

Ecoregion

# Chhota-Nagpur Dry Deciduous Forests



**Area of the ecoregion**  
122,419 km<sup>2</sup>



**Altitude**  
6-1,400 m



**Annual rainfall**  
1,100-1,400 mm



**Temperature**  
6°C-46°C



Ecological  
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## Overview

The **Chota-Nagpur Dry Deciduous Forests** occur on two large plateau complexes that bridge the Himalayan foothills and the peninsular hill ranges. The elevated rugged terrain falls away into the Sone river basin which consequently joins the lower Gangetic plain towards the north. The landscape is characterised by lateritic plateaus, ravines, cliffs, deep alluvial plains, gorges and inselbergs that form a complex peneplain that contains several microhabitats, soil types, and elevations. These sal (*Shorea robusta*) dominated forests form a floristic bridge between the moist forests north and drier regions south and west with higher elevation pockets within its folds and ridges. With a rich biogeographic history, a third of the forests still exist in various stages of degradation but are threatened by industrial mining, agriculture, and soil erosion. These forests are home to a large diversity of plants and animals as well as millions of indigenous peoples in tribal communities.

## Ecological Restoration Projects in the Ecoregion

We are currently not aware of any projects located in this ecoregion. Please mail us on [hello@era-india.org](mailto:hello@era-india.org) if you know of any projects that could be listed here.



Folded undulating hills and plateaus with deep valleys and diverse forests.

## Adjoining ecoregions

This ecoregion is situated between the **East Deccan Moist Deciduous Forests** and the **Lower Gangetic Plain Moist Deciduous Forests**. Towards the west, the ecoregion conjoins the **Narmada Valley Dry Deciduous Forests**.

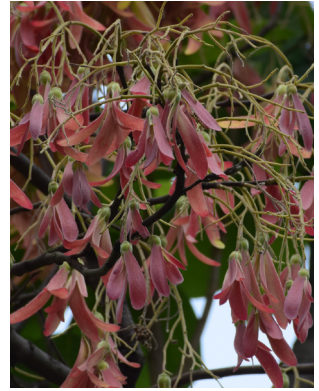
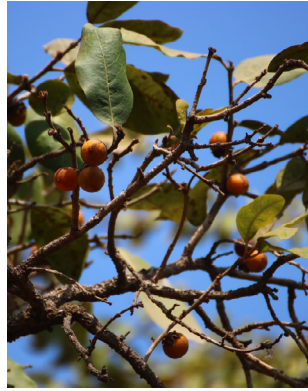
## Geography

The **Chhota-Nagpur Dry Deciduous Forests** are situated on two large plateau complexes (Chhota-Nagpur and Hazaribagh-Koderma plateau) that cover an area of 122,419 km<sup>2</sup>. The ecoregion extends 450 km in length latitudinally from the East Deccan complex until the Sone river basin before falling away to the lower gangetic plain. The ecoregion spans 580 km longitudinally from the western extremities of the Satpura hill ranges up until the coastal alluvial regions of the Sunderban Delta. This ecoregion is distinctive from the surrounding geomorphology and has a complex topography and geology that forms deep valleys, cliffs, large sections of elevated highlands, inselbergs and broad and dense meandering network of alluvial floodplains. Altitude varies from 6 m – 1400 m (in the Parasnath hill range) asl. Rivers and streams flow radially from interlocked highlands both north to the gangetic plain and towards the Bay of Bengal. Northward flowing rivers include Rihand, Kanhar, North Koel, and Gopad. South-eastern flowing rivers form larger fluvial basin systems with many tributaries; these rivers include the Subarnarekha, Brahmani, Bhaitarani, Kansabati, Damodar, and Mayurakshi rivers. These rivers are fed by a network of swales and gorges/steep valleys of smaller streams that are semi-perennial to seasonal. The majority of forests within this ecoregion are situated within the state of Jharkhand. Intact forests still cover a third of the landscape and sustain a population of millions of indigenous tribal communities, e.g., the Birhor, Korwa, Hill Kharia, Santhal, Munda, Oraon, Ho, Bhumij, Mahli, and Lohra.

## Geology and Soil

The landscape forms a classical tropical peneplain, deeply eroded and moulded by rivers, uplift and bedding. A large granitic-gneiss complex makes up the foundational bedrock. These rocks are interspersed by chertified limestones and sandstone belts. This layer is followed by a deeply weathered layer of paleosols that gives way to a broader horizon of fissile black shale. Shale layer includes laminae holding lignite or bitumen-like organic matter compounds and also networks of iron ore as well as manganese, bauxite and various other mineral deposits. Sitting atop this complex

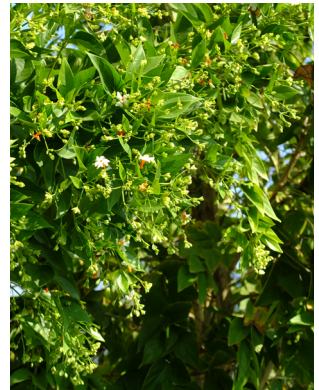




Canopy Trees [left to right]: *Alstonia scholaris*, *Diospyros melanoxylon*, *Semecarpus anacardium*, *Shorea robusta*



Sub-canopy Trees [left to right]: *Buchanania cochinchinensis*, *Premna latifolia*, *Syzygium salicifolium*, *Wrightia arborea*



Lianas/Climbers [left to right]: *Pueraria tuberosa*, *Ventilago denticulata*, *Hiptage benghalensis*, *Nyctanthes arbortristis*



mosaic of composites is a layer of deeply weathered laterite or charnockite extrusions that form broad mesa plateaus broken by ravines, gorges, and valleys. Inselbergs and conical formations occur in isolation formed by the porphyritic or dome gneiss. Pure laterite and murrum exist. Soils of these regions, much like the rest of the geology, vary substantially from one region to another. Soil can range from being heavily eroded ferralitic-lateritic soils to sandy loam or alluvial loam to murrum. The thickness of soil horizons depend on underlying basal rock systems as well as the aspects of the topography and formations that it resides on. Soils can change substantially along slopes and form dramatic soil catenas and varying horizons. A major component of all soils include large volumes of mica clay formed by the hydrological weathering of granite and gneiss.

## Climate

This ecoregion has a marked annual seasonality with wide ranges of temperature (6 - 46 °C) and an annual drought extending for upto 7 months. The summer months between March end till June are characterised by low humidity (<30%) with arid westerly winds and nearly half the smaller streams running completely dry. A majority of the rainfall is received during the Southwest monsoon between July and October with annual rainfall ranging between 1100 to 1400 mm. Thundershowers and local scale convectonal rainfall during the summer months play an important role in



Dense tall canopies of forests along the broad fluvial basins.

# Characteristic native plant species

## Trees

*Adina cordifolia*  
*Albizia odoratissima*  
*Alstonia scholaris*  
*Anogeissus latifolia*  
*Butea monosperma*  
*Dalbergia sissoo*  
*Diospyros melanoxyton*  
*Diospyros montana*  
*Ficus bengalensis*  
*Ficus glaberrima*  
*Ficus racemosa*  
*Garuga pinnata*  
*Glochidion lanceolarium*  
*Grewia tiliaefolia*  
*Lagerstroemia parviflora*  
*Lanea coromandelica*  
*Madhuca longifolia*  
*Mallotus philippensis*  
*Mangifera indica*  
*Mitragyna parviflora*  
*Ougeinia oojeinensis*  
*Pterocarpus marsupium*  
*Pterygota alata*  
*Schleichera oleosa*

*Semecarpus anacardium*  
*Shorea robusta*  
*Soymida febrifuga*  
*Terminalia tomentosa*  
*Terminalia arjuna*

## Sub-canopy

*Bauhinia purpurea*  
*Boswellia serrata*  
*Bridelia retusa*  
*Buchanania cochinchinensis*  
*Casearia tomentosa*  
*Cassine glauca*  
*Chionanthus ramiflorus*  
*Drypetes assamica*  
*Erythrina suberosa*  
*Ficus microcarpa*  
*Ficus mollis*  
*Ficus semicordata*  
*Gardenia resinifera*  
*Manilkara hexandra*

*Murraya paniculata*  
*Premna latifolia*  
*Sindora siamensis*  
*Sterculia villosa*  
*Syzygium salicifolium*  
*Vitex negundo*  
*Wrightia arborea*  
*Ziziphus mauritiana*

## Lianas/Climbers













*Combetrum decandrum*  
*Cryptolepis buchanani*  
*Ficus foveolata*  
*Hiptage benghalensis*  
*Ichnocarpus frutescens*  
*Millettia auriculata*  
*Pueraria tuberosa*  
*Tinospora cordifolia*  
*Ventilago denticulata*  
*Nyctanthes arbortristis*

## Shrubs

*Abroma augustum*  
*Antidesma acidum*  
*Caesalpinia cucullata*  
*Callicarpa arborea*  
*Carissa carandas*  
*Carrissa spinarum*  
*Colebrookea oppositifolia*  
*Crotalaria retusa*  
*Croton persimilis*  
*Flacourtia indica*  
*Grewia laevigata*  
*Helicteres isora*  
*Holarrhena pubescens*  
*Phyllodium pulchellum*  
*Sophora acuminata*  
*Ziziphus oenoplia*  
*Symplocos racemosa*



# Plant seasonality

J	F	M	A	M	J	J	A	S	O	N	D
											
											
											

providing moisture for water-deprived ecosystems. These rains are however quite unpredictable and variable inter-annually. The winter period between November and March is mild in the lower elevations and plains. However, in the higher elevation and plateau regions frost forms on a regular basis during the night and can extend up until March, with more than two weeks of continuous nocturnal frosting taking place during the peak cold period. Additionally, the early winter and late monsoon months witness the build up of fog.

## Natural vegetation

Vegetation is primarily of a mixed deciduous forest type (tree density at 350 - 480 stems per hectare) with the plateaus functioning as a transitional zone of moist forests, savannah, rocky escarpment, and riverine alluvial species. The forests are composed of four principal layers including the main canopy (18 - 25 m) dominated by the dipterocarp *Shorea robusta* (sal) and a subgroup of dominant associate species. This is followed by the sub-canopy (8 - 18 m) comprising a more variable community of evergreen, scrub forest, and moist forest species shared with the Gangetic plains and the escarpments of the Eastern Ghats. The third equally- diverse layer comprises the understory shrubs (1 - 8 m) whose densities, diversity and spread is associated with the topography and associated canopy species. Apart from taller, structurally typical tropical and sub-tropical deciduous forests, the ecoregion is characterised by tracts where the soil is denuded and thin for larger tree vegetation due to the underlying laterite tables, rock domes, cliffs and steep slope faces. These areas support a complex array of herbaceous communities from mature/climax grasslands, pteridophytes, epiphytes and *Impatiens* balsams to mosses and lichens. Open ecosystems are a diverse and unique component of the landscape and in smaller specific belts bound the tall deciduous forests and link the escarpment formations interlocked between valleys and hills.

## Variation within ecoregion

The primary factors governing the diversity of microhabitats include soil type and topography and annual rainfall in that order. Additionally forests of this landscape act as a higher-elevation transitional bridge between the flora of the subtropical-lower himalaya to the Satpura hill ranges along the Narmada river basin and thus carry over communities of both ecoregions within small pockets. Tall *Shorea robusta* dominated forests constitute a large portion of forest ecosystems; these belts occur in soils which



are primarily in sandy or alluvial loam. Within the monospecific sal stands there is considerable variation in both the growth characteristics and associated species surrounding sal. In areas of high annual rainfall and medium elevation (300 - 800 m), sal forests may include both evergreen and deciduous species based on the prevailing soil fertility, depth, elevation and length of the annual dry period. Correspondingly the floral compositions of the associated vegetation vary:

In drier rugged areas of the landscape *Shorea robusta* is associated with species such as *Boswellia serrata*, *Sterculia urens*, *Anogeissus latifolia*, *Lannea coromandelica*, *Erythrina suberosa*, *Cochlospermum religiosum* and *Gardenia resinifera*. In tracts with slightly more moisture and milder droughts and more porous fertile soil, associate species include: *Terminalia tomentosa*, *Adina cordifolia*, *Mitragyna parvifolia*, *Pterocarpus marsupium*, *Ougeinia oojeinensis*, *Croton oblongifolius* and *Holarrhena pubescens*. The forests with maximum moisture contain more evergreen and brevi-



Left to right: Indian wolf, Malabar pied hornbill.



Left to right: Lesser florican, Indian rock python.

deciduous species and the sal is associated with species such as *Dillenia pentagyna*, *Syzygium salicifolium*, *Symplocos racemosa*, *Trema orientalis*, *Mallotus philippensis*, *Kydia calycina*, *Toona ciliata*, *Colebrookea oppositifolia*, and *Terminalia arjuna*. Floral communities with higher moisture are primarily found in swales, along perennial and semi-perennial mountain streams and in deeper alluvial soil within valleys. Trees like *Terminalia arjuna*, *Syzygium cumini* grow along river banks in this ecoregion. Riverine moist forests host many epiphytic species with more than 15 orchid species, with dendrobium orchids being the most dominant. These forests also contain a high diversity of pteridophytes that can be both epiphytic and can also form ground cover along cliffs, and rocky escarpments with higher moisture in higher elevations (900 - 1400 m); some examples include: *Ophioglossum sp.*, *Lygodium flexuosum*, *Cheilanthes bicolor*, *C. tenuifolia*, *Selaginella sp.*, *Ampelopteris prolifera*, *Diplazium esculentum*, *Leucostegia immersa* and *Pronephrium nudatum*.

Beyond a certain elevation and slope gradient sal forest types give way to open natural ecosystems due to the shallow leached soils as well as the persistence of frost which prevents tree regeneration. These higher elevation, harsher and more rugged ecosystems are dominated by climax **grassland ecosystems** that form focused belts along ridges, depleted and eroded rock and laterite tables as well as higher elevation frost-dominated areas. Grasslands occur in areas where mica clay is also abundant. Some species of these grasslands include: *Alysicarpus vaginalis*, *Aristida cyanantha*, *Bothriochloa pertusa*, *Cynodon dactylon*, *Cyperus aristatus*, *Dactyloctenium aegyptium*, *Desmodium triflorum*, *Dichanthium annulatum*, *Echinochloa colonum*, *Evolvulus alsinoides*, *Setaria glauca*, *Sporobolus diander*, *Gomphrena globosa* and *Vetiveria zizanioides*. These grasslands are interspersed by more stunted forests characterised by *Bauhinia*, *Acacia*, *Soyimida*, *Wrightia*, *Zizyphus* and *Vitex* species and species adapted to higher elevations and frost (*Syzygium salicifolium*). Additionally a diverse group of figs become more dominant including *Ficus glaberrima*, *F. tomentosa*, *F. mollis*, *F. microcarpa*, *F. semicordata*, and *F. foveolata*.

Thus ecosystem type and species composition is a coefficient of the elevation, slope, overall moisture content and extent of winter and summer seasonality. These variables are largely driven by the complex nature of the plateaus, created by the folded composition nested within the underlying geology.



## **Plant seasonality**

There is a spread of different phenological cycles based on the different forest types and composition discussed earlier and stark climatic seasonality. There are windows of maximum fruiting, flowering and flushing episodes that occur within more arid as well as moist sites. These 'peaks' are represented in the table above. It is important to note that grasses, pteridophytes and ficus species follow different cycles in their own respective ways.

## **Pollination and seed dispersal ecology**

Chief pollinators are arthropods, mainly bees (hymenoptera) and moths/butterflies (lepidoptera). Pollination also occurs by a multitude of bird species that are attracted to the copious production of nectar. Most flowers are generalised to pollination by multiple species. The fruits are mostly dispersed by wind or by frugivory and seed dispersal by birds, primates, and small mammals.

## **Animal life**

The forests of this ecoregion are an important extent for large mammal species including the Indian wolf, Bengal tiger, sloth bear, nilgai, dhole and gaur. Totally the forests are home to 50 species of mammals with smaller mammals including porcupine, hyena, hare, Indian spotted chevrotain (mouse deer), barking deer, langurs, rhesus macaques, otters, Indian fox, jackal, pangolin, jungle cats, fishing cats, mongooses, wild boars and bats. Some snakes of this ecoregion include Indian cobra, common krait, rock python, rat snake, and Russell's viper. More than 88 fungi species have been found within these forests with 5 mycorrhizal fungi, and many are known to be edible. The ecoregion is home to over 200 species of birds some examples including the Lesser Florican, Malabar Pied-Hornbill, Oriental Honey-Buzzard and Indian Paradise-Flycatcher. Moreover a high diversity of insects both seasonal and perennial including numerous moths and spiders have been recorded.

## **Conservation**

About 29.6% of the forests within the Chhota-Nagpur Dry Deciduous Forests are still extant and show some level of continuity. These forests and associated open natural ecosystems act as vital corridors connecting the Satpura, Eastern Ghats and the Gangetic plains for endangered species like the Indian wolf and Bengal tiger. Much of

the forests are now restricted to very rugged terrain and poor soils as agrarian use has taken over much of the alluvial plains and valleys. Furthermore, existing forests occur over rich geological resources and are placed under significant pressure due to mining for bauxite, iron, coal, mica, limestone and magnesium. The large-scale deforestation of the steep and complex peneplain has resulted in the drastic erosion of topsoil with the rain and run off exposing the impermeable rock underneath and causing high sedimentation in rivers and dams. This is of critical consequence to agriculture/water cycles as well as changing forest composition and structure across the plateaus. The forests are also placed under pressure for firewood, timber, non-timber forest produce extraction as well as urbanisation, dams, and linear intrusions such as roads.

## **Important Protected Areas in the Ecoregion**

1. Koderma Wildlife Sanctuary
2. Betla National Park
3. Mahuadanr Wolf Sanctuary
4. Palamau Tiger Reserve
5. Palkot Wildlife Sanctuary
6. Lawalong Wildlife Sanctuary
7. Hazaribagh Wildlife Sanctuary
8. Dalma Wildlife Sanctuary
9. Badalkhol Wildlife Sanctuary.

## **Ecological Restoration Projects in the Ecoregion**

We are currently not aware of any projects located in this ecoregion. Please mail us on [hello@era-india.org](mailto:hello@era-india.org) if you know of any projects that could be listed here.

## Acknowledgements

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[cover] Ecoregion Map: A. P. Madhavan  
[Pg 1] Forest forest forest only forest: Targeriyar  
[Pg 3] *Semecarpus anacardium*: J.M.Garg  
[Pg 3] *Diospyros melanoxylon*: Shiwalee Samant  
[Pg 3] *Shorea robusta*: Aniruddha Singhamahapatra  
[Pg 3] *Alstonia scholaris*: J.M.Garg  
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### One Earth Ecoregion Snapshot

<https://www.oneearth.org/ecoregions/chhota-nagpur-dry-deciduous-forests/>



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