1 Introduction

1.1 Background

Further details are given in the Fact Sheet for Jammu and Kashmir, Annex 1.

1.1.1 Location and Terrain

The State of Jammu and Kashmir (J&K) is the northernmost state of India. It lies between 32°17' and 37°N and 74°18' and 80°83' E. It has a total area of 101,387 sq. km.

The terrain is hilly and mountainous, with the exception of some plains in Jammu and the Kashmir Valley. The State can be divided into three distinct physiographic zones: Jammu, Kashmir, and Ladakh.

Jammu lies between 32°20' and 33°10' N and 74°45' and 74°55' E. The **Kashmir** Valley is an oval-shaped plain embedded in the mountains at an elevation of 1,585 masl, and lying between 33°15' N and 34°07'N and 74° and 75°10'E. **Ladakh** lies between the Himalayan and Karakoram Mountains. The main town of Ladakh is Leh, at an elevation of 3,517 masl and located at 34°10'N and 77°37'E.

1.1.2 Agro-Climatic Zones

Jammu and Kashmir State can be divided into five agro-climatic zones.

Sub-Tropical Zone

Parts of Jammu, Udhampur, Poonch, and Rajouri districts fall in this zone. The mean elevation ranges from less than 300 masl to nearly 1,350 masl. The main features are hot summers with monsoon precipitation and relatively dry but cold winters.

Valley Temperate Zone

This zone covers the Kashmir Valley and inner Himalayan valleys. The mean elevation ranges from 1,560 masl to about 4,200 masl. The zone has wet, cold, and snowy winters and relatively dry and moderately hot summers.

Dry Temperate Zone

This zone includes all areas above the outer hills including the major parts of the districts of Poonch, Rajouri, and Doda. The altitude ranges from 1,300 masl to more than 3,000 masl.

Cold Arid Zone

This zone covers the districts of Ladakh in the east and Gilgit and adjacent areas in the north-west. The altitude ranges from 2,900 masl to peaks of 7,200 to 8,400 masl. The main features are severe cold and dry winters with moderately hot summers.

Intermediate Zone

This zone covers the mid and high altitude areas of Doda, Poonch, Rajouri, and Udhampur. The rainfall pattern here resembles that of the Valley Temperate Zone in winter and that of the Sub Tropical Zone in summer.

1.1.3 Soils

The soils of Jammu and Kashmir are the result of climatic and geomorphic processes. They vary from skeltonised to deep alluvial soils. Mountain meadows, sub-mountain (podsolic) soils, and brown hill soils are mainly confined to Ladakh, Kashmir, and parts of Jammu. Deep alluvial soils are only found in the lower parts of Jammu.

1.1.4 People

In 1991, the estimated population of the state was 7.72 million, compared with 3.25 million in 1951. The population density in the state is 76 persons per sq. km., compared with a national average of 267. But the population is growing at a fast rate, at 2.97 per cent per year, which is 0.04 per cent more than the growth rate between 1961 and 1971. About 76 per cent of the total population live in rural areas.

1.1.5 Livestock

The total livestock population in J&K in 1982 was 6.01 million. By 1992 it had increased to 8.71 million.

Grazing Intensity

The increasing numbers of cattle, sheep, and goats is placing an immense pressure on the limited grazing resources within the forest area of J&K. Grazing is preventing forest regeneration and is a limiting factor to the success of Forest Department plantations.

Less than 50 per cent of the total forest area may be available for grazing as a result of inaccessibility, closure for regeneration of plantations, or closure of protected forests, national parks, and sanctuaries. If 3 million cattle graze in the available forest areas, then the grazing intensity is more than 3 cattle per ha. For proper grazing, each head of cattle requires 2 ha; thus the grazing intensity is at least 6 times the permissible limit. The ways to overcome this are to put more area under pasture, to raise fodder yield from forest areas, and to raise pasturage outside forest areas by closure and rotational grazing.

Nomadic Grazing

The major characteristic of grazing in the valleys and high mountain pastures is the age-old practice of nomadic grazing. Every year, nomads move down to the plains during winter with their livestock—large numbers of buffalo and cattle—especially to the warmer areas of Jammu, Himachal Pradesh, and the Punjab. Nomadic grazing is a direct consequence of the cold climatic conditions in the upper reaches of the State. In winter, these areas are covered with snow, grass is not available and pasturage is scarce. Thus the animals have to move to the warmer areas for fodder. This form of land use is considered bad, as it does not provide stability for the nomadic grazers and the continual movement deprives the nomads of socioeconomic benefits. Farmers in the neighbouring states, who also keep cattle, must compete for fodder with the herds of the nomads.

1.1.6 Forests

Approximately 20 per cent of the total geographical area of J&K state is forested (see Table 1.1). This is just above the national average of 19%, and far less than the desired coverage of 66% as per the National Forest Policy for the Himalayan region. Two-thirds of the total area of the state, however, is occupied by the vast cold desert of Ladakh. And forest cover in the

Table 1.1:

Region	Total Geographical Area (in sq. m)	Forest Area* (in sq. km)	Forest area as % of Total Area
Jammu	26,293	12,066	45.89
Kashmir	15,948	8,128	50.96
Ladakh	59,146	36	0.06
Total	1,01,387	20,230	19.95

* 'demarcated forest', see Annex 1

remaining forest region of Jammu and Kashmir is actually 47.8%. Before 1947, forest cover in this area was 52%, thus 4.2% or about 870 sq. km. of forest cover has been lost since then as a result of heavy encroachment and conversion of forests into non-forest uses.

Of the total forest area, about 5,000 sq. km., or one quarter, suffers from degradation of different magnitudes. Degradation results from the disproportionate growth in the human and livestock population coupled with deforestation and a widening gap between the demand and supply of forest produce. It is difficult for the Forest Department to meet the social demands of people on a sustained basis from the existing resources.

The forests in the state can be classified into three main types, sub tropical, temperate, and alpine, each with a number of sub-types.

Sub-Tropical Forests

The sub-tropical forests can be further classified into dry deciduous forests, pine forests, and dry evergreen forests.

Dry Deciduous Forests.These are found all along the foothills and are characteristic of areas that receive monsoon rains. The dominant species are *Acacia catechu, Lannea coromandelica, Dalbergia sissoo, Anogeissus latifolia, Aegle marmelos, Ehretia laevis, Kydia calycina*, and *Ougeinia oogenenesis*.

Pine Forests—Chir pine *(Pinus roxburghii)* forests cover the outer ranges between 800 and 1,800 masl. They are found in pure stands on the outer hills of Jammu. This species requires a well-drained soil and is found on quartzite and limestone formations. At suitable altitudes, chir pine easily colonises grassy slopes when protected against fire and grazing. Towards its lower limit it merges with dry deciduous forests, and at its upper limit it is associated with broad-leaved species like *Lyonia ovalifolia* and *Pyrus pashia*. At higher altitudes, blue pine and deodar establish themselves under chir pine and finally replace it. Hot dry slopes are often covered with gregarious patches of *Euphorbia royleana*, a thorny succulent, in association with *Rhus parviflora* and *Carissa spinarum*.

Dry Evergreen Forests—These forests are found at around 1,000 masl: that is in areas characterised by a hot dry season, with a marked cold winter and occasional frost. The species include *Mallotus philippinensis, Nyctanthes arbortristis, Cassia fistula, Dendrocalamus strictus*, and shrubs like *Carissa spinarum, Dodonaea viscosa, Woodfordia fruticosa, Adhatoda vasica*, and *Zizyphus* spp.

Temperate Forests

Temperate forests can be sub-divided into Himalayan moist temperate and Himalayan dry temperate forests.

Himalayan Moist Temperate Forests—The dominant species in this type are *Cedrus deodara, Picea smithiana, Abies pindrow, Pinus wallichiana*, and *Quercus semecarpifolia*. Other species found include *Euonymus tingens, Rhododendron arboreum, Meliosma* spp., *Carpinus viminea, Acer caesium, Fraxinus micrantha, Prunus cornuta*, and *Betula aloides*. Depending on the dominant species, the forests can be further sub-divided into types.

Moist deodar forests lie between sub-tropical pine forests and sub-alpine formations. They are mostly found between the altitudes of 1,700 and 3,300 masl, except on the northern slopes of the Pir Panjal Mountains, where they occur between the outer wet ranges and the inner dry zone The number of dominant species is small, and the species occur in more or less pure stands rather than in mixed ones. Depending on the altitude and aspect, the principal species are *Cedrus deodara, Pinus wallichiana, Picea smithiana*, and *Abies pindrow*. There is a small mixture of broad-leaved species, *Parrotia jaquemontiana* predominates in the west.

Kail (*Pinus wallichiana*) forests have a greater altitudinal range than other conifers (1,200-4,500 masl). The species merge with *Pinus roxburghii*, birch, and junipers at the lower and higher limits, respectively. Kail forms pure stands as riverine blue pine forests and is also found at

the lower edge of forests on moderate and gentle slopes in Kashmir Karewas, and areas adjoining villages.

Fir forests of *Abies pindrow* (silver fir) and *Picea smithiana* (spruce), with mixtures of blue pine, deodar, and some evergreen and broad-leaved species, are found above deodar forests at altitudes between 2,400 and 3,000 masl.

The common **shrubs** in these forests are *Rosa moschata, Lonicera quinquelocularis, Strobilanthes wallichii, Smilax vaginata, Viburnum cotenifolium, V. stellulatum, Asparagus* spp, *Jasminum humile,* and *Deutzia corymbosa.* Ground flora include *Viola canesens, Fragaria vesca, Ophiopogon* spp, *Polygonum speciosum, Impatiens* spp, *Vicatia conifolia, Valeriana wallichii, Ainslaea aptera, Galium* spp, and *Adiantum venustum.* Some common climbers are also found like *Hedera helix, Vitis himalayana, Clematis montana, and Jasminum officinale.*

Himalayan Dry Temperate Forests—The Himalayan dry temperate forests are mainly composed of conifer species. These forests are found in the inner ranges of the Himalayas at an average elevation of about 1,700m where the impact of the south-west monsoon is feeble, and the total annual precipitation is about 1,000 mm, usually in the form of snow in winter. The major species is deodar (*Cedrus deodara*), which occupies the zone ranging from 2,000-2,500 masl. Forests here are sometimes mixed with or replaced by *Pinus wallichiana* at lower altitudes with a warmer climate. Higher up, in moist locations, they are mixed with *Abies pindrow* and *Picea smithiana.* Broad-leaved associates of this forest type are *Acer caesium, Fraxinus micrantha, Quercus dilatata, Ulmus wallichiana,* and *Corylus colurna.* Shrubs like *Artemisia, Astragalus,* and *Ephedra rom* are also found.

Alpine Area

Forest type growth in the alpine area can be classified into moist alpine and dry alpine scrub.
Moist Alpine Scrub—This type of vegetation starts immediately above the tree line at 3,600 masl and extends up to 4,900 masl. The scrub areas contain stunted vegetation like *Juniperus squamata, J. recurva, J. macropoda, Rhododendron anthopogon,* and *Betula utilis,* alternating with meadows. Many herbaceous plants are found; including species from the genera *Gentiana, Saxifraga, Corydalis, Rumex, Cardamine, Thymus, Aster, Viola, Campanula, Fritillaria,* and *Epilobium.* Common grasses are *Agropyron* spp, *Bromus asper,* and *Poa annua.*

Dry Alpine Scrub—This type of vegetation is found in the inner ranges adjoining dry temperate forests at 3350masl. The vegetation is xerophytic with dwarf shrubs predominating. The common species found are, *Juniperus wallichiana, J. communis, Caragna brevispina, Artemesia sacrorum, Lonicera* spp, *Potentilla* spp, *Salix* spp, *Myricaria* spp and *Hippophae rhamnoides.* Herbaceous flora include *Sedum crassipes, Srosulatum* and *Androsace rom, Primula minutissima, Saxifraga* spp, *Leontopodin* spp, *Arenaria* spp, *Collianthemum kashmerianum, Draba gracillima, Potentilla fruticosa, Koleresia dutheii,* and *K. capelifolia.*

1.2 The Role of Forests in the Livelihood of Mountain People

Forests play an important role in increasing the productivity of agricultural land by provision of humus and leaf litter.

The forest topsoil is very rich and fertile. Local communities apply topsoil and leaf litter to their agricultural fields. These natural fertilisers are rich in nutrients and improve the texture of the soil, thereby enhancing the water-holding capacity, which results in an increase in agricultural yield. The forests themselves increase the rate of infiltration and decrease water runoff, thereby protecting agricultural fields from excessive erosion. Forests also serve as shelterbelts and windbreaks. They protect agricultural crops from extremes of temperature, and serve as a water bank regulating the water in springs and streams below.

In the past, the Shivalik belt from Ravi to Rajouri was covered with deciduous forests. There were large numbers of springs and a perennial flow of water in the gullies. The forests were full of wildlife,

and the forest communities, nomadic grazers, and wildlife lived in harmony with the forest.

With the increase in human and livestock populations, and because of forest encroachment, these forests became degraded. As a result, both the perennial streams and seasonal and permanent springs dried up. About 30 years ago, deep tubewells were dug to supply drinking water to the people living in the area. Now the water table has dropped and the Public Health Engineering (PHE) Department is facing difficulties in supplying drinking water to the communities living around the forests. With the depletion of forests in Poonch-Rajouri, part of Udhampur district, part of Doda district, and the Kandi areas of Kashmir province, people are facing water shortages, a non-existent problem in the past.

Shortage of fodder for local communities and nomadic grazers has also caused occasional conflict and at times explosive situations.

1.3 Forest Management

The term common property resources is not commonly used in J&K State. However, it applies in essence to the community forests that have been formed and are being managed under the Statutory Rules and Orders No. 61 (SRO-61) of 1992. In community forestry, the local communities and the Forest Department are partners in managing the forests.

Demarcated forests are the property of the state government. The government frames acts and laws from time to time for their protection and management. The local communities enjoy concessions in these forests to meet their bonafide requirements, but they do not enjoy concessions on all forest products. The government can withdraw these concessions at any time. Details of such concessions are given in the Kashmir Forest Notice, 1912, and the Jammu Forest Notice, 1912.

1.3.1 Traditional/ Indigenous Forest Management Approaches

Before 1947, informal community systems for the overall welfare of the village community existed in all villages and hamlets.

Forests were divided informally among villages or clusters of villages. Each village community met its requirements for fodder, fuelwood, and minor forest produce from its own forests, and would not interfere in the forests of other villages. No villager would encroach upon the forest land or harm the forest because they respected the forest and feared community sanctions.

Any disputes between individuals or groups of individuals within the village community were resolved by the '*bradari*', or in certain localities the '*bradari-bhaichara*' or '*panch*'. The Bradari was an informal body of people of high integrity and good understanding who commanded respect in the community. The governing body was non-elected and had no fixed number and was chosen from among all the individuals of a village. The decisions taken by the body were implemented faithfully. They were made after detailed deliberations and guided by past practices. Forests were effectively protected under such '*bradari*' or '*bradari-bhaichara*' systems.

Immediately after the independence of India from British rule, a new system was set up in J&K State. With the coming of many political parties, the traditional systems underwent change. Village communities became divided into political and ideological groups, creating tensions within them. Because of this, common property resources became the target of misuse, and forests were affected by encroachment, illicit felling, and other forms of degradation. Even so, most village communities still restrict their activities to their own village forest.

1.3.2 History of Forest Management before Independence

In earlier times, the administration of the forests was with the civil authorities. The Wazir-i-Wazarat was in charge of a district, while under him *tehsildars* managed the affairs of each *tehsil*. The office staff consisted of one moharrir together with the Wazir-i-Wazarat. An official, often illiterate, called a '*girdawar*', or '*kumbadan*', controlled outdoor work with a few '*rakhas*' or '*chaprassis*' working under him. The kumbadan collected the forest dues or '*rasums*' on the various articles consumed, initially from

individuals but later from village communities. This collection of revenue was the only work that was done, and no protection work was undertaken.

No records are available to show the extent to which forests were worked for timber in earlier times. Timber felling for export began in about 1855 AD (1912 Bikram Sambat) by traders from Punjab, and afterwards by state contractors. *Pattas* and written permits allowing the holder to fell a certain number of trees of any diameter anywhere he wished were granted on payment of a fixed sum per tree in advance. Supervision of harvesting was minimal. The permit holder or contractor felled trees in the places most convenient for him. For a long time, only local labourers were employed for log extraction. The villagers cut trees around their cultivated areas, near their villages, and as close as possible to floating streams. Forests in such localities still bear evidence of the devastation caused in the shape of stumps standing on agricultural lands, and bare areas with useless undergrowth.

The scientific management of forests in British India started with the appointment of a German-trained forester, Dr. Brandis, as the Superintendent of Forests, Pegu (Burma) in 1856. The appointment of Dr. Brandis as the first Inspector General of Forests of India during 1864 marked the initiation of planned forest management. It was Brandis who developed the principle of tree extraction: that in any forest the number of First Class trees (trees over prescribed diameter) felled in one year should be equal to the number of growing stock of second class trees. Within a few years, Brandis undertook extensive tours of the most valuable forests in the country with local conservators. He discussed and initiated the preparation of simple working plans for selected forests. In 1864, Brandis, Steward, and Wood prepared the "Valuation Survey Report on Bushar Forest" in the Punjab. To make headway in preparing simple working plans, Brandis was assisted by two other trained forest officers, Schlich and Ribbentrop.

In 1882, when the Forest Department was decentralised a new situation arose which caused a setback to the progress of working plans. Before that, the Department's affairs were in the hands of the Central Government, and the Inspector General wielded power. With decentralisation in 1882, the revenue from forests within their jurisdiction went to the local governments, and officers showing an increased surplus received pronounced recognition in the annual report, irrespective of whether the increase was from overfelling or not. As a result, even where working plans existed, the prescriptions therein could easily be deviated from, and even dodged by local officers under the direct influence of the local government.

In 1884, as a result of the efforts of Mr. Schlich, the Inspector General of Forests, the control of preparation of forest working plans and management of forests were brought under a Working Plan Branch created in the office of the Inspector General of Forests. The centralisation of the preparation of working plans resulted in an immediate spurt in working plan activities all over the country. During 1892, Mr D' Arcy wrote a monumental manual on forest working plans. Following this, the writing of working plans was standardised.

In 1891AD the State Forest Department of J&K was created, managed by the then mperial Forest Service (IFS) officer Mr. J. C. McDonell. In 1893 AD, the State Council passed the Forest Regulation No.1, and rules for protecting forests were drawn up. Demarcation activities commenced and surveys of boundaries were undertaken. The Department's capacity was increased to cope with the increase in work. Forest fires were discouraged and practically suppressed. Roads and paths were constructed to facilitate access to the countryside, felling of green trees was discontinued, and the energy of the Department was devoted mainly to working out the felled trees and logs/sleepers left in the forests by former contractors. The Department also felled dying and deformed trees that could not be expected to survive for long.

Scientific forest management started later in J&K State than in other Indian states, but it had the advantage of the experience gained in other states under British India, especially the

advantage of D. Arcy's manual on forest working plans prepared in 1892.

Mr. W. Mayes, an IFS officer, prepared the first working plan for Bhaderwah Forest Division in J&K State in 1902 unassisted by any trained staff. He not only completed demarcation of the forests, but stock mapped them, divided important portions into manageable units, described them, and even collected useful statistical data on single tree growth. Under this plan, selection felling of a limited number of trees over 7½ feet girth was prescribed in each compartment. In 1904, timber harvesting by the Department was abandoned, and the principle advocated in the Indian Forest Department of sale of standing trees to a purchaser was adopted.

The Kishtwar working plan was prepared in 1908, under which deodar forests were worked according to the Indian Selection System with exploitation of trees over 7½ feet in girth. Other species, including blue pine, were ignored and the felling cycle was fixed at 14 years. In 1912, the Kashmir Forest Notice and Jammu Forest Notice were issued. These notices gave the local community certain concessions, and in lieu of these concessions the communities were legally obliged to protect the forests. This was a historical event, which laid the foundation of joint forest management in J&K State. The concessions granted under these notices were incorporated in subsequent working plans.

Between the two World Wars, the activities of the Forest Department gradually increased and working plans were made for almost all the forests in the state. The more accessible forests of important commercial species were brought under a uniform system.

The Second World War was a setback to the progress of working plans, resulting in a chaos in forms and compartment histories. A special conference was held during 1945-46 at Dehradun in which techniques of partial enumeration were standardised and additions were made in the volume tables and yield tables. The post-war working plans stressed detailed stock mapping and collection of more statistical data on growth and yield of the forests. The old concept of having even-aged forest underwent radical change. In areas where establishment of regeneration was a great problem, advance growth up to 18 inches in diameter was considered as a future crop. Poles in the class between 18 and 24 inches in diameter were also considered as advanced growth.

1.3.3 History of Forest Management Post-Independence

As a result of serious political disturbances in 1947, many villages were burned along with many forest rest houses and other buildings. The state of instability worsened and forest protection was at its lowest ebb. Forests suffered heavy losses from illicit felling. All forest activities came to a halt. The main export line was lost as a result of the partitioning of the Punjab. Timber traders suffered heavy losses. Thakur Harnam Singh Pathania, the then Chief Conservator of Forests and a forestry stalwart of rare genius, proved equal to the task. He soon evolved multi-pronged strategies to bring forest working to normal. As a special relief measure, the government sanctioned 200 cu.ft. of deodar timber and 2 kail trees per family to rebuild houses.

During 1948-52, the timber depots were rehabilitated. Timber depots were established in Pathankot Punjab (India), the nearest railhead. Booms were constructed on the river Chenab at Akhnoor to enable timber traders to collect their timber to transport to Pathankot by road. Many relief and rehabilitation measures were undertaken to sustain forest lessees and make their return to work possible. The government of the time was liberal and announced many concessions when accepting Pathania's proposals. These measures, coupled with other administrative actions, returned forest management to normal.

However, the government then committed a mistake by launching a 'Grow More Food Campaign', under which people living in and around forests were asked to grow agricultural crops in forest land without trees in order to achieve self-sufficiency in food. This ill-conceived

policy laid the foundation for encroachment of forest lands. Although the government later halted this policy, it assumed alarming proportions in deodar, kail, and chir forests in subsequent years. The increases in the human and livestock populations, coupled with increased demands for timber and other forest produce, greatly raised the pressure on forest resources and led to the failure of natural regeneration.

Efforts to raise plantations did not succeed. Some senior foresters realised the ill effects produced by the degradation of forests and started experimenting on their own to find solutions. They were convinced that forests could only be protected with the willing co-operation of local communities. Village committees were constituted and proved successful in the protection of plantations. The Government of Jammu and Kashmir issued SRO No. 61 of 1992, which formalised Joint Forest Management (JFM) in J&K. But JFM did not make much headway because of militancy in the state. JFM is confined to demarcated degraded forests situated at low altitudes that are completely barren, and to the outside of demarcated forests, community lands, and Khalsa Sarkar areas. So far about 300 sq.km. of degraded forest and about 300 sq.km. of community land have been brought under JFM village plantations.

1.3.4 Silvicultural

Deodar-kail forests constitute 84% of the total forest area of J&K. Apart from their protective and aesthetic values, they are the main source of forest revenue, deodar being by far the most lucrative. As a result of strict forest and fire conservancy after 1892, major species like deodar regenerated well and were established rather sporadically everywhere. But the state of regeneration did not enable the separation out of areas large enough to form compartments or sub-compartments for management purposes.

In general, deodar forests on easily accessible grounds are managed under the shelter compartment system. The exploitable diameter is fixed at 75 cm (30 inches) which corresponds to a rotation of 150 years. Since deodar stands are scattered and advanced growth is abundant over large areas, the original uniform system of fixed periodic blocks has been modified to one of conversion. In this convention, sacrifice of immature stock is avoided. Trees less than 45 cm (18 inches) in diameter at breast height are taken as regeneration, and groups of trees in the 45-60 cm (18-24 inches) diameter class are also retained as part of the future crop. The resultant irregularity in the crop that will appear at the end of the conversion period is accepted as a necessary concomitant to the system. As deodar continues to live soundly beyond the rotation age, there is no fear of serious deterioration in the stocks. Deodar on steep and difficult terrain is managed under the Indian Selection System as applied to spruce and fir forests.

Kail is generally found mixed with deodar and cannot be separated out into convenient management units, therefore it is managed along with deodar as a subsidiary species. Pure patches of colonised kail are too young to warrant separate management.