauna. Willows, poplars, water reeds and grasses grow in abundance in the area. The low land belt has poplars, chinar and apple trees, almond and cherry covering an appreciable area.

2.7.1 Lake Hill Side Zone

This belt from Gagribal to Harwan is mostly bare except rocky outcrops at the ridge end which supports stray trees and groves of conifers and other associated vegetation. Large tracks of this belt have been fenced by Forest department and as a result of protection and aorestation over past many years the area is fairly vegetated. Natural succession of indigenous species is taking place at a steady rate. Number of closures and plantations has been raised by Forest department in this Zone and some of them have shown remarkable results such as at Chasmashahi, Kralsangri, Nishat and Shankaracharya Hills. Shankaracharya Hill stands out distinctly in this Zone which deserves special mention. This prominent hill feature was completely barren except for some pine trees in past. It was taken up by Forest Department in 1926-28 for aorestation works. At first common Iris was planted along the contours to stabilize the site. Then xerophytic shrubs occurring locally were planted. In subsequent years Melia, Ailanthus, Robinia, Pines, Deodar, Kail and Chir were planted. Number of exotic pines was also planted in contour trenches. As a result of these works and strict protection, most of the hillside is completely green and well covered. The area has been declared as reserved forest.

2.7.2 Dara Zone

These are South facing hills devoid of any vegetation with biotic interference at its peak. Apart from Dara Nallah the area is drained by highly eroding hill torrents/nallahs which directly fall into the lake. The natural vegetation of some hardy grasses and bushes grow in this area. In this belt too some aorestation and drainage line control works have been executed for the past few years.

2.7.3 Dachigam Zone

This covers sizeable portion of the overall Dal Lake Watershed and has remained under strict protection and control for the past 60 - 70 years. It was originally taken up as a private hunting ground by the then Ruler of Kashmir. The construction of
Harwan reservoir for drinking water supply for Srinagar City was another important reason for protecting this watershed. In the early stages the eviction of ten villages from the watershed made it possible to reduce the biotic interference to the minimum and thus has remained till today the safe haven for Kashmir stag (Hangul) and incidentally providing the best sylvan surroundings so near to Srinagar. The sanctuary now has the status of National Park.

2.7.4 Vegetation of Dachigam

Dachigam exemplifies the typical conditions of vegetation that can be achieved in other parts of the watershed. Following forest types (Champion and Seth, 1968) are recognized.

Group 12 - Himalayan Moist Temperate Forests
  12 c1 d - Western Mixed Coniferous forests
  12 c1 e - Moist Temperate Deciduous Forest
  12 / s 2- Riverain Blue Pine forests

Group 13 - Himalayan Dry Temperate Forests
  13 c3 d s 1 - Pohu Scrub
  13 c3 /d s 2- Dry Temperate Scrub

Group 14 - Sub Alpine Forests
  14c1- West Himalayan sub Alpine Birch/ Fir Forests – Betula/Abies
  14 / 2 s 1- Sub Alpine Blue Pine Forests
  14/ d s 2- Sub Alpine Pastures

Group 15 - Moist Alpine Scrub
  15 c 3- Alpine Pastures.

2.7.4.1 Lower Dachigam

This zone is mostly occupied by Riverain forests. The vegetation growing along the main Dachhigam Nallah is mostly broad leaved. The major tree species are *Morusalba, Celtisaustralis, Ulmusvillosa, Quercusrubur, Juglansregia, Aesculusindica,*
Acer indica, Ulmus, Salix and Populus. Prunusaremonica is found in open scrub area whereas English Oak and Robinia is in distinct pure patches which shows evidence of having being planted in abandoned agricultural fields. Plantations have been raised subsequently for providing winter feed to wild animals. On slopes the shrub composition is quite evenly distributed in lower Dachigam; some of these are Prunus, Rubus, Berberis, Rosa moschata, Indigofera and Pohu. Pohu covers large parts of the valley in pure stands or with other species. Great variety of herbs is also present among which Strobilanthes is most common particularly in shaded parts. The North facing slopes have more tree and shrub cover with blue Pine being the major tree species. Pohu covers vast areas occupied by occasional pine or horse chestnut. Blue pine gives way to Fir in higher elevations. The South facing slopes are grassy with occasional shrubs like Rosa, Rubus, and Koeleria. Herbs include Enacia, Hypericum and Potentila. The nallah has a reasonable tree cover including horse chestnut and walnut with Pohu as dominant shrub.

2.7.4.2 Upper Dachigam

With Dachigam Nallah narrowing to less than 50 m from Pehlipur the upper Dachigam does not have well defined Riverain or valley vegetation. The vegetation on slopes is depending on aspect.

**North facing slopes:** For a short distance along the nallah the lower slopes are covered with Pohu interspersed with Pine. Higher up the forest changes to pure conifer forests namely Fir, Picia and Taxus with occasional Birch till about 3000 m. above this elevation, the vegetation is a mixture of alpine meadows or Birch forest. The tree line extends up to 3500 m. The higher reaches of the upper Dachigam are characterized by debris of moraines interspersed with grassy meadows. Juniper scrubs and alpine meadows make the rest of the vegetation complex up to Marsar Lake.

**South facing slopes:** These are dominated almost completely by grasses except some patches of blue Pine. As one proceeds up it gives way to Fir / Birch forests. Beyond 3000 m it is again vast alpine meadows with Juniper scrub taking over the ground.
2.8 TRANSPORTATION

Dal Lake watershed has a dense network of road transportation system mainly in the city area (Fig. 2.5). However, most area of the watershed is uninhabited which constitutes the Dachigam National Park. The National Highway-NH1A is the main road network which passes through the city area of the watershed and is finally connected to Leh via Ganderbal in the Northern direction. The Southern portion of the watershed is connected to Jammu via Anantnag and the Western side is mostly connected by various urban centers of Soura, Iddgah, and Lal Chowk etc. while the Eastern portion of the watershed is bounded by the Zabarwan mountain range which restricts any road network to the Dal Lake watershed.

Source: Generated from SOI Toposheets, 1961 and modified from CARTO SAT, 2010

Fig. 2.5
2.9. HUMAN HABITATION

Dal Lake watershed is inhabited by Thirty seven settlements comprising of eighteen rural settlements while the remaining nineteen settlements are of urban in character (Table 2.2). Most of the villages are located on the North and North-Eastern portion of the watershed while the wards are located in all the sides of Dal Lake with major concentration on the Western side.

Table 2.2: Villages/Wards under the Jurisdiction of Dal Lake Watershed

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Villages</th>
<th>Constituency Name</th>
<th>Electoral Wards</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Khimber</td>
<td>Harwan</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Takya Sang Reshi</td>
<td>Nishat</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Mala Pora</td>
<td>Dal Gate</td>
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<td>4</td>
<td>Mulanar</td>
<td>Khawaja Bazar</td>
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<td>5</td>
<td>Haripora</td>
<td>Tarabal</td>
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</tr>
<tr>
<td>6</td>
<td>Faqir Gujri</td>
<td>Jogilankar</td>
<td>40</td>
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<tr>
<td>7</td>
<td>Saidpora Bala</td>
<td>Zind shah Sahib</td>
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<td>8</td>
<td>Saidpora Hamchi</td>
<td>Hassanabad</td>
<td>42</td>
</tr>
<tr>
<td>9</td>
<td>Murender Bagh</td>
<td>Mukhdoom Sahib</td>
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</tr>
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<td>10</td>
<td>Danihama</td>
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<td>Chhatrahama</td>
<td>Lal Bazar</td>
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