Chitrakoot Forests : A treasure of Cultural and Biological Diversity

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Introduction

Chitrakoot is situated on the border of Chitrakoot district of Uttar Pradesh and Satna district of Madhya Pradesh. The general topography is hilly and undulating cut off by numerous reveres and rivulets. Mandakini, Valmiki, Gunta, Gedua, Chakara and Jhuri rivers drain the region. The forest of the Chitrakoot predominantly consists of tropical dry mixed deciduous type. The climate is dry and the maximum temperature goes up to 50.5°C in the month of May and minimum up to 5 °C in the month of January.

Chitrakoot is one of the famous place of pilgrimage of Hindus in India and surrounded by lush green hills of legendary Vindhyachal range. Chitrakoot is also well known for its beautiful hill ranges, historical caves, perennial streams and varied flora and fauna. Therefore, the Chitrakoot has been sacred place of worship for sages and hermits since antiquity.

According to *Ramcharit-manas*, it is said that Lord Ram with consort Sita and younger brother Lakshman dwelt in Chitrakoot about eleven and half years.

This holy place has provided spiritual inspiration and energy to many sages and dignitaries and changed their attitude of life like great saint Valmiki, Goswami Tulsidas, Abdul Raheem Khankhana, Tansen and even Aurangjeb etc. It is mentioned in Indian history that when the Mugal Emperor Akbar, expatriated Abdul Raheem Khankhana, one of the 9 jewels of his Government, the chancellor of the exchequer and a great poet took asylum in Chitrakoot.

Chitrakoot hill (also called Ramgiri) had also been residing place of Yaksha (a Demi God) of Kalidas's Maghdoot . This is the place from where Yaksha sent a massage through Megh (cloud) to his beloved wife who was residing at Alkapuri, which was situated near Himalaya.

Biodiversity of Chitrakoot in ancient time

During Ramayana period, Chitrakoot was very rich in biodiversity. Great saint Valmiki and Goswami Tulsidas illustrated a comprehensive account of biodiversity in their texts Ramayana and Ramcharitmanas respectively. According to Valmiki Ramayana, Chitrakoot is a beautiful and sacred place where different types of herbs, shrubs, trees and climbers bearing variety of fruits, flowers and roots are available. The richness of flora and fauna of Chitrakoot is described four chapters of Ramayana. He has also described varied fauna of Chitrakoot. He has mentioned the names of different variety of birds, animals and movements of tigers, elephants and deers in the forests.

Valmiki also mentioned names of several trees found on Kamadgiri in Ramayana. These are Am (*Mangifera indica*), Jamun (*Syzygium cumini*), Asna (*Lagerstroemia parviflora*), Lodh (*Symplocos racemosa*), Chironji (*Buchanania lanzan*), Kathal (*Artocarpus*

heterophyllus), Dhawa (*Anogeissus latifolia*), Dhak (*Butea monosperma*), Ankol (*Allangium salvifolium*), Bhavya (*Dillenia indica*), Tinsa (*Ougenia oogeinensis*), Bel (*Aegle marmelos*), Tendu (*Diospyros melanoxylon*), Bans (*Dendrocalamus strictus*), Kasmri (*Gmelina arborea*), Neem (*Azadirachta indica*), Sakhua (*Shorea robusta*), Barun (*Crateva unilocularis*), Mahua (*Madhuca longifolia* var. *latifolia*), Tilak (*Wendlandia exerta*), Ber (*Zizyphus mauritiana*), Aonla (*Phyllanthus emblica*), Kadamb (*Anthocephalus chinensis*), Bent (*Calamus rotung*), Indrajau (*Holarrhena pubescens*), Bijak (*Punica granatum*), and Neebu (*Citrus aurantifolia*) with other flowering, fruiting and shade giving trees. He has also described varied fauna of Chitrakoot. He has mentioned the names of different variety of birds, animals and movements of elephants and deers in the forests.

Goswami Tulsidas has also described similarly the beauty and diversity of flora and fauna of Chitrakoot. According to Ramcharitmanas "Chitrakoot hill has luxuriant vegetation of herbs, shrubs, trees and climbers. He has also mentioned the names of different variety of birds like blue jays, koels, parrots, cuckoos, kakavas, partridges, and animals like elephants, lions, monkeys, boars and deers etc". Chitrakoot was very rich in respect of medicinal plants too. It is mentioned in Ramayana that "there are thousand kinds of medicinal plants are available in Chitrakoot region that express them at night like flame of the lamp". The high value medicinal plants found in Chitrakot forests are *Tinospora cordifolia*, *Gymnema sylvstre*, *Achyranthes aspera*, *Urginea indica*, *Curculigo orchioides*, *Dioscorea bulbifera*, *Desmodium gangeticum*, *Coccinia grandis*,*Cordia macleodii*, *Litsea glutinosa*, *Oroxylum indicum*, *Steriospermum suaveolens*, *Pterocarpus marsupium*, *Terminalia arjuna*, *T. bellirica*, *T. chebula*, *Actiniopteris radiata*, *Cyperus rotundus*, *Vernonia cinerea*, *Sida cordifolia*, *Ampelocissus latifolia*, *Peristrophe paniculata*, *Cassia tora*, *Diplocyclos palmatus*, *Tridax procumbens*, *Phyllanthus fraternus*, *Elytraria acaulis*, *Solanum nigrum*, *Teramnus labialis*, *Vitex negundo*, *Abutilon indicum*, *Cocculus hirsutus*, *Hemidesmus indicus*, *Enicostemma hyssopifolium*, *Boerhavia diffusa*, *Solanum virginianum*, *Helicteres isora*, *Aegle marmelos*, *Allangium salvifolium* etc.

Forest diversity

The forest types of Chitrakoot predominantly consist of tropical dry deciduous types. According to Champion and Seth (1968) revised classification of forest types of the India, the forest of this area fall under the following main type and sub types:

Main type- Tropical dry mixed deciduous forest.

Sub type:-

(a) *Anogeissus pendula* (Kardhai) forests.

(b) *Anogeissus pendula* scrub.

(c) *Boswellia serrata* (Salai) forests.

(d) *Dry Bamboo* Drakes.

(e) *Acacia catechu* (Khair) forests.

The main type forest of Chitrakoot area is mixed forests. The *Boswellia serrata*, *Acacia catechu*, *Bamboo* spp., *Anogeissu spendula* are sub types occur as small patches within the mixed forests.

Mixed forests

Mixed forests occur on underlying rock which is generally sand stones and shales. The soil is sandy to sandy loam, fine to coarse grained and red lateritic. The areas having shallow, coarse-grained sandy and lateritic soil bear very poor quality forests. A large number of species constitute mixed forests, out of which *Anogeissus latifolia*, *Diospyros melanoxylon*, *Lannea coromandelica* and *Boswellia serrata* are predominant. Other species found locally are *Phyllanthus emblica*, *Buchanania lanzan*, *Madhuca longifolia*, *and Butea monosperma*. *Zizyphus xylopyra* and *Zizyphus oenoplia* are almost everywhere. *Acacia catechu* is also found throughout this type in varying proportion depending upon the soil conditions.

Madhuca longifolia, *Diospyros melanoxylon*, *Boswellia serrata*, *Lannea coromandelica*, *Phyllanthus emblica*, *Buchanania lanzan* and *Acacia catechu* are species mostly

found in this type. Small patches of regeneration of *Boswellia serrata*, *Anogeissus latifolia*, *and Anogeissus pendula* also met with. On the whole the regeneration is not adequate.

The mixed forests are not adequately stocked. Due to drier conditions prevailing, the forests are open and poor in growth. Due to over increasing biotic interference like recurring fires, unrestricted heavy grazing, over exploitation and indiscriminate felling under nectar, fast retrogression has set in the forests, tree growth is winding down at an alarming speed. The floristic composition of mixed forest is as under:-

The top story consists of *Anogeissus latifolia*, *Diospyros melanoxylon*, *Lagerstroemia parviflora*, *Lannea coromandelica*, *Boswellia serrata*, *Terminalia tomentosa*, *Madhuca longifolia*, *Terminalia bellirica*, *Pterocarpus marsupium*, *Buchanania lanzan*, *Dalbergia paniculata*, *Dalbergia lanceolaria*, *Sterculia urens*, *Schleichera oleosa*, *Albizzia odoratissima*, *Bombax ceiba*, *Mitragyna parvifolia*, *Haldina cordifolia*, *Aegle marmelos*, *Butea monosperma*, *Erythrina suberosa*, *Terminalia arjuna and Syzygium cumini.*

The under story consists of *Zizyphus xylopyra*, *Phyllanthus emblica*, *Milusa tomentosa*, *Holarrhena pubescens*, *Randia dumetorum*, *Bauhinia*, *retusa*, *Writghtia tinctoria*, *Cassia fistula*, *Acacia catechu*, *Antidesma diandrum*, *Gardenia latifolia*, *Zizyphus nummularia* and *Euphorbia nerifolia*. *Dendrocalamus strictus* found on slopes.

Shrubs are *Nyctanthes arbortestis*, *Lantana camera*, *Helicteres isora*, *Carissa opaca*, *Woodfodia fruticosa*, *Vitex negundo*, *Embelia tsjeriam-cottam*, *Grewia hirsuta*, *Murraya paniculata*, *Grewia rothii*, *Indigofera cassioides*, *Securinega virosa* and *Mimosa rubicaulis.*

Herbs are *Tephrosia purpurea*, *Xanthium strumarium*, *Argemone maxicana*, *Achyranthes aspera*, *Desmodium gangeticum*., *Flemingia bracteata*, *Tridax procumbens*, *Sida cordifolia*, *Waltheria indica*, *Cassia obtusifolia* etc. Grasses are *Eragrostis tenella*, *Heteropogon contortus*, *Themeda quadrivalvis*, *Apluda aristata*, *Schima nervosum*, *Sacharum spontaneum* etc.

Climbers are *Zizyphus oenoplia*, *Zizyphus rugosa*, *Ventilago denticulata*, *Ichnocarpus frutescens*, *Abrus precatorius*, *Mucuna pruriens*, *Butea superba*, *Bauhinia vahlii*, *Smilax zeylanica*, *Gymnema sylvestre*, *Dioscorea bulbifera*, *Capparis zeylanica*, *Ipomoea pesti-gridis* etc. *Epiphytes* and parasites are *Dendrophthoe falcata*, *Vuscum nepalense*, *Vanda tessellata*, *Cuscuta reflexa*, *Alectra chitrakutensis*, *Orobanche aegyptiaca* etc.

Kardhai forests

Kardhai (*Anogeissus pendula*) forests met with in Kamta block of Chitrakoot forest range. About the 11.46% of the total area is covered with kardhari forests. The composition of the Kardhari forests is the top story and understory are *Anogeissus pendula*, *Mitragyna parvifolia*, *Lunnea coromandelica*, *Lagerstroemia perviflora*, *Diospyros melanoxylon*, *Anogeissus latifolia*, *Aegle marmelos*, *Acacia catechu*, *Bauhinia racemosa*, *Zizyphus xylopyra* and *Flacourtia indica*. *Dendrocalamus strictus* found on slopes.

Shrubs are *Carissa opaca*, *Helicteress isora*, *Capparis sepiaria*, *Zizyphus nummuleria*, *Grewia hirsuta* etc. Herbs are *Cassia tora*, *Tephrosia purpurea* etc. Grasses are *Heteropogon contortus*, *Eragrostis tenella* etc. Climbers are *Ichnocarpus frutescens*, *Zizyphus oenoplia*, *Gymnema selvestre*, *Cocculus hirsutes* etc.

Salai forests

Salai (*Boswellia serrata*) forests occur in shallow dry soil particularly on ridges and plateau as an edaphically type in mixed forests. About 3.2% of the total area is covered with salai forests. The main associated of *Boswellia serrata* are *Lannea coromandelica*, *Haldina cordifolia* and *Anogeissus latifolia*. The floristic composition of forest is as follows:

The top story consists of *Boswellia serrata*, *Lannea coromandelica*, *Anogeissus latifolia*, *Diospyros melanoxylon*, *Erythrina suberosa*, *Cochlospermum religiosum*, *Schleichera oleosa*, *Buchanania lanzan*, *Lagerstreomia parviflora*, *Sterculia urens*, *Aegle marmelos*, *Ficus tomentosa* etc.

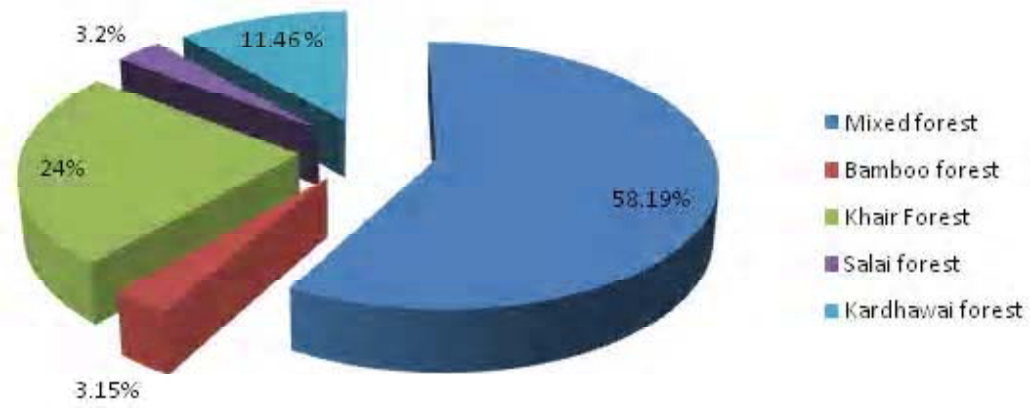


Fig. : Forest type of Chitrakoot

The under story consists of *Zizyphus xylopyra*, *Gardenia latifolia*, *Ephorbia nerifolia*, *Acacia catechu* and *Flacourtia indica*. Shrubs are *Nyctanthes arbortristis*, *Helicteres isora*, *Gardenia turgida*, *Bauhinia retusa*, *Holarrhena pubescens*, *Woodfordia fruticosa*, *Grewia hirsuta* etc. Herbs are *Cassia tora*, *Sida cordifolia* etc. Grasses are *Heteropogon contortus*, *Eragrostis tenella* etc. Climbers are *Zizyphus oenoplia*, *Butea superba*, *Vetilago denticulata*, *Pueraria tuberosa* etc. Epiphytes and parasite - *Dendrophthoe falcata*, *Vanda tessellate* etc.

Khair forests

Khair (*Acacia catechu*) forests occur throughout the Chitrakoot area in varying proportion in the under story in mixed forest. Along with Khair xerophytes species such as *Zizyphus xylopyra*, *Acacia leucophloea* and *Zizyphus mauritiana* are generally met with. About 24% of total area is covered with Khair forests.

Bamboo forests

Bamboo (*Dendrocalamus strictus*) do not form pure forests but occur as under story in the mixed forests. Male bamboo is the only species of bamboos found in the area on all geological formations on hill slopes.

Uncontrolled felling by the villagers and Basors in the past, coupled with recurrence of fire and heavy lopping by the grazers have generated congestion in the bamboos clumps. The bamboo clumps are mostly bushy in form and uneconomical to work. The condition of the clumps over larger area of the forest is not healthy. The total area of bamboos is estimated to be 3.15% of the total forest area of the Chitrakoot.

Cultural diversity

Chitrakoot region has also been rich in cultural diversity since ancient times. There are several tribal communities like Kol, Gond, Mawasi, and Khairwar etc. as mentioned in Ramcharitmanas still reside in Chitrakoot forest area and utilize a wide variety of plants for food, fodder, fuel, medicine, dye, gum, tannin, thatching, household and farming implements etc. The tribals are very poor and illiterate. The agriculture is the main occupation but the collection of fuel wood and minor forest produces from the forest and selling these produces in nearby local markets is the main source of their economy. The Chitrakoot is largely secluded from urban culture and the people of this region still retain many originalities of their culture. They rear some domestic animal like cow, goat, hen, buffalos etc. The tribal people inhabit in remote and far distant areas of the forest where no organized modern medical facilities are available. Besides, they are very poor and of course unable to buy expensive modern medicines. Therefore, they utilize locally available

plant species for the treatment of human as well as livestock ailments and diseases. They are familiar about the medicinal uses of plants found in their village surroundings and forest areas. It is seen that the age old cultural heritage of tribal is fast changing due to rapid urbanization, interference of out siders in the tribal areas and changes in economic patterns. The habitat and environment where these primitive people experienced and learnt useful plant lore through generation are also disappearing day by day due to reckless deforestation and over exploitation of natural resources. During the investigation it is also observed that the young generation is not interested to hold this invaluable traditional knowledge transmitted orally from generation to generation. Therefore, before this traditional knowledge is lost forever it must be documented properly. The Deendayal Research Institute has taken this initiative to document the traditional knowledge on folklore medicine of 20 villages of Chitrakoot district of Uttar Pradesh under CSIR project.

Biodiversity of Chitrakoot

A detailed floristic study of Chitrakoot region has been carried out by the author during the year 2003-2008 and found that there are about 750 species, 445 genera and 111 families of flowering plants (excluding cultivated and ornamental plants) found in Chitrakoot. Out of 750 species, 76% belong to dicots and 24% belong to monocots. The collected voucher specimens are properly mounted, identified and preserved in the Herbarium of Arogyadham, Deendayal Research Institute, Chitrakoot.

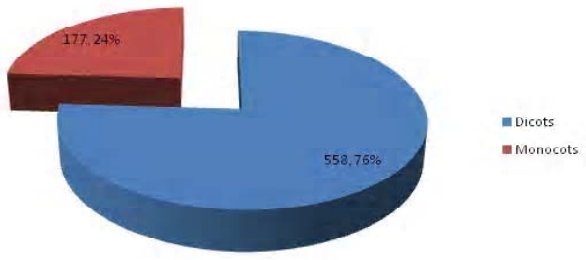
Out of total 750 species, 445 genera and 111 families; 573 species, 344 genera and 89 families are belonging to dicots and 177 species, 101 genera and 22 families belonging to monocots.

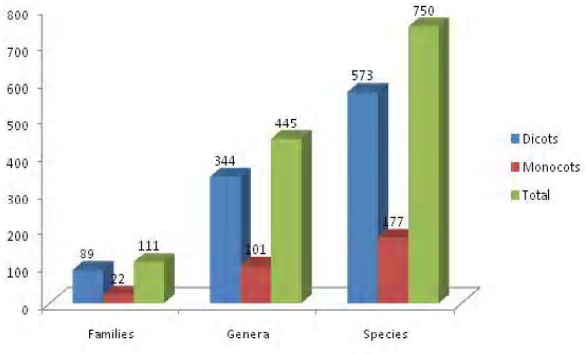
The relative importance of the families in a biodiversity study is usually expressed by tabulating 10 dominant families in the order of their number of species. In Chitrakoot, the Poaceae is the largest family, followed by Fabaceae, Asteraceae, Cyperaceae etc.

Ten dominant families of Chitrakoot region

S.No.	*Name of Family*	*No. Species*
1	Poaceae	78
2	Fabaceae	76
3	Asteraceae	43
4	Cyperaceae	32
5	Cucurbitaceae	32
6	Euphorbiaceae	29
7	Acanthaceae	26
8	Convolvulaceae	24
9	Scrophulariaceae	19
10	Malvaceae	18

Percentage of dicots and monocots





Dominant genera

The *Cyperus* is the dominant genus having 20 species. Followed by *Indigofera* and *Ipomoea*-11 species each. *Ficus* has 10, *Cassia* 9, *Euphorbia* and Fimbristylis 8 each, *Grewia*, *Crotalaria*, and *Blumea* 7 each, *Alysicarpus*, *Justicia*, *Phyllanthus*, *Eragrostis* 6 each, *Sida*, *Corchorus*, *Desmodium*, *Tephrosia*, *Acacia*, *Dioscorea* and *Commelina* 5 each. Besides 6 Genera have 4 species, 27 have 3 species each, 68 have 2 species each and remaining 343 genus representing single species.

Threatened plants

Alectra chitrakutensis, *Butea monosperma var. lutea*, *Butea sp*, *Cordia macleodii*, *Litsea glutinosa*, *Piper longum*, *Zingiber zerumbet*, *Acorus calamus*, *Aristolochia indica*, *Gloriosa superba*, *Dioscorea pubera*, *Costus speciosus*, *Tacca leontopetaloides*, *Eulophia herbacea*, *Operculina petaloidea*, *Nervellia prainiana*, *Clerodendrum serratum*, *Actinopteris radiata and Embelia basal*, *Dioscorea bulbifera*, *Uraria picta*, *Habenaria plantaginea*, *Citrullus colosynthis*, *Trichosanthes bractiata*, *Plumbago zeylanica*, *Chlorophytum tuberosum*, *Arisaema tortuosum*, *Plesmonium margaretiferum*, *Curcuma amada Gymnema sylvestre*, *Cochlospermum religiosum*, *Mucuna pruriens Sterculia urens*, *Gymnema sylvestre Baliospermum montanum*, *Steriospermum chelonoides*, *Celastrus paniculatus Pterocarpus marsupium*, *Oroxylum indicum* and *Terminalia chebula* etc. threatened.

Loss of biodiversity

At present, the biodiversity of Chitrakoot is declining fast due to the degradation of habitats by heckles and indiscriminate cutting of forests for timber, fuel wood, expansion of agriculture, construction of roads, querying of stones, grazing, invasion of alien weeds, overexploitation of plants for medicines etc., the rich biodiversity of Chitrakoot region has reduced to a great extent. There are certain high value medicinal plants like *Chlorophytum tuberosum*, *C. arundinaceum*, *Curcuma amada*, *Operculina petaloidea*, *Oroxylum indicum*, *Alectra chitrakutensis*, *Litsea glutinosa*, *Asparagus racemosus*, *Gloriosa superba*, *Andographis paniculata*, *Aristolochia indica*, *Celastrus paniculatus*, *Embelia basaal*, *Plumbago zeylanica*, *Uraria picta*, *Gymnema sylvestre Baliospermum montanum*, *Curculigo orchioides*, *Pterocarpus marsupium*, *Crataeva magna Eulophia herbacea*, *Actinopteris radiata*, *Pterocarpus marsupium*, *Costus speciosus*, *Butea monosperma var. lutea*, *Abrus precatorius*, *Terminalia chebula*, *Dioscorea bulbifera* ,*D. hispida*, *D. pentaphylla*, *Nervilia prainiana*, *Bacopa monnieri*, *Centella asiatica*, *Smilax zeylanica*, *Luffa echinata*, *Cordia macleodii*, *Pueraria tuberosa*, *Momordica dioica* etc. These plants are assessed as threatened plants under IUCN Red List categories (2000). Therefore, it is an urgent need to save the natural habitats and conserve the valuable medicinal plants diversity of Chitrakoot region. Yet certain areas like Dharkundi, Markundi, Valmiki pahad, Ansuiya forest, Devangana Ghati, Hanumandhara, Guptagodawari forest, Mohkamgarh forest, Bagdaraghati forest and Kamadgiri hill have rich collection of plants and animals. These areas can be proposed for *in situ* conservation.

Conservation of biodiversity

The Deendayal Research Institute established a herbal garden in Arogyadham campus covering an area of 5 acre. The objectives of herbal garden are– 1. To conserve germplasm material of rare and endangered plants and high value medicinal plants found in Chitrakoot forest area; 2. To aware the local people about the uses and importance of plant diversity. There are about 500 medicinal and rare and endangered plants conserved in the herbal garden. The garden gets its identity for conservation of *Alectra chitrakutensis*, an endemic and critically endangered plant of India. The Botanic Gardens Conservation International, certified the garden for its unique conservation. Dr. A.P.J. Abdul Kalam, The former President of India, visited herbal garden in 2005 and very well appreciated. The plants conserved in garden include 120 trees, 78 shrubs, 65 climbers and 220 herbs.