Ecoregion

# Orissa Semi-evergreen Forests

**Area of the ecoregion**
22,285 km²

**Altitude**
10-220 m

**Annual rainfall**
1300–2000 mm

Temperature
19˚C – 38˚C



Ecological Restoration Alliance

## Overview

The Orissa Semi-evergreen Forests form a unique biogeographic zone around the Mahanadi and associated river deltas which create a fertile belt of alluvial sediments and loam. These forests have higher moisture and are more aseasonal compared to the highland vegetation towards the west. The forests create a bridge between the moist deciduous forests and coastal mangroves and associated lagoons, estuaries and wetland formations. The semi-evergreen forests once formed a dense, low statured, diverse span of unique species communities that share similarities to the **East Deccan Dry Evergreen Forests.** The forest type and variation is primarily determined by the proximity to the coast. Much of the semi-evergreen ecosystem has undergone deforestation and aridification due to anthropogenic pressures but small pockets still exist within the secondary vegetation of some Protected Areas.

## Adjoining ecoregions

The Orissa Semi-evergreen Forests occupy a coastal belt between the **Krishna Godavari Mangroves**, and towards the west transition into the **East Deccan Moist Deciduous Forests**. Towards the north along the coast this ecoregion is contiguous with the **Lower Gangetic Plains Moist Deciduous Forests**.

Dense low-canopy semi-evergreen forests on the hills; Deras Dam

## Geography

This ecoregion occupies a bio-geographically unique pocket of forests covering an area of 22,285 km$^2$. The landscape is mainly distinguished by the climatic influence of the coast. A majority of the 324 km of the landscape lies along the eastern coastline including a large river delta complex of  the Mahanadi river as well as extended tracts of brackish lagoons, estuaries, and wetlands. The ecoregion also encompasses the Chilika lake; the largest wetland ecosystem in Asia and a Ramsar site of critical ecological importance. The landscape has three primary rivers including the Rushikulya, Baitarani, and Brahmani apart from the large delta complex of the Mahanadi river. The terrain is primarily flat and gently undulating with low hills towards the west with an elevation range of 10 to 220 m. Much of the smaller streams and rivulets are largely seasonal which make up broad alluvial depository floodplains rather than more erosive, topographically complex processes.

## Geology and Soil

The basal rock is primarily metasedimentary in origin. However the lower hills contain granitic and gneissic intrusions.The region includes a large section of the eastern coastal plains of Orissa, fed by river estuaries, lakes and deltas and thus is primarily made of alluvial loam deposits, and fine and dense clay that accumulate from the weathering and erosion of the folded geological plethora of the highland regions. The soil of the flood plains are rich in minerals and are very fine grained but also contain a fair amount of granular sandy material transported by river action. The silt-like soil has high water retention capacity.

## Climate

A warm coastal tropical climate predominates with low variability in temperature and humidity through the year. This climatic type and local weather patterns are primarily mediated by the proximity to the coastline. Temperature varies between the extremes of 19 – 38˚C with an average of 33˚C occurring throughout much of the year. Thus this ecoregion experiences significantly lower seasonality in terms of temperature and moisture than interior more highland regions. Much of the rainfall is received through the southwest monsoon (July to September) with this coastal region facing the brunt




*Canopy Trees[left to right]: Diospyros malabarica, Manilkara hexandra, Naringi crenulata, Strychnos nux-vomica*




*Sub Canopy [left to right]: Drypetes roxburghii, Gardenia latifolia, Bridelia retusa, Atalantia monophylla*




*Shrubs [left to right]: Holarrhena antidysenterica, Indigofera cassioides, Mimosa himalayana, Woodfordia fruticosa*




*Lianas [left to right]: Cissus quadrangularis, Ichnocarpus frutescens, Cissampelos pareira, Pergularia daemia*

of larger cyclones and depressions as they attain landfall from the Bay of Bengal. Some Rainfall is also received in concentrated windows of time during the northeast monsoon. Annual precipitation is quite variable between years and can be anywhere between 1300 mm to 2000 mm with an average of 1400 mm. During the cold dry months from January to March, the landscape receives a significant amount of dew especially in areas close to the coast.

## Natural vegetation

The climax forests of the Orissa Semi-evergreen Forests include a dense and diverse mixed forest with a junction of evergreen, semi- deciduous and more hardy dry deciduous and shrubland species. The forests are comparatively lower in canopy height and stature than typical moist deciduous forests of the highland regions further inland. These forests share biogeographic and adaptive strategies similar to the **East Deccan Dry Evergreen Forests**. Species community and composition is quite variable and dependent on several edaphic and climatic factors. However, a common characteristic of these forests are the interlocked, stunted, diverse and dense canopy and subcanopy. The outer boundaries of the larger sal (*Shorea robusta*) stands taper off in the western hills of this ecoregion with areas closer to the coast (eastern part) having unique assemblages of evergreen shrubs and trees (e.g *Diospyros ebenum, Naringi crenulata, Drypetes roxburghii, Streblus asper, Symphorema polyandrum,*

Dense forest clumps grow on flat lands that flank the coast; Parlakhemundi, Orissa

# Characteristic native plant species

## Canopy Trees

*Alangium salvifolium*
*Albizia lebbeck*
*Albizia marginata*
*Alstonia scholaris*
*Anogeissus latifolia*
*Artocarpus heterophyllus*
*Careya arborea*
*Cassia fistula*
*Diospyros ebenum*
*Diospyros malabarica*
*Diospyros melanoxylon*
*Diospyros montana*
*Ficus benghalensis*
*Ficus racemosa*
*Grewia tiliifolia*
*Haldinia cordifolia*
*Lannea coromandelica*
*Madhuca indica*
*Mallotus philippensis*
*Manilkara hexandra*
*Michelia champaca*
*Morinda tinctoria*
*Naringi crenulata*
*Protium serratum*
*Pterocarpus santalinus*
*Schleichera oleosa*
*Shorea robusta*
*Streblus asper*
*Strychnos nux-vomica*
*Syzygium cumini*
*Terminalia alata*
*Terminalia arjuna*
*Xantolis tomentosa*

## Sub-canopy

*Acacia nilotica*
*Atalantia monophylla*
*Bridelia retusa*
*Buchanania lanzan*
*Cassia fistula*
*Casearia elliptica*
*Chloroxylon swietenia*
*Cleistanthus collinus*
*Clerodendrum viscosum*
*Commiphora wightii*
*Dillenia indica*
*Drypetes roxburghii*
*Flacourtia jangomas*
*Gardenia latifolia*
*Glycosmis pentaphylla*
*Holarrhena pubescens*
*Ixora pavetta*
*Lagerstroemia speciosa*
*Pongamia pinnata*
*Semecarpus anacardium*
*Symphorema polyandrum*

## Shrubs

*Combretum roxburghii*
*Holarrhena antidysenterica*
*Imperata cylindrica*
*Indigofera cassioides*
*Jasminum pubescens*
*Mimosa himalayana*
*Woodfordia fruticosa*
*Ziziphus mauritiana*

## Lianas

*Combretum roxburghii*
*Holarrhena antidysenterica*
*Imperata cylindrica*
*Indigofera cassioides*
*Jasminum pubescens*
*Mimosa himalayana*
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# *Plant seasonality*

| J | F | M | A | M | J | J | A | S | O | N | D |
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and *Atalantia monophylla*) that later transition into the mangrove- associate forests ecosystems.

## Variation within ecoregion

Within the semi-evergreen forests, distance from the coast is one of the key determinants for species composition, stand structure and microclimatic variations. The western hilly regions, which lie furthest away from the coast are typified by more seasonal, less humid climates, with more complex topography and less alluvial deposits. These changes result in a taller tree canopy with the presence of species like *Shorea robusta* which share more similarity to moist deciduous forests. Land closer to the coast are almost completely flat, has higher moisture, higher humidity, lower annual variability in temperature, greater amounts of dew fall and greater weathering by winds. These areas have more stunted and dense vegetation typical of dry evergreen and mixed vegetation as well as large lagoons, estuaries, marshes and deep alluvial deposits and deltas. Thus the typical semi-evergreen forest belts occupy a specialised pocket of the land-sea gradient and are pivoted on fine-scaled balances of soil, water availability and temperature.

Large bodies of fresh, saline and brackish water are prevalent in the broad delta regions. One of the largest lagoons in Asia, Chilika Lake, occupies a significant portion of this region spreading over an area of 1020 $km^2$ with more than 42 rivulets and streams feeding in freshwater every year that are exchanged with oceanic tidal action. The lagoon contains large volumes of seagrass, a diverse algal community and is home to important fauna including the Irrawaddy dolphins, hundreds of species of fish and crustaceans, and many coastal-wetland birds that reside in the islands within the lagoon. The Chilika lake has larger microclimatic effects on the surrounding vegetation and also extends the reach and distribution of mangrove-associated species hundreds of kilometres inland creating a unique intersection and exchange of ecosystems and biological communities.

## Plant seasonality

Staggered flowering happens throughout the year for different individuals. Maximum fruiting across species occurs between the early southwest monsoon through the north-east monsoon. Ficus species tend to be more aseasonal and spread out through the year.

## Pollination and seed dispersal ecology

Most plants are pollinated by bees, butterflies, moths, bats, and birds. The dominant group of pollinators are social and solitary bees (i.e. *Apis cerana, Apis dorsata, Trigona iridipennis* and *Braunsapis picitarius*), followed by butterflies and moths (lepidoptera) and then the family of flies (diptera). Most of the flowers open during the day and provide nectar alone. Most flowers are generalised to multiple pollinators, with some exceptions specialised on nocturnal moths or bats. Most fruits are dispersed by birds and small mammals (such as palm civets), besides monkeys, jackals, and bats. Some species disperse their seeds through wind, water or other mechanical means.

## Animal life

The Orissa Semi-evergreen Forests are home to primarily smaller mammal species such as civets, Indian wolves, jackals, mongooses and the jungle cat. Parts of

Left to right:  Jungle cat, indian jackal

Left to right: Asian Elephant, ruddy mongoose

the western portion of the ecoregion provide an important refuge for significant populations of the Asian elephant. The landscape hosts a high diversity of bird species (more than 215 species) particularly in the wetland and estuarine zones.

## Conservation

The semi-evergreen forest ecosystems are some of the most critically disturbed ecosystems in the subcontinent with a majority of once contiguous dense tracts of mixed evergreen deciduous forests converted to agrarian land, especially within the large rice production belt. Much of existing pockets of forest have been deforested to become arid scrublands or are severely lopped and degraded leaving large tracts of bamboo (Dendrocalamus strictus). During the later parts of the 20th century 16.5 percent of evergreen forests were lost within a single decade. Anthropogenic pressures such as grazing, fuel wood, and slash and burn agricultural practices are still prevalent and in some parts of the ecoregion have resulted in the complete loss of humus or the upper soil horizon. Existing semi-evergreen forest vegetation are found in small pockets within the larger secondary vegetation of Protected Areas.

## Important Protected Areas in the Ecoregion

1. Khallikote Reserve Forests
2. Kerandimala Reserve Forest
3. Chandaka Reserve Forest
4. Kapilash 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 if you know of any projects that could be listed here.

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Text
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[cover] Ecoregion Map: A. P. Madhavan
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[Pg 3] *Diospyros malabarica:* Chief RedEarth
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[Pg 3] *Pergularia daemia*: SAplants
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**One Earth Ecoregion Snapshot**
https://www.oneearth.org/ecoregions/orissa-semi-evergreen-forests/

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