

# UTTARAKHAND FOREST : A COMPARATIVE STUDY OF HILLS, BHABAR AND TARAI AREA

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## ABSTRACT

*The Word 'forest' is derived from the Latin word 'Foris' meaning outside, a large area covered chiefly with trees and undergrowth. An area of high density of trees, a system which composed of plants, animals, microorganisms, as habitat for variety of living beings. Technically, forest can be defined as an area, set aside and maintained under vegetation for any indirect benefit namely, climatic, protective or environmental and/ or for production of wood and non-wood products. Forests play an important role combating desertification, preventing erosion problems, other protective functions, Climate change and acting as carbon reservoirs and sinks. Forests play a vital role in protecting fragile ecosystems, watersheds and freshwater reservoirs and as storehouses of rich biodiversity. Biodiversity is the variety and variability of plant, animal and microorganism in a ecosystem. Forests play a very important role, as valuable natural resource in the economy and development of any area. Being a backbone of many industries, these also create employment opportunities in many ways. Forests also fulfill the needs of the social and domestic requirements of vast segment of population in the rural areas through providing fuel and fodder as also a variety of building material. In This paper we discussed about the forest of Uttarakhand – a comparative study of Tarai, Bhabar and hill forest , their geographical aspect.*

**KEYWORDS:** Forest, Tarai, Uttarakhand, Hills, Bhabar

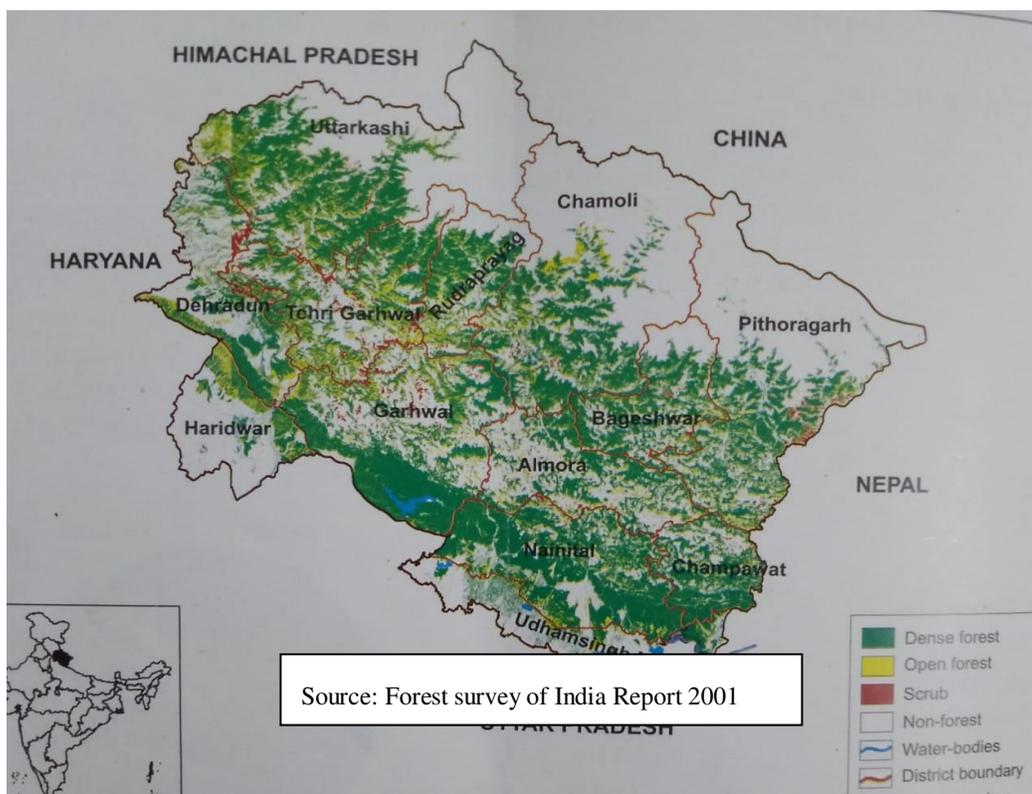
## INTRODUCTION

Uttarakhand is beautiful state set at the foothills of the snow clad Himalayas with lush green vegetation. Uttarakhand the 27<sup>th</sup> state of Republic of India lies between 28° 44' & 31° 28' N Latitude and 27° 35' & 81° 01' East longitude. It was carved out of UP on 9<sup>th</sup> November 2000 with 13 district. Uttarakhand has total area of 53,483 Sq. Km of which 86% is mountainous and approx 61% is forest. Forests are distributed in patches in all parts of Uttarakhand Himalaya and occur in largely varying

altitudes and climatic conditions- ranging from the moist and high rainfall zone of the south to the lower zones of the snow bound ranges and also along the semi arid Trans Himalaya to the north and north east of the main ranges. We can say that Uttarakhand Himalaya contains rich forest diversity. Forest is distributed along the altitudinal gradients from broad leaf

deciduous forest to pine, mixed oak, coniferous forests and alpine meadows.

Forest is equally plays an important role for sustaining the life of both human and animal. Forests are the major source of livelihood of the



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mountainous people. Rural people of uttrakhand are directly dependent on forest resources for food, fodder and fuel-woods. Utrakhands forests are distributed along the altitudinal gradients vary from tropical to sub tropical, temperate to alpine. Broad leaf deciduous forests are found in the tarai and doon plains. Pine forests is densely and extensively distributed above the valleys and mid-altitudes, Mixed oak forests lies in the temperate zone and conifer forests lies in the cold climate zone.

**Objectives:** The main objective of conducting this study is to examine forest distribution, diversity, economic viability and use pattern and conservation of forests of Utrakhand.

**Methodology:** Data on diversity, distribution and use pattern were collected from secondary source and self observation method, taken care of the qualitative approach. Forest survey of India data of 2001 and 2019 were gathered appropriately.

**Study Area:** Study area is Tarai, Bhabar and Hills of Utrakhand. Utrakhand has rich and diversified forest resources with their high economic viability and a substantial option of livelihood of the rural people.

### District Wise Forest Cover of Utrakhand

District	Geographic Area	Dense Forest	Open Forests	Total	Percent
Place/ Year	2001/ 2019	2001 / 2019	2001 / 2019	2001 / 2019	2001 / 2019
Almora	3139	1143 / 1036	352 / 683	1495 / 1719	47.63 / 54.68
Bageswar	2246	1079 / 924	218 / 339	1297 / 1263	57.75 / 56.34
Chamoli	8030	2115 / 2023	468 / 687	2583 / 2709	32.17 / 33.74
Champawat	1766	973 / 960	152 / 266	1125 / 1226	63.70 / 69.40
Dehradoon	3088	1124 / 1261	362 / 347	1486 / 1609	48.12 / 52.09
Garhwal	5329	2492 / 2476	650 / 919	3142 / 3395	58.96 / 63.71
Haridwar	2360	418 / 351	194 / 234	612 / 585	25.93 / 24.80
Nainital	4251	2645 / 2502	463 / 540	3108 / 3042	73.11 / 71.55
Pithoragarh	7090	1670 / 1470	363 / 610	2033 / 2080	28.67 / 29.33
Rudrapragyag	1984	880 / 833	273 / 310	1153 / 1142	58.11 / 57.57
Tehri Garhwal	3642	1437 / 1357	627 / 709	2064 / 2066	56.67 / 56.73
Udham Singh Nagar	2542	623 / 338	146 / 94	769 / 432	30.25 / 16.99
Uttarkashi	8016	2424 / 2322	647 / 715	3071 / 3036	38.31 / 37.87
Total	53483	19023 / 17852	4915 / 6451	23938 / 24303	44.76 / 45.44

Source - Forest survey of India 2001 / 2019

Analysation shows that three districts namely Chamoli, uttarkashi and pithoragarh has the largest geographical area but their forest cover is almost one third of it. Whereas champawat is lowest in geographical area but its forest area is two-third of it. Proportion of forest cover is also high in Nainital, Bageshwar, Garhwal and Rudraprayag and Tehri Gharwal districts. Nainital has the highest share of

forest cover. Almora and Dehradoon has medium share of forests whereas Haridwar and US Nagar districts has the smallest share of forest. The forest cover is low in Haridwar and US Nagar because of large scale Industrialization and Deforestation for 4 Lane Highway Roads. Besides this encroachment, Illegal mining and fire is also play an important role in decreasing forest in this area. There are 12662 cases of deforestation found in last 10 years i.e. 1266 cases yearly and 106 cases per month. (Jagran 15 feb. 2020). As per the report of 2019 of forest department the density of forest decreases by 79 Km square near populated area.

**Utrakhand forests** can be classified as:

1. Tropical wet Evergreen Forest
2. Tropical moist Deciduous Forest
3. Tropical Dry Deciduous Forest
4. Sub Tropical Pine Forest
5. Mountain Temperate Forest
6. Alpine Forest
7. Alpine Bush land and Meadows

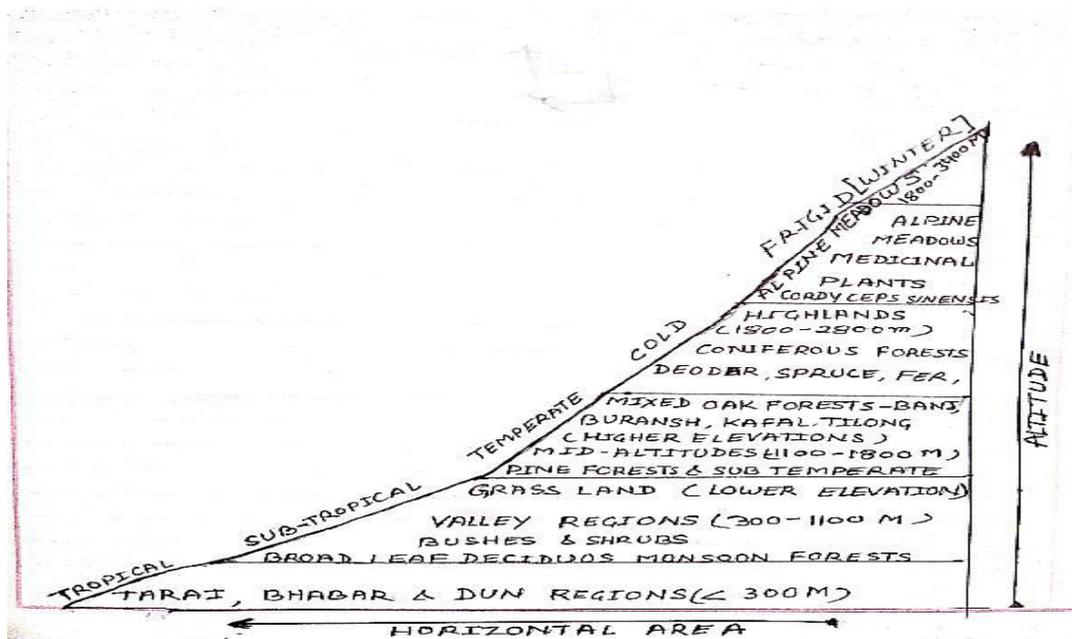
Tropical wet Evergreen Forest are mainly expend in Tarai-Bhabar Area of Utrakhand. Where temperature is 34 degree celcius and rain is more than 200 Centimeter. Due to high temperature and high rainfall forest are dense. Generally Forest are green and trees are very high in height.

- Tropical Moist Deciduous Forest are found in the southern of shivalik Range, Doon Vally and tarai areas. Where temperature is 20 degree celceous and rain fall is 100 – 200 centimeter, tree’s shed their leaf before spring season, these are also known as Mansooni Forest. Sal, Sagoan, Palas, Anju, Bambo, sahtoot etc trees found in these forest. Economically Sal And Sagaon are very important.
- Tropical Dry Deciduous Forest are found in a very small places in the uttrakhand. From haldwani to Kotdwar where temperature is 18 – 20 degree celceous and rain is 50-100 meter these forest are found. Tree’s are small in size. Sal, Palas, Gular, Jamun, baer etc are mainly found in these forests. Bushes and shrubs are also found in this region.
- Sub tropical forest is found between 300 to 1100 meter height from the sea level. These are characterized by mixed tropical forest with bushes and scrubs.
- Pine forest are densely distributed between 1100 – 1800 meter. In pine forest pine is the single species and it does not allow other trees to grow. In mixed oak forest dominating species are Oak itself, Tilonj , kafal , Bhamore , Dal chini and burans.

### Graphical representation of vertical distribution of forest in Utrakhand

#### Vegetation Zone - Utrakhand

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conditions i.e., the species which can handle heat, dryness and can survive without water for long.

Tarai is usually called “the land of marshes”, and nowadays, these are usually replaced by agriculture lands, in this region’s the scope for dense growth of forest is very less. Hence they are dominated with agricultural areas.

Many different native species can be found in tarai region one of which is sal but due

to high water level in such areas the species tend to be inferior since the aeration is very poor, due to high moisture hence the sal species are comparatively inferior comparative to the other regions.

Some species of tarai region are prone to waterlogged conditions i.e., they grow better in waterlogged conditions, hence they usually grow near streams or swamps for their better growth, they form a narrow belts like structure following the river course.

Due to such conditions mechanized agro forestry has been done for the extension of forest and forest resources. Hence some native species like teak, popular and eucalyptus has been promoted for growth for commercial use for fuel and fodder also in rural areas, canals, railway lines, this growth have been managed to grow mechanically.

The main reason for plantation of these native species is that its rotation period is comparatively short around 8 to 9 years and can provide the desired material in lesser time period.

Forest Type	Sub Type	Altitude (m)	Vegetation
Sub Tropical Forests	Savana vegetation, mixed broad leaved Species	200	Tall Grasses mixed tree species, Planted Eucalyptus, poplar, Teak
	Sub Tropical Deciduous Forests	250	Saal, Khair, shisham, sagawn, haldu, Bamboo and Eucalyptus
	Low Altitude Mountain Forests	500	Mixed broad leaved species and shrubs
	Warm temperate forests	1000	Sal, Pine, Chir and mixed species
Temperate Forests	Temperate conifer forests	1300	Pine, Chir
	Cold Temperate forests- Broad leaved	1800	Banj-Oak, Rhododendron
	Sub- alpine forests- moist deciduous	2000	Moru, blue pine, Low level silver fir, Spruce, Deodar, Cypress
Sub Alpine Forests	Sub alpine forests- high altitude conifers	2500	Kharshu, Blue pine, High level silver fir, Rhododendron, Juniper, Birch
	Alpine pasture	3500	A large variety of grasses, Shrubs and Flowers, herbaceous plants, Pastures and aromatic plants
Alpine Vegetation			
Trans Himalayan Vegetation	Mixed sub- alpine species	4000	Blue Pine- 2000-3000, Deodar- 2400- 3000, Spruce- upto 3000, High level Silver fir – Upto 3800, Birch – 3000 – 3600, Bushes, pastures, rock plants, flowers, herbs

### TARAI FORESTS

Tarai region in Uttarakhand covers usually the lower portion of district Nainital, also tarai covers the Haridwar district in Garhwal and udham singh nagar. Here the temperature is high during most of the months in the year, hence it covers the species which can stand to these

### Main Species Tarai and its Use:

**Eucalyptus:** It is a fast growing evergreen tree. There are more than 400 deferent species of eucalyptus. It is also known as Blue Gum, is the main source of eucalyptus oil used globally. The leaves also contain Flavonoids and Tannins,

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flavonoids are plant based anti oxidant and tannins may help to reduce inflammation. It is also a medicinal property.



**Poplar:** Poplar tree is a deciduous tree and belongs to a family of Salicaceae. These tree are the fast growing tree under ideal climatic conditions. Poplars wood and bark are used for making plywood, Boards, matchsticks, also for making sports goods and pencil. Poplar plant growing up to the height of 85 feet or above within life span of 5 to 7 years. Growing poplar trees for profits a wise decision.



**Shisham:** Dalbergia sissoo, Known commonly as north Indian rosewood or Shisham, is a fast growing, hardy, deciduous rosewood tree of native to the Indian subcontinent. It is a large, crooked tree with long, leathery leaves and whitish or pink flowers. Sheesham wood is one of the best woods for furniture; not just for its durability, easy care solution, resistance from termites, but also because it is light on the budget as compared to solid wood or teak wood..with no extra expense on maintenance, sheesham wood furniture is highly cost efficient.



**Khair:** Senegalia catechu is a deciduous, thorny tree which grows upto 15 meter in height. Khair tree is very useful in the dental problems. It gives relief in the dry cough. It is also given Stomatitis, Anaemia, Leprosy, Bronchitis, Diarrhoea etc. Kattha and cutch are the extracted from wood of khair tree.





**BHABAR FORESTS**

Bhabar covers usually the foothills of uttrakhand , the forest growing in haldwani, kotabag, ramnagar, Corbett tiger reserve, kalagarh, kotdwar, laldhang, and all along the mountain slopes at the foothills descending from northern, north eastern and eastern parts of dun valley comes under the bhabhar zone.

Forests of bhabar are charecterised by dense growth, the soil here is enriched with humus due to which the vegetation here is very dense and variety of species can be grown here. Bhabar region is considered the best region for plantations , artificial regeneration, and vast growth.

The common species which can be seen here are Semal, Haldu, Dhauri , Ber, Amaltas etc.The nature of the forest is usually deciduous because it has a deep water level and high porosity. Here Sal species can be seen with a superior nature as compared to tarai region, due to different variety of soil. Commonly and most favorable variety of soil found here is loamy soil which is best for proper growth of most of the species including Sal. The only demerits faced by Bhabar forests is that it has been over exploited by grazing animals, human interference, lopping , deforestation, and burning by many areas by trespassers. Also the villages, towns , found around this region seems to overuse the products for their personal needs of timber, fuel , fodder , and other materials used in industrial or commercial purpose.

**Main Species Bhabar and it's Use:**

**Haldu:** Scientific name of Haldu is *Haldina cordifolia*, is a deciduous tree with a large crown ; that can grow over 20 meters high. Haldu is at its blossoming during winter, Bark of the tree act as an antiseptic flowering. Haldu is used for construction, window frame, furniture, boxes and toys etc.



**Sagown( Teak) :** Its scientific name is *Tectona grandis*.is a tropical hardwood species, it is most valuable and high price timber crop. It is deciduous tall tree upto 40m tall with grayish brown branches. Teak wood has leather like smell when it is freshly milled and particularly valued for its durability and water resistance. The wood is used for boat building, furniture, exterior construction, Carving and other wood projects.





**Semal:** The botanical name of Semal is *Bombax ceiba*, it is commonly known as cotton tree. Semal grows to an average height of 20 meters, matured tree grow upto 60 meters in moisture tropical region. It is also called silent doctor, it is an ayurvedic tree with all its parts like fruits, flower, roots , leaves and bark etc. being used to cure various types of diseases. In ayurveda it is to promote sexual health, relieve problem like asthma, diarrhea, and anemia. All its parts contain proteins, carbohydrates, lipids, fats, vitamin A and Vitamin c are present in good quantity. Semal also contains various types minerals and anti oxidant.



**Toon:** The botanical name of toon is *Toona Ciliata*. It is also known timber tree. It is used to make boxes and also used as medicinal plant.



#### HILL FORESTS

The Hill forest is vary attitudinally according to their altitude from 1000m to 4000m, can be divided into zones

#### Dry Slopes of Lesser Himalaya- The Chir Zone (1000m – 2000m):

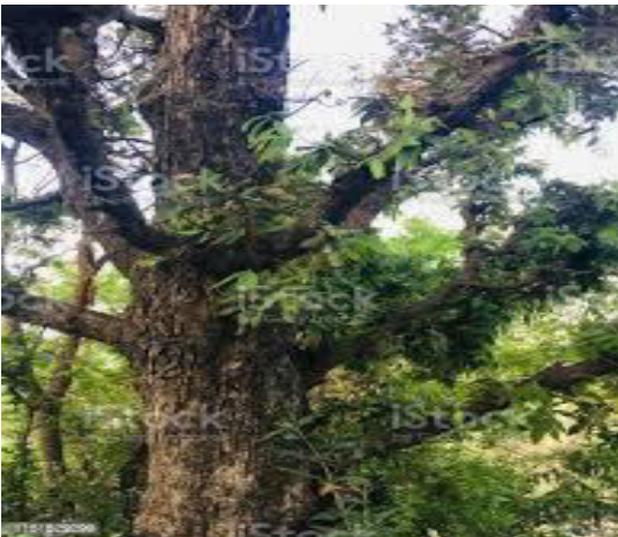
Chir forests are found on all geological formation. These forests are spread over vast tracks in Uttrakhand, generally adjoining habitants and are hardiest among the hill forest. Chir is the sole dominant and it is not uncommon to find only tree species present. ( J. C. Joshi 2004). A pine tree locally known as Chir is conifer that covers 16% of the forest area of the Uttrakhand. Pine chir are medically. Medical properties include antiseptic, antioxidant, astringent, Inflammatory, expectorant, high in vitamin C for cold, flu, cough, congestion etc. it can also us in decorative pieces.





Mid Slope forests of Banj (Oak) Zone. ( 1800m – 2500m )

There are three principal type of Oak – Banj, Moru and Kharsu – and each occupies more or less in distinct altitudinal zone in Uttarakhand. Banj has the lowest altitudinal range and it occurs in the 1800-2500 meters elevation. Banj is an evergreen broad- leaved species also has fire resisting qualities, the most important of which is its great power of reproduction by coppice shoots (J.C Joshi 2004), means new growth (stems) arising from the dormant or adventitious buds near the base or stump of a tree where the previous was cut i.e. a young tree that has grown from a sucker and not from seed. (Merriam-Webster)



Banj is a good fodder and has also served as chief source of fuel and fodder for the local village people. The Banj forest plays a vital role in soil and water conservation, but at the same time, these are being exploited in a reckless manner. These forests besides supplying organic manure of the highest quality are also important as a wild life habitats and aesthetic value as well. Oak is widely used Building construction, Furniture making and veneer Production.

**High altitude sub- alpine Forests zone. (2000m – 4000m):**

A great variety of trees are found in these high altitude sub alpine forest including conifers and other broad leaved species. While many of these species occur within a vast altitudinal range, some other is restricted to a limited range along the low altitudes. These forests there can be discussed under two zones according to the altitudinal variations.

**(a) Low altitude sub-alpine forests (2000m – 3000m):**

These forests are found between elevations of 2000- 3000 m and the species generally show a limited range of altitude as compared to the species in the high altitude sub-alpine forests. The Principal species of the forest are-

**Moru:** Moru is the high altitude variety of Oak and occurs between 2000-2700 m and occupy, to a large extent an intermediate zone between the Banj Oak and Kharsu Oak, a high altitudinal variety of Oak. The Moru forests attain a maximum development at elevation between 2100-2400 m on deep moist soil and especially when sub soil is limestone.

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They are generally deciduous by nature and the canopy found is very dense. ( J.C Joshi 2004)



**Low Level Silver Fir:** This species occurs between 2100-3200 m elevation and forms continuous forest between the elevations ranges of 2400-2900 m. These forest ranges are close to the main Himalaya and Silver Fir is usually the dominant species along when mixed with Spruce, these two are conjointly dominant. (J.C Joshi 2004). These forests are not very dense but more or less widely scattered. Silver fir has medicinal use in treatment of bronchitis, cystitis, leucorrhoea, ulcers and flatulent colic. The resin is also used externally in bath extracts, rubbing oils etc. for treating rheumatic pains and neuralgia.



**Blue Pine:** Blue Pine (*Pinus wallichiana*) is a coniferous evergreen tree found in the uttrakhand Himalaya. These forests found between 1800-2600 m altitude and fairly extensive forest of Blue Pine occurs between 2000- 3000 m. In Driest tracts, these forests extended between elevations 3000-3700 m. According to the altitude, these are sometimes found mixed with Cypress, Deodar, and Spruce and Silver fir. The Forest of Blue pine usually passes into Birch and High Level Silver Fir at their upper limit. Blue Pines provide multiple uses such as fuel wood, torchwood, and leaf litter. Blue pine protects water, soil, infrastructure and climate risks. Blue pine woods are used in carpentry, joinery, wall paneling, veneers, and furniture and boxes. Construction timbers include beams, planks, and Scaffolding.



**Spruce:** The forest of Spruce is generally occur south of the main ranges in the uttrakhand Himalaya and is usually dense, and generally confined to limestone and prefers areas of low rainfall to grow. These forests are finding between elevations 2100-2700 m and reach up to elevation of over 3000m. It is species which often found with the species like Kharsu and Moru, and broad leaved deciduous species like pangar etc.

**Cypress:** These forest of Cypress trees occur south of the main Himalayan ranges and along the dry zone. It occurs in limestone soils in association with Moru and an undergrowth of scrub. These species grows between elevations of 2000-2900m. These forests occur in soils derived from quartzite as

well as gneiss, and species Capable of exists on rocky slopes with low soils. The Cypress is extremely susceptible to fire and driven it to cling to steep rocky precipitous and shun all grassy area.

**Deodar:** Deodar forests occur in small and small isolated patches in the main Himalayan ranges in different parts of the uttrakhand and are often found in mixed with Blue Pine and Cypress forests. These forests found in between elevation 2400-3000 m. The most developed Deodar forests found in the upper Alaknanda valley in district Chamoli. These forests are open and trees are small in heights. Deodar is used in Ayurveda for treatment of inflammation, paralysis, low appetite, cramps, diabetes, fever, fungus, bacteria, infections, water retention etc.



#### Deodar

(b) **High altitude sub-alpine forests (3000m – 4000m):** These forests occur along the highest altitudinal range of forests in Uttrakhand and extend between 3000-3500m elevations. The species composition of these highest forests slightly differs in eastern and western parts of Uttrakhand Himalaya. Towards the west i.e in garhwal Himalaya, Rhododendron and low level silver fir along with some other species are the principle components of these forests, towards the east Birch, High Level Silver Fir and Kharsu are the principal species occurring in these forests. (Joshi 2004).

**Kharsu:** Kharsu occupies the highest zone among the Oak, and the forests are found between 2200-3500m. These forest are usually very dense and different elevations the species of Banj Oak, Moru or Silver Fir also occur within these forests. These forests are also characterized by the presence of shrubs which occur in great variety.

**Birch:** This high altitude species and the forests occur between 3000-3500 m elevation although in the area of low snowfall. These forests may be found upto 3600 m elevation.

#### CONCLUSION

Uttrakhand state has rich and plenty of forests resources, which have high potential for economic development of the state. About 70% of the economy of Uttrakhand depend on agriculture, livestock and forest, and

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rural people of uttrakhand are substantially dependent on forests for fuel-wood, fodder and food/fruits. (Sati 2006). Forests products timber or non timber can further enhance rural livelihood, if they are used sustainably, as use pattern of the forest products are limited up to the surrounding villages and the forests area are located in the remote regions are unused. For smart management of the forests products and major forest use, forest based small scale industries at village level and sustainable management of the of forests and grasslands are essential. For instance furniture industry, dairy farming and wild fruits and flower based processing centers have potential for utilizing forest products sustainably. Along with this we have to take conservation measures. Pine trees are the most susceptible to forest fire, thus prompt and immediate measures are to be taken. Pine is most economically viable and found in abundant in Utrakhand.

### REFERENCES

<https://w.w.merriam-webster.com>

- Joshi, S.C (2004) *Uttaranchal and Development, A Geo-Ecological Overview*, Nainital, Gyanodaya Prakashan,
- Maithani, Prof. D.D. Prasad,, Dr. Gayatri and Nautiyal, Dr. Rajesh *Geography of Uttatrkhanda*- Allahabad, Sharda Pustak Bhawan
- Negi, Dr. S.S.(1995) *U.K Land and People* , New Delhi.
- Sati,Vishwambhar Prasad and Bandooni, S.K.(2018) Forest of uttrakhand: Diversity, Distribution, Use pattern and Conservation, *ENVIS Bulletin, Himalayan Ecology*, Volume **26**, 2018
- Singh, et al (2007) *Forest Environment And Biodiversity* Delhi, Daya Publishing House
- State of Forest Report 2001*- Forest Survey of India (Ministry of Environment & Forests) Dehradoun.
- State of Forest Report 2019*- Forest survey of India ( Ministry of Environment & Forests) Dehradoun