INTRODUCTION

Forest is referred to as an area occupied by different kinds of tree, shrubs, herbs and grasses and maintained for the production of wood products. Technically forest is an area set aside for the production of timber and other forest produce, or maintained under woody vegetation for certain indirect benefits which it provides e.g. climate or productivity (Anon 1966). In the Forest Act of 1965 forest has been defined as "Land covered with trees, brush wood and jungle (Guha 1983).

Forests are one of the most invaluable natural resources for mankind, as they have a global aspect, in the sense that their extent, quality and function in any one country inevitably affects the interest of people in any other country, for a wide variety of reasons.

The forests are very important not only for overall well-being of country or people but for entire mankind also. It is believed that with the creation of the universe, first there was water and then slowly the land developed. With the coming upland of land and earth, the first identities to appear were perhaps the trees and the vegetation. With the advent of civilization and knowledge of civilization, there was a setback to the forest wealth due to commencement of agriculture.

India has witnessed successive invasion and forests were the first and foremost victims. However the significance of forests has been described in Vedas, Upanishads etc. The forests assumed a great importance in Ashoks’s reign with his edict to plant trees along the roads to shelter passers-by.

The history of forests in India is closely linked with its political history; demography and economic development. The record of forestry in various states, which were part of India before the advent of British on the scene are insufficient. In his exhaustive work on the
forests of India. Stebbing has dealt with this history right from the earliest times to 1925. The work of Stebbing was revised and updated till 1947 by Champion and Osmaston (Stebbing 1925).

There are number of information on the history of forests in India during the “British rule”. These include the works of Ribbentrop (1989), Brandis (1907) and Negi (1991). Since then there has been rapid development in the field of forestry in India. The Forest Policy of 1988 has become the foundation of forestry in modern India. This policy places great stability through preservation of forests and conserving natural heritage. The objectives can be achieved by preserving the remaining natural forests and other vast varieties of flora and fauna, which represents the remarkable biological diversity and genetic resources of the country.

Nature has endowed India with rich forests, which cover about 20% of the total geographic area of country. These ranges from the alpine meadows of Kashmir in the north to the rain forests of Kerala in the south; the dry thorny forests of Rajasthan and the evergreen forests of the north east India. Over 40,000 species of plants are found in these forests of which over 7,000 are endemic. These represent about 12% of the total global plant wealth. India has about 3,000 species of trees. On a global scene, forests currently occupy roughly one third of the world’s land surface. As against this global scene, forests of India occupy nearly 64.01 million ha. of land (FSI 1989) and constitute 1/5th of the land of the country.

It is estimated that 92.27% of the recorded forest area is owned by the forest department, 3.18% by other government departments (Sagreiya 1994). It has been estimated that the actual forest cover of the country is only 19.39% (GOH 1998-99) of its total geographic area. In terms of quality the forests cover only 59% of the actual forest cover of the country in the form of dense forests; the rest of the forest cover consists of open forest and mangroves.
With only 2% of the total forest area of world, India supports about 15% of the total human and 14% of cattle population of the world. It indicates a large number of people living in and around the forests are dependent on the forests for their livelihood.

In their extent, distribution and potential the forests of Jammu and Kashmir constitute of the biggest industry and being so they are the mainstay of economy of the state. In view of their importance they have been described as the Green Gold of the state. The forest industry absorbs fifty thousand families all over the state in various operations for eight months.

Kashmir Himalaya range of India is pre-eminently a land of forests, which among other things are the mainstay of economy. The valley is rich in forest wealth and 51% of its total geographic area is under forest (Anon 1996). The total geographic area of the valley is about 15,948 sq. km., and out of it the forest area comprises 8128 sq.km. The forest of Kashmir are distinguishable into Deodar, Kail, Fir, Chir and mixed broad leaved zones in the region. Kashmir region has 46.34% of its forest area belonging to the commercial category; a significant portion (53.66%) is related as uncommercial (Anon 1996), Bandipora alone accounting for 29% followed by Lidder (16%).

The forests of Kashmir valley have been classified by Champion and Seth (1968) under groups 12, 13, 14 and 15 in the revised classification of Forest Types of India. The forest, thrive better between 2500-2900 m. Beyond 3000 m, the arboreal forests fade into high level fir forest up to 3200 m, the upper timber forest are less dense and poor in quality, which ultimately gives way to bush-land vegetation beyond 3200 m.

On the basis of photometer interpretation surveys of Tomar (1969) the state forest area has been divided into catchments, namely
Kashmir valley and Chenab valley, each having four forest divisions (excluding Ladakh).

On the basis of type and function of forests Naqushband, classified the vegetation of state into four main types: Dry tropical forest, mountain sub-tropical forest, temperate forest and alpine scrubs. The forest of the Kashmir valley he includes in mountain temperate forest types and subdivides it into three types viz: fir-kail forest of Pir Panjal Range and Sind valley; deodar-kail forests of Kamraj, langate and parts of Khiuhama; and deodar-kail forests of Buniyar kathai and Baramulla Ranges (Personal communication with officers of Forest Department of Jammu and Kashmir).

There is not a single facet of modern living, whether tangible or intangible for which forests are not indispensable. Denudation and obliteration of vegetal cover and tree poses a threat to the survival of living organisms. Disturbance and over exploitation has been very extensive and out of 15,000 species of flowering plants of India, 1,500 are evaluated in various categories of threatened species (Nair 1987).

Forests conserve the top soil and consequently the soil fertility and hence emphasis must be laid on the protection, conservation and creation of forests. A thorough knowledge of behavior of forest tree seed is the basic key for the successful raising of trees. Hence, seed is a very significant input not only in plantation forestry, but also for the regeneration of natural forests.

In order to improve the forest tree, seed production and testing came into existence. The urgency and enormity of the task of production of quality seed and other propagating material may be judged from the fact that the National Wasteland Development Board has drawn up an ambitious programme to rehabilitate 175 mha. of wasteland. The most essential factor for the success of plantation activity is the ready availability of seeds. The introduction of improved
seed production techniques, use of seed from promising provinces and genetically improved seed of known source cannot only improve survival rate but also enhance productivity of forests by 25-30%.

The natural regeneration of forests are not in congruity with the removals that coerce to resort to artificial regeneration. The reforestation programme requires large quantities of quality seeds. Therefore attempts are being made to collect the seeds. A seed collection is one of the man’s old occupations and probably begins when seeds were first harvested for food. Subsequently part of harvest was retained to provide basis for crops for the following year. This step provided the transition from “haunters and food gathers” to agriculture.

In forestry the establishment of artificial plant tree crops derived from specifically harvested seed, was a Silvicultural method seldom practiced before the start of the eighteenth century. With growing general acceptance of plantation as a better alternative to natural regeneration in most parts of the world as growing demand for tree seeds has simultaneously arisen.

The idea of plantation specifically established for the production of forest seed appeared in the literature as early as 1707 (V. Hassenkemp, 1952). A set of rules or prescription to maintain standard of quality control in forest seeds have been developed by the Forest Research Institute, Dehradun. Similar rules have been framed by the International Seed Testing Association (ISTA) of North America and the Federation of International due commerce des Senesces (FIS).

Production, testing and distribution of high quality seed need to be regulated by strict quality control through seed certification (Anon 1979). Various steps essential for executing the seed certification programme i.e. field inspections, collection, processing, sampling and testing of seed need a cadre of well trained professionals. Seed
identification is a necessary part of seed testing, crop improvement, forest management and taxonomy. The ability to recognize seeds, always important in farming has become more essential in modern scientific agriculture and forestry; with out it there would be little merit in perfecting methods of growing useful plants.

Seed identification, which is a specialized field of botany, has been developed over last 50 years to meet the problem of labeling of forestry, agriculture and other seeds. There are no organised treatments for the identification of seed such as the botanical manuals for identification of plants. In India in this regard little effort has been made by Madan Gopal and Thapliyal (1971).

Accurate identification of seeds is necessary for the proper management of forests. This requires a skill and good judgment on the part of seed analyst making the examination. The plant taxonomist may take into consideration all vegetative parts of plants from inflorescence to root in making an accurate identification. The seed analyst on the other hand, must take important decision on the more limited evidence provided by fruit and seed alone.

An old Chinese proverb "one picture is worth ten thousand word" is especially applicable for the identification of seed.

Basic knowledge of fruit and seed morphology is essential for any one involved in seed supply, both in order to identify seeds and fruits (Kozlowski & Gunn 1972).

ETHNOBOTANY

Evolution of human life and culture has directly or indirectly been associated with and influenced by the surrounding environment. Primitive man living closely associated with nature, mainly dependent on it for his survival. His dependence on the plants around him, made him to acquire the knowledge regarding plants and its uses.
Consequently he became the store house of knowledge of many plants, accumulated and enriched through generations and passed from one generation to another.

Ethnobotany came into being when the earliest man observed animals eating certain plants and he gathered and haunted for his food and for healing his wounds. Ethnobotany may be defined as an anthropocentric approach to botany, and is essentially concerned with gathering information on plants and their uses. The term ethnobotany was first coined by Harshberger (1896), to indicate plants used by the aboriginal people.

Historically the field of ethnobotany has belonged to the explorers and adventures of Europe who observed and documented the use of plants by the aboriginal people, they encountered on their travel.

Ethnobotany is very old discipline. Only in the 20th century it assumed the status of a distinct branch of natural science. It has been variously defined by different workers. The mostly widely explanation is “the use of plants in primitive societies.” The present century has witnessed the emergency of ethnobotany as a distinct branch of natural science. There has been increasing interest all over the world in the scientific study of man plant interaction in the natural environment.

More than 300 million indigenous people viz. shifting cultivators, forest dwellers and artisans live in more than seventy countries in habitats ranging from the Arctic to rainforest of Asia and South Africa. India and China together have more than 150 million tribal people.

Due to its interdisciplinary nature and socio-economic impacts, the linkages of ethnobotany have proliferated and its relevance has
been established with problems of nutrition, life support species, rural health, drug use etc.

The impact of ethnobotany in conservation of natural resources is very direct. On one hand it relates to the beliefs, taboos, avoidance and other constructive approaches of the primitive people, on the other hand cultivation practices of some primitive people adversely effect the environment. By and large, the primitive people have preserved forests as sacred groves or through other mythological association. Hence even today the message of conservation can be brought to many primitive societies through faith and tradition rather than in terms of loss of biomass.

Since the early ethnobotanical studies in aboriginal plant use, the scope of ethnobotany expanded enormously, encompassing the botanical aspect of a number of ethno-scientific fields including ethnomedicine, ethnotaxonomy and ethnoecology as well as the anthropological and botanical study of material culture and subsistence mode.

Ethnobotany appears to be a bridge between botany and medicinal plants; but in fact it is much more. It starts a step before even botany in the sense that it supplies the idea and the basic material for botanical research and study. It then takes us to usefulness of plants.

Nature has created plants in the world for every ailment, and there is cure for every disease, man only has to find it out. It has always been a first rate drugstore with enormous range of plants that are known to have effective therapeutic qualities. It leads to a new or less known herbs of traditional medicine, gives us clues for new material for pharmacological and clinical research, and provides data on new local names and new distributional areas of raw drugs and generally such material which are easily available and cheap. Also,
due to obvious psychological ease, the folk medicines have wide local acceptability and provide a broad base for interaction with other practices and prescriptions. Hence, ethnobotanical research provides new vistas for application, improvement and popularization of traditional medicines.

The history of plants in India can be traced to the remote past in the Vedic period. The Rig-Veda perhaps the oldest repository of human knowledge having been written about 4500-1600 B.C claims about 99 medicinal plants, the Yejurveda mentions 82 plants and Athurveda deals with 88 plants, almost all having medicinal ingredients and used to cure deadly diseases. As per the Vedas the Brahmans dealt with 129 plants and Kalpasutra describe some about 519 plants (Kaushik and Dhiman, 2000).

India is very rich in ethnobotanical information. Vast ethnobotanical knowledge exists in India since ancient times. The ethnic people have provided several “Miracle Plants” of immense food and medicinal value to the modern civilization. Traditional knowledge of human health and medicine has recently become a major role in addressing the health care needs of developing countries and indigenous people.

About 80% of India’s population live in villages and a considerable proportion comprise tribal, living in forest areas. Ancient Indian and world literature in medicine suggest that the primitive people used several kinds of medicinal plants for combating disease (Bodding 1925). The Indian people know a great deal about medicinal plants. Studies reveal that the largest proportion of the biodiversity in our entire ecosystem is used by villager communities for human and veterinary ailments (Seters, 1997).

There has been increasing interest in recent years in medical ethnobotany mainly because of renewed interest in traditional herbal
medicine, particularly the tribal medicine. The revival of interest in natural drug especially those derived from plants, started in the last decade mainly because of the wide spread belief in the “green medicines” and that they were healthier and safer than the synthetic ones. Several tribal societies of India practice, traditional farming and grow traditional crop plants and their wild relatives (Singh, 1998).

According to WHO report (1978) on traditional medicine indigenous treatment is main source of primary health care system of 80% population of world (Patil and Yadav 2000).

In North Western Himalaya a wider section of people those living in far flung areas are still deprived by adequate medicinal facilities and employ traditional means, inherited from their ancestors, for curing various diseases.

In Kashmir Himalaya, which is a rich repository of medicinal flora, local treatments are commonly used by the inhabitants of remote far flung areas and nomadic people like Gujjars, Bakerwals, Chopons and Shepherds. The Himalaya, known for its loftiest and longest mountain ranges in the world, is a reputed treasure of medicinal plants. In Himalayas drastic climatic conditions have necessitated the prevalence of indigenous traditional medical system. In Kashmir valley there has been a good impact of Unani system of traditional medicine. Lawrence (1895) in his book on the valley of Kashmir writes “when I have made enquires as to various plants which I have seen in the valley and on hillsides, I am always told that they are hot and good for cold humors, cold and good for hot humors”.

The ethnobotanical exploration conducted during 1982-92 have depicted that vast storehouse of herbal charms still exist with the hill tribes living peace fully in the far-flung mountain ranges surrounded
by everlasting snow. Medicinal plants occur in different altitudinal ranges and grow luxuriously in alpine region.

The valley has a long history of utilization of herbal drugs. There has been a continuously growing tradition of herbal treatments and both Ayurvedic and Unani system of medicine have played a major role in health care system of this region.

Map of the Kashmir Valley, showing location and administrative districts
STUDY AREA

Perched securely among the lofty snow-sprinkled mighty Himalayan mountain chain, the emerald blue skies peeping through the chinks of clouds, the tall chinar or trees swaying to the rhythm of gusts of wind, all condense into a kindly smile, forming a lovely state of Jammu and Kashmir.

It is located in the northern part of Indian sub-continent in the vicinity of the Karakoram and western mountain ranges. It falls in the great north western complex of Himalayan Ranges with marked relief variation, snow-capped summits, antecedent drainage, complex geological structure and rich temperate flora and fauna. The forests of the state are a natural tonic wrapped up in a wonderland- a paradise for the stressed city folk from all over the country. The Kashmir region or valley is a significant part of the state.

Since ancient times, the valley of Kashmir has been a meeting ground of many cultures. The earliest references about Kashmir are contained in the Annals of the Hang-Shu, which date back to 220 BC. After this we find it mentioned in the Greek classics of Ptolemy, Dionysios, Hakataios and Herodotus. In the sixteenth century, Kashmir and its rulers are mentioned in the Annals of the Tang-dynasty. We also find Kashmir and its people described in the Arabic work of Al-Masudi, Al-Qizwini, Al-Idrisi and Al-Beruni. In about 8000 BC the valley was a big lake but after its drainage, it become a habitate for a dozen tribes, most prominent being the Kash, which is also known as the Kassites. This tribe was of Semitic origin and had come from Mesopotamia, where ever this tribe went it made mention of its origin by adding the names as of Kashmir in Egypt, Kasan in Iran, Kashgar in Central Asia and of course the Hindu-Kush mountain.
Kashmir valley lies in between the Himalayan range in the north and of the Pir Panjal range in the south, comprehended between latitude 33°55" to 34°50" and longitude 74°34" to 75°35". The valley lies in the north west of India. The valley is an ancient lake basin 116 miles long and 40-70 miles wide. The average elevation of the valley is 5,300 feet above sea level. The total area is about 6,000 sq. miles. The mountain slopes, being covered with forest and pastures, the low and more or less flat part of the valley measures about 84 miles by 20 to 25 miles, the area being about 2,000 sq. miles or 1.2 million acres. The population density is about 325 per sq. mile.

The valley is believed to have lying under vast lake, which got drained gradually through the Baramulla Khadanyar gorge as the Himalaya grew higher and higher, "The Dal lake, the Manasbal, the Wular and many other lakes are the shrinking remnants of this great lake". The valley bed is covered by Karewa deposits, representing sediments of these vast bodies of lakes water. The remnants now covered the half of the valley.

**CLIMATE**

The climate of Kashmir varies according to aspect and elevation. Owing to this orientation, the climate is rigorous on top of the mountain, while it is temperate in the valley. The valley is not cut off from the influence of monsoon lying in the extra tropical belt. The valley enjoys tropical mountain climate, tempered with moderate monsoon condition. In consequence of the high elevation of Kashmir the winter season is extremely rigorous and cold on the whole, the spring and autumn are pleasant.

The monsoon rain occurs as a result of penetration into this region of the monsoon current through the trenched valleys. During the cold weather the valley precipitation increases with the elevation up to and even above 20,000 feet. As a result the valley gets plenty of
snowfall from middle of December till late in February almost every year.

The precipitation rapidly increases towards south. The north eastern part receives the highest precipitation of over 150 cm. In the extreme south eastern, rainfall exceeds 100 cm. According to district wise distribution, the annual precipitation varies from 60-120 cm. over Anantnag district, and from 80-100 cm over Baramulla district.

There is a conspicuous change in the climate with altitude. As the altitude rises towards meadow slopes (“morgs”) of the surrounding mountain, the temperature of 24°C at Srinagar (altitude 1600 m) decreases to 10°C at an elevation of 3600 m. There is also some yearly change in the climate, making some workers believe that Kashmir has not one but combination of climates. Meher-Homji (1971) classified the climate of Kashmir as the Mediterranean type.

On the basis of temperature and precipitation the Kashmir valley has four seasons viz. winter (Dec.-Feb.), spring (March-May), summer (June-August), autumn (Sep-Nov.)

However, a common local practice in Kashmir is to recognize six seasons in year (two month each), namely spring (‘Sonth’), mid March to Mid May; (‘Grishm’) mid May to mid July; rainy season (‘Waharat’) mid July to mid September; autumn (‘Haurd’) mid September to mid November; winter (‘Wand’) mid November to mid January; sever winter (‘Sheshur’) mid January to mid March.

The temperature ranges from an average daily maximum 31°C and minimum 15°C in the July to and average daily maximum of 4°C and minimum of -4°C in January. The maximum daily humidity ranges from 80-90% through out the year and drops about 70% at night during the winter and 40% during the summer.
GEOLOGY

The geology of the Kashmir region displays a chronological record of the great alpine orogeny including the sedimentations, tectonics and volcanicity that followed the Himalayan orogeny. In addition to exhibiting on its surface the rock specimens belonging to all ages, beginning from Archaen complexes which formed the floor of the Himalayan geosyncline up to the recent alluvium, the region also displays remnants of global deposits at lower altitudes as an evidence to climate changes in part. Evidence of dynamic structural deformation like folds, faults, thrusts, napes and huge igneous intrusions are also discernible, (Pithawala 1953; Wakhaloo, 1964 and Raza et al 1978).

The valley of Kashmir was formed by folding and faulting as the Himalayan mountain chain was thrust between the Indian subcontinent and the rest of Asia. The valley runs northwest to the southwest along the strike of mountain chain and is drained by the river Jhelum, which cut through Pir-Panjal at the Baramulla gap. The Pir-Panjal Ranges south of Kashmir valley comprise mainly the basaltic lava, flows of the Panjal volcanic (lower permenia) and also sporadic sediments of agglomeratic slates, Gondwana beds and zewan formation of Permo-carboniferous age.

'Karewas' form a conspicuous feature of the geology of Kashmir (Sahni 1936). The Karewa formation of Kashmir valley belongs to pleistone ice age. During the pleistone epoch the valley was occupied at times by a lake, known as the Karewa lake, which got filled by the lacustrine sediments and the alluvium deposited by the river Jhelum. Thus, the valley is now an alluvium-filled basin, a large part of this alluvium-filled, being recent formation by the river Jhelum. The alluvium comprising compacted detrial material, such as the loom and clay, provides a useful base for agriculture activities.
**TOPOGRAPHY (PHYSIOGRAPHY)**

Physiographically, the region comprises a number of zones that are closely associated with structural components of the western Himalaya. From southwest to northwest these zones consists of the plains, the foot hills, the Pir-Panjal range, the valley of Kashmir, the great Himalayan range, the upper Indus valley and the Karakoram Range. Accordingly, there is a tremendous variety of landform and climate in the region.

Kashmir has been described land of lakes, streams, turfs, fruits, forests and mountains. Performed securely among the snow capped mountains at an average height of about 15,000 feet above the sea level, lies the green valley of Kashmir. Range after range of mountains guard valley. The general aspect of the valley is that of basin surrounding on all sides by a ring of lofty mountains. Within it is an extensive terrace of alluvial soil watered by river Jhelum and its numerous tributaries. These rivers and streams flow down from the mountains and are fed by glaciers, snow and rain. The valley resembles a gem set in the gasket of ever lasting Himalayas. The wild grandeur of its mountain barriers and its own intrinsic loneliness make it an “emerald set in pearls”.

Topographically, it is a deep elliptical bowl-shaped valley bounded by mountains and 64% of the total area of the valley is being mountains. The altitude of the floor of valley at Srinagar is 1600 m (above sea level) and the highest peak among its surrounding mountains is that of the Kolahoi or ‘Gwashibror’ (Kaul 1977).

**SOIL**

Kashmir depicts rich diversity in soils, whose origin varies from alluvial to lacustrine and glacial. The soil cover is of considerable thickness in the bowl of Kashmir and in the adjoining traces where
enormous deposition has taken place since Pleistocene times. Hoon (1939) studied the soils in the hill of Kashmir. Raza et al (1978) dealt with the soil of Kashmir with reference to the following broad Physiographic divisions.

The valley basin and the side valley of the Jhelum up to 1850 m; the highlands, mainly between 1850 and 3350 m; and the Karewa uplands.

**Valley Soils:**

The soil of valley basin and the altitude terraces are fertile and abound in organic matter and other plant nutrients, being fairly rich in Calcium & Magnesium. The texture is variable from clay-loam to loams.

**Highland Soils:**

There are important differences in soil types with in the highlands; mainly depending, inter alia, on the site, nature of the slope and altitude. The mountain slopes are usually forested with extensive patches of grasslands. Texturally the soils of different altitudinal belts in Kashmir valley are mostly silty and clay (Kaul in Raza et al. 1978)

**‘Karewa’ Soils:**

The Karewa soils are composed of slits, thus poorer, though differences occur between the Karewa gurtic varieties and the rich gurtic soils. Based on colour, the Karewa gurtic soil types vary from light-hued soil (e.g. Ompora Karewa) and red-hued soil (Budgam Karewa) to the dark blackish soil referred to as ‘Surhzamin’. The Karewa soil are economic important and are used for growing saffron, almonds, walnuts, apples, peaches. The higher reaches of Karewa soils are under maize cultivation.
There are other special soil types locally known such as "Surhzamin" (Vegetable soil), 'lemb' (tract of land served by a natural spring), 'Redh' (floating garden soil, 'Tand' (land on mountain slopes reclaimed form forests).

**VALLEYS**

**Lidder Valley:**

The first upland valley to the east of Jhelum is the Lidder valley and it gives passage to a river at the same time. It extends in a northern direction from Anantnag to Phalgam and includes the parganas of Dachinpor on both sides by mountains which are interestingly lofty and covered with dense forest.

**Sind Valley:**

The Sind valley is the most beautiful lateral valley of Kashmir. It owes its name to the river Sind Lar which is fed by the glacier and streams. It extends from Ganderbal to the Zojjilar pass, covering a distance of 58 miles. This valley is best example of the grandeur of mountain scenery of Kashmir. Sunmarg is the most beautiful undulating grassy meadow now the Tajwar glacier which is a famous tourist spot. The valley abounds in large forests of pine and the tracts down below are linked with walnut and many other kinds of trees.

**Lolab Valley:**

This is fertile oval shaped valley and is situated in the north east side of Kashmir. It is about 15 miles long and 3 miles wide. The valley is thickly covered with dense forests of deodar. There are extensive pastural lands in the valley under the hills and along the side of the spurs, where a large number of cattle are grazed. Beside this fruit like apple, cherry, peach and walnut are abundant.
RIVERS

The principal river of Kashmir is the Jhelum, which flows in the middle of the valley, locally known as the Vyeth; it has its source at the Verinag spring, situated at the foot of the Pir-Panjal Mountains. At Srinagar, it flanks the Dal Lake and before it enters into the lower Wular Lake at Bangari, it is joined by Sind (Lar) on the right. From Khanbal to Bangari, the river covers 80 miles and it’s out fall at sopore. The Phoru River joins the river at Doebgeh, very rich deodar forests lie in the region and these are floated down to the river in the form of logs.

LAKES

1. The Wular Lake is the largest freshwater lake in India. It is about 16 km long and 9.6 km wide with ill defined shores. This lake lies between Bandipore and Sopore at a distance of 75 km.
2. The Dal Lake is a beautiful lake near Srinagar. It is 8 Km long and 6.4 km wide. It is the flood-lung of Jhelum.
3. The Anchar Lake is a swampy area. It is 8 km long and 3 km wide.
4. The Manasbal Lake is situated at a distance of 21 km from Srinagar. It is 5 km long and 1 km wide.

VEGETATION TYPES

The valley of Kashmir has a rich flora and presents a picture of an almost constant verdure.

(I) **Sub-Tropical deciduous:** - This is characterised by a large number of trees, mostly deciduous, which extends from the lowest altitude to about 1500 mts. This type occurs is Uri Tehsil of Baramulla district.
(ii) **Temperate zone:** - This is by far the most extensive vegetation zone in the state and occurs between 1500 and 3000 mts, altitude. It extends over the entire Kashmir valley.

(iii) **Alpine zone:** - This is characterised by high level birch, Rhododendron, Willow etc., and a multitude flowering annuals which lend a characteristic scenic grandeur to the meadows of Kashmir. This zone ranges from 2400 m and above.

**FOREST TREES**

Kashmir is rich in forests which abound in a great variety of trees. Almost all the mountains are coated with dense forests, of these the deodar or Himalayan cedar merits the first notice. Then comes Kairo or Blue pine. The Himalayan spruce is known as Kachil in Kashmir. Budloo is the Kashmir name for *Abies webbiana* or the Himalayan silver fir. The Brimiji or *Celtis australis* is species of neetle tree which abounds in Cemtries. The forests of Kashmir are full of Birch, Maple, Hazel, Wild Oak, Beech, Fir and Pine.

The Saroo is very common in forests as well as gardens. The Blue pine and Fir are the most prominent among the coniferous species. The Fir generally occurs above an altitude of 2500 m and may be seen up to 3100 mts, which is practically the tree limit in Kashmir. The blue pine chips are used as lights and torches by the villagers.

The Deodar is the more or less absent on the northern slopes of the Pir-Panjal facing the valley, but elsewhere, it forms extensive forests, particularly in the Lolab valley. The Deodar is usually seen in the altitude of 7000-12000 feet above the sea level. The spruce and the blue pine may in some places occur along with the Deodar but in Kashmir the spruce does not attain much prominence and is found only in patches. The silver fir grows to a great size, reaching 150 feet in length and 16 feet in girth.
Among the broad leaved trees of Kashmir mention must be make of Maple, Beech, Brimiji, Hazel, Hawthorn, Birdchiry, Elm and Birch. The birch or bhojpatra and alder approach the limit of perpetual congelation. The graceful birch grows at high altitude. The yare (Pinus wallichiana) found in Gulmarg, district Kupwara and Guraiz.

The popular (Phras) attain a great length and luxuriance. There are two species of popular found in Kashmir and the Kabuli, popular is very beautiful with white bark and with salivary leaves. The species of willow grow in the valley. A familiar planted tree is chinari which like the walnut belongs to the valley.

FOREST TYPES

Champion and Seth (1968) have classified the forests of Jammu and Kashmir State under the following seven types, among 16 major ones recognized by them in India.

<table>
<thead>
<tr>
<th>Group Number</th>
<th>Forest Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Sub-tropical pine forest</td>
</tr>
<tr>
<td>10</td>
<td>Sub-tropical dry ever green forest</td>
</tr>
<tr>
<td>12</td>
<td>Himalayan moist temperate forests</td>
</tr>
<tr>
<td>13</td>
<td>Himalayan dry temperate forests</td>
</tr>
<tr>
<td>14</td>
<td>Sub-alpine forest</td>
</tr>
<tr>
<td>15</td>
<td>Moist alpine forest</td>
</tr>
<tr>
<td>16</td>
<td>Dry alpine scrub.</td>
</tr>
</tbody>
</table>

The terminology of these forest types changed by Singh and Singh (1987) and the groups 9 and 10 occur mostly across the Pir-Panjal. Furthermore, the classification of Champion and Seth (1968), based mainly on climate condition does not hold good for the Kashmir
valley, because its typical temperate climate is not influenced by the southwest monsoon and it is marked by different from that of the outer Himalaya. Therefore, our forests do not fit exactly into the broad types of Champion and Seth (1968). This has prompted some local workers to elaborate the idea of Inayatullah and Tiku (1964) to classify the forests of Kashmir valley under a distinct sub-type. 'Kashmir valley temperate forests (also Wali 1964, Inayatullah and Tiku 1965, Kawosa 1977, Tiku 1978, Wadoo and Zadoo 1980, Kema 1983). Accordingly, these forests are classified into three main groups; viz. Kashmir temperate forests, Kashmir sub-alpine forests and Kashmir alpine forests (Sub-tropical dry ever green forest type covers a few small pockets in the northwest part of Kashmir).

1. Kashmir temperate forests
   (i) Karewa forests
      (a) Karewa blue pine forests
      (b) Karewa deciduous forests
   (ii) The montane forests
      (a) Montane mixed coniferous forests
      (b) Montane decidous forests
      (bi) Montane broad leaved forests
      (bii) Montane parrotiopsis forests
      (c) Montane high-level kail forests

2. Kashmir sub-alpine forests
   (i) Montane high level fir forests
   (ii) Birch forests

3. Kashmir alpine forests
1. **Kashmir temperate forests (1600-2700 m)**

These forests as conceived here correspond to the group 12 & 13 of Champion and Seth (1968), namely Himalayan moist temperate forests. This group is characterised by the extensive occurrence of coniferous forests, with little species diversity and after interspersed with some broad-leaved, deciduous arboreal elements. The species distribution varies greatly with the altitude and aspect, as a result of which two main sub-groups may be recognized; the Karewa forests and the montane forests.

(i) **The Karewa forests (1600-2500 m)**

These forests are distributed on the Karewa mounds along foothills and being near to habitation, are subject to much biotic interference. Two main types of forests can be recognized in this category.

(a) **Karewa Blue-pine forests.**

These forests comprise pure stands of blue-pine/Kail (*Pinus wallichiana*), with very little deodar (*Cedrus deodara*) and since broad leaved trees on moist slopes, viz. *Aesculus indica, Fraxinus excelsior, Crataegus songarica, Populus alba, Ulmus* species, *Juglans regia* and *Ailanthus altissima*. The understorey comprises shrubs belonging to species of *Viburnum, Berberis, and Clematis*. The ground cover is formed by species of *Viola, Fragaria, Thyonus, Taravacum, Podophyllum, Ranunculus* etc.

(b) **Karewa deciduous forests**

These forests occur on the southern and other exposed slopes, which have been cleared of the original forests, and are subject to grazing and browsing. There is no tree cover (or only some isolated trees), but various shrubs and bushes, such as species of *Berberis, Rosa, Indigofera* etc.
(ii) **The Montane forests (2100-2700 m)**

These comprise a variety of forests, with pure and mixed strands of coniferous and broad leaved elements. Based on the crop characteristics, the following three types may be recognized.

(a) **Montane mixed coniferous forests**

These forests consists of mainly blue-pine and silver fir (*Abies pindrow*), with a little of Deodar, Spruce (*Picea Smithiana*), and Yew (*Taxes wallichiana*). The broad leaved trees, including *Aesculus indica*, *Fraxinus excelsior*, *Juglans regia*, *Corylus colurna*, *Prunus cornuta* and *Acer caesium* are often associated along moist places.

(b) **Montane deciduous forests**

These forests generally occupy the northern slopes with better moisture condition. The various tree species forming these forests include *Juglana regia*, *Aesculus indica*, *Fraxinus excelsior*, *Prunus cornuta*, *Acer caesium* and *Salix* species.

(bi) **Montane broad leaved forests**

These forests generally occupy the northern slopes with better moisture conditions. The various tree species forming these forests include *Juglans regia*, *Aesculus indica*, *Fraxinus excelsior*, *Prunus cornuta* and *Salix* spp.

(bii) **Montane Paratiopsis Scrubs**

The openings in the mixed coniferous forests often have extensive growth of Parratiopsis species.

(c) **Montane high-level Kail forests**

These occurring between the montane mixed coniferous forests and the sub-alpine forests. This type comprises pure belts of *Pinus*
wallichiana. The broad leaved associates include *Aesculus indica*, *Acer* species, *Fraxinus excelsior*, *Indigofira heterantha* and *Desmodium elegans*, while the ground flora is more or less similar to that is the mixed conifer forests.

2. **Kashmir Sub-alpine forests (2700-3400 m)**

   These forests correspond to the group 14A of Champion and Seth (1968) and are characterized by the preponderance of Silver fir in the lower reaches and birch at higher elevation. Accordingly, two types of forests are discernible:

   (i) **Montane high level fir forests**

   *Abies pindrow* and *Abies spectabilis* are dominant being spotted with *Pinus wallichiana*, *Picea smithiana* and Broad-leaved arboreal elements, including *Acer* species, *Prunus cornuta*, *Syring emodi*, *Aesculus indica*, *Juglans regia*. In the higher reaches of these forests, fir is generally replaced by white birch (*Betula utilis*) and some shrubby species of *Salix* and *Lonicera*.

   (ii) **Birch forests**

   These forests occur at higher elevation in the sub-alpine zone, usually above 3200 m, though isolated tree may also be seen dotting the high-level fir forests much below this altitude. The tree comprises pure patches of *Betula utilis*, the last tree elements in the Kashmir Valley Mountains.

3. **Kashmir Alpine forests (3400/3700 m)**

   These forests occur above the tree line, is very cold and rigorous climate. They comprise alpine scrubs, formed mainly by stunted *Betula utilis* and *Juniperus squamata*. 
CHARACTERISTICS OF THE KASHMIR FOREST

- Deodar is more or less absent on the northern slopes of the Pir-Pinjal facing the valley, but elsewhere it often forms pure strands between 1700-2500 m, particularly in the Lolab valley (Muthoo and Wali 1963, 1965).

- The spruce at some places occurs in association with blue pine and deodar, and at other with fir, but on the whole it does not attain much prominence and is often seen as isolated trees or only in small patches.

- The Yew (Taxus wallichiana) is less frequently encountered throughout these forests.

- The broad-leaved deciduous woody species occur along damp situations, sometimes forming extensive association by themselves.

- The birch forests usually occur above 3200 m elevation.

- The alpine scrubs comprise such hardy species as shrubby birch, Junipers, Some willow and Lonicera.