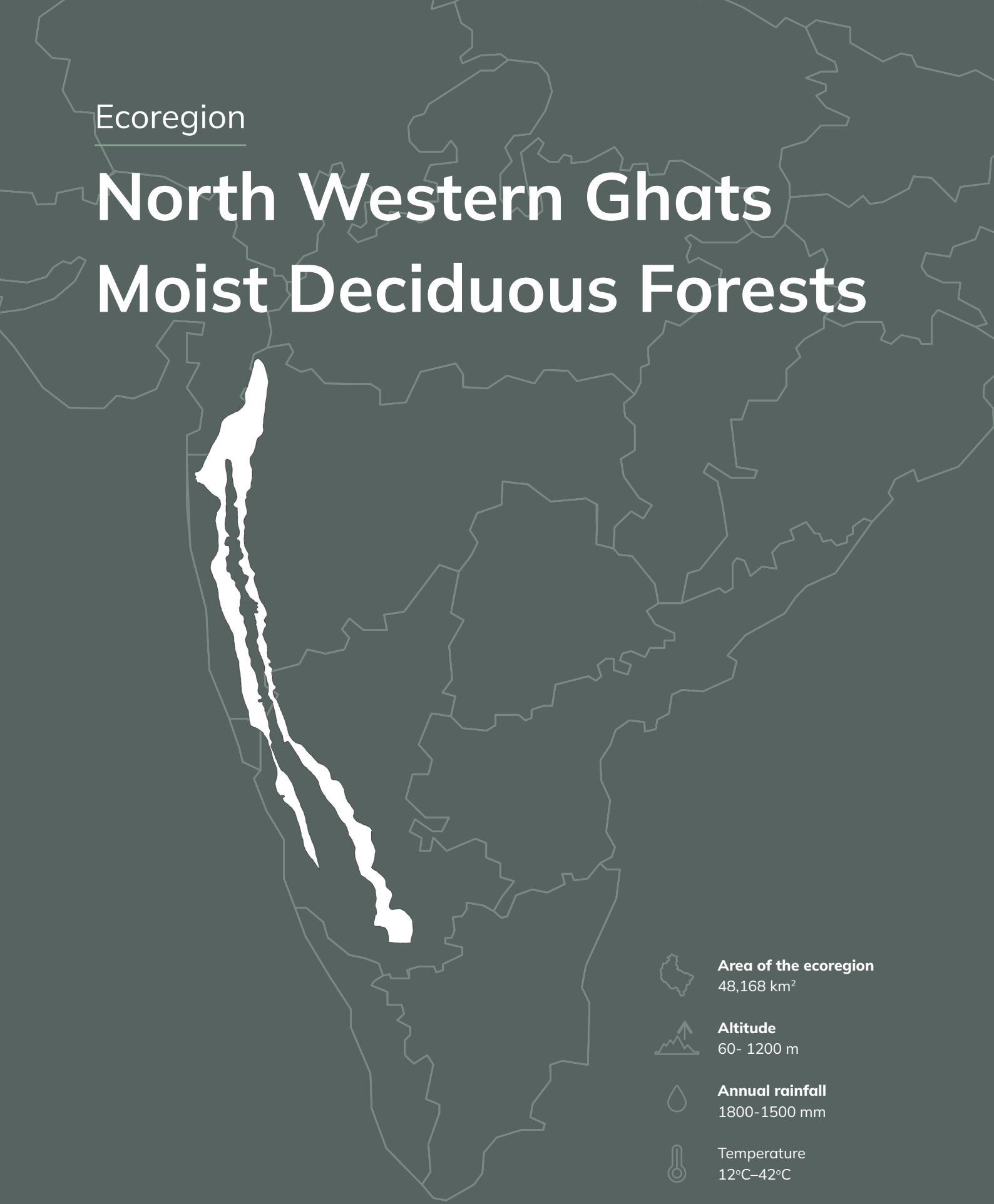
Ecoregion

North Western Ghats Moist Deciduous Forests



Area of the ecoregion
48,168 km²

Altitude
60- 1200 m

Annual rainfall
1800-1500 mm

Temperature
12°C–42°C

Ecological Restoration Alliance

Overview

The North Western Ghats Moist Deciduous Forests are a crossover between wet evergreen forests and dry deciduous forests surrounding the western ghats escarpment to the east and coastal forests to the west. This ecoregion is situated in the rain shadow belts of land that span out from the precipitation peaks found along the crest of the Deccan plateau before it slopes down to the Arabian sea. The ecological role and geographic relevance of these forest types share many similarities to the South Western Ghats Montane Rainforest. However these two ecoregions grossly differ based on species composition and community structures and geology of the landscape. The long belt of forest has a majority of the peninsular river basins flowing through them and are the point of convergence of smaller streams and tributaries into larger single fluvial systems.

Ecological Restoration Projects in the Ecoregion

Ecological Restoration of Panchgani tableland

Adjoining ecoregions

The southern extent of the eastern arm of this ecoregion is contiguous to the Deccan Scrub Forests and the South Deccan Dry Deciduous Forests. The north eastern tract for

Steep valleys, Sahyadri, Northern Western Ghats, Maharashtra

forests is contiguous with the Narmada Valley Dry Deciduous Forests. The western arm of this region transitions into the Malabar Coast Moist forests. This ecoregion almost completely surrounds the North Western Ghats Montane Rainforest and is a geological extension of the latter.

Geography

This region, covering an area of 48,168 km^2 almost entirely wraps around the wet evergreen montane rainforests in two distinct 'arms' (west and east). The western flank is found on the slopes of the Ghats as the Deccan slopes down to meet the Malabar coast. The eastern flank is located in the areas moving away from the escarpment edge. Following the vertical position of the Western Ghats escarpment is 1057 km from the Tapi river in southern Gujarat with Hemavati river basin as the southern extent. The location of moist deciduous forests is primarily based on precipitation gradients. It forms a belt of forests that transition from moisture laden plateaus, ridges, higher elevation crests and peaks of the Western Ghats down to the rain shadow regions of the Deccan and the Malabar coast. It shares most of its river systems with the North Western Ghats Montane Rainforest including eastward flowing rivers such as the Koyna, Krishna, Bhima, Malaprabha, Ghataprabha, Godavari, Tungabhadra; and the small group of westward flowing rivers that include: Netravati, Sharavati, Kali, Mandovi and Zuari. Within this landscape rivers gain speed and volume as smaller streams and montane rivulets converge becoming larger and more singular drainage systems that flow out into the plains. The mean elevation averages between 700 and 900 m in elevation. The hills are largely flat-topped, with numerous deep and highly fluvially dynamic valleys with strong erosive processes with folds and faults. Towards the west, the elevation falls significantly and rapidly to a minimum of 60 m near the plains.

Geology and soil

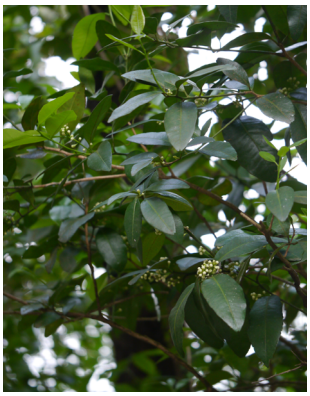
Soil types range from soft ferruginous clay loam, gravelly black volcanic soils to impervious lateritic clay horizons. It has slabs of heavily leached and weathered ferralitic laterite sitting in vertical beds over a bedrock of layered basalt. The rocks are found in flat layers forming the even undulating terrain of the plateau to the east and the vertically stratified structures of the Ghats. Towards the south of the ecoregion, the bedrock of basalt becomes interspersed with gneiss and schist formations. Most of the basalt has broken down into red ferralitic ferruginous loam soils but intact slabs form caps over hill tops forming flat topped plateaus and monolithic structures.




Trees - Canopy[left to right]: *Xylia xylocarpa, Neolamarckia cadamba, Miliusa tomentosa, Dillenia pentagyna*




Trees - Sub-canopy[left to right]: *Cordia obliqua, Erythrina stricta, Litsea glutinosa, Stereospermum colais*




Shrubs[left to right]: *Atalantia racemosa, Gnidia glauca, Murraya koenigii, Pavetta crassicaulis*




Lianas[left to right]: *Aristolochia indica, Asparagus racemosus, Dioscorea oppositifolia, Gymnema sylvestre*

Lateritic formations of Shri Bhimashankar Jyotirlinga Wildlife Sanctuary

Climate

Annual precipitation ranges from 1800mm - 3500 mm. 80 percent of the rainfall received the Southwest monsoon between the months of June to September. Rainfall occurs in a concentrated torrential manner in short windows of time. The southern extent of this region may receive rain from some large-scale depressions during the Northeast monsoon. Convectional thunderstorms during the hot months may play an important role in the sustenance of the ecosystem with significant rains occurring at this time to break the drought period. The annual summer drought ranges from 4 months down south to 7 or more months in the interior northern regions of this forest type. Maximum temperatures during this time can go upto 42 degrees with an average of 38 Degrees. Winter months extend from November to February with temperatures ranging from 12 - 28 degrees. Elevation and proximity to the coast play a significant influence on microclimatic characteristics.

Natural vegetation

Most deciduous forests are tall and stratured with the emergent trees attaining a height of 30 - 40 m. The canopy is between 20 - 30 m tall followed by a smaller layer of sub-canopy trees. Shrubs and lianas are quite variable in density and occurrence within the forests as there are quite distinct differences based on the availability of moisture, which varies according to geographic location. The sub-canopy of the forest holds

Characteristic native plant species

Tree

Canopy

Anogeissus latifolia
Bauhinia malabarica
Bombax ceiba
Careya arborea
Dalbergia latifolia
Dillenia pentagyna
Diospyros montana
Ficus amplissima
Ficus drupacea
Ficus religiosa
Haldina cordifolia
Holoptelea integrifolia
Lagerstroemia hirsuta
Lagerstroemia microcarpa
Macaranga peltata
Mallotus philippinensis
Mangifera indica
Melia dubia
Meyna laxiflora
Miliusa tomentosa
Mitragyna parvifolia
Neolamarckia cadamba
Pterocarpus marsupium
Radermachera xylocarpa
Schleichera oleosa
Spondias pinnata
Strychnos nux-vomica
Syzygium cumini
Tabernaemontana alternifolia
Terminalia cuneata
Terminalia elliptica
Terminalia paniculata
Tetrameles nudiflora
Xylia xylocarpa

Sub-canopy

Buchanania lanzan
Cassia fistula
Cordia obliqua
Diospyros nigrescens
Erythrina stricta
Grewia tiliifolia
Haldina cordifolia
Heterophragma quadriloculare
Kydia calycina
Lannea coromandelica
Litsea glutinosa
Madhuca neriifolia
Ougeinia oojeinensis
Phyllanthus emblica
Putranjiva roxburghii
Sterculia villosa
Stereospermum colais
Wrightia tinctoria
Ziziphus rugosa

Shrubs

Atalantia racemosa
Balanites aegyptiaca
Breynia retusa
Carissa spinarum
Catunaregam spinosa
Gnidia glauca
Helicteres isora
Holarrhena pubescens
Murraya koenigii
Pavetta crassicaulis
Strobilanthes callosa

Lianas

Acacia concinna
Argyreia nervosa
Aristolochia indica
Asparagus racemosus
Atalantia wightii
Carissa carandas
Clematis gouriana
Cryptolepis buchanani
Dioscorea oppositifolia
Gymnema sylvestre
Hemidesmus indicus
Ichnocarpus frutescens
Jasminum malabaricum
Merremia tridentata
Passiflora foetida
Pothos scandens
Tragia hispida

Plant seasonality

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

a greater proportion of evergreen species that have adapted to drier and more seasonal environments. Trees of moist deciduous forests are broadleaved and mostly hardwoods forming straight boles and are quite diverse with more than 406 species of trees and shrubs. The plants produce copious fruits and flowers as the dropping of leaves during the summer months helps streamline the energy budget and thus supports a large population of fauna in the appropriate seasons.

Variation within ecoregion

'The topography includes spurs of the WG running towards the eastern plains and steep slopes and valleys towards the west in the Konkan region, Pande (2005). Due to the length and geographic position there is much variation in microclimate, stand structure and species composition in relation to latitude and elevation. With latitude, there is an increasing amount of moist deciduous forest species and a lower canopy height, along with a reduction in annual precipitation and an increase in seasonality. A gross variation occurs between the 'western arm' and the 'eastern arm' with majorly different biogeographic climate and topography between the two.

The western flank is located nearly 740 m below the regions found along the Deccan plateau with less topographical variation. Furthermore western receive higher proportions of rainwall as they are located in the windward side of the Ghat slopes and may have a greater proportion of wet evergreen species present in their composition. In contrast eastern regions have a higher proportion of dry deciduous forest and scrub species present and as there is considerable intermingling of floristic belts and ecozones. Thus moist deciduous forest floristic composition is greatly influenced by the community and ecosystems adjacent and surrounding the specific areas. Annual temperatures and microclimatic features also show gross differences between the western and eastern sections with higher elevation leading to less humidity, and lower minimum temperatures. Endemism within this biogeographic zone was estimated to be around 19.84 % of species.

Plant seasonality

This forest type shows a greater synchrony in overall seasonal phenology, with high levels of convergence in leaf production, flower production and fruiting patterns due to optimization of growth and reproductive strategies. The broad windows for these events have been represented in the table below. The main variation between individual plant species occurs due to the differing growth and maturation rates. For example,

leaf initiation and maturation time periods can take between 1 - 12 weeks with a peak in april. Rate of flower maturation, initiation and time open has a broad range within species ranging from 10 - 60 days. Fruiting begins at the end of the southwest monsoon and takes an average of 3 months to mature with most maturation of fruits clustered around the end and beginning of the year. Leaf abscission for deciduous trees occurs between the months of December and January. Leaf production-abscission cycles and flower initiation timings show variable multi-year patterns, while fruit maturation tends to show limited variability.

Pollination and seed dispersal ecology

Most flowers are generalist in nature with multiple groups of fauna pollinating and visiting several different species. Most deciduous forest trees produce copious amounts of nectar and thus are most dominantly pollinated by birds and hymenopterans, and less often by other insect orders. Of the trees, two thirds of the fruits are dispersed by animals while most others are wind-dispersed species. Animal fruits are predominantly dispersed by birds, primates, large mammals, and bats.

Animal life

In total regions within the ecoregion have been reported to hold more than 529 faunal species. This plays a vital role in sustaining large mammal populations and hosting an extended range for species such as the tiger, Asian elephant, sloth bear, leopard, and golden jackal and giant squirrels. This forest type is known for its important seasonal habitat range expansion for wet forest such as the Malabar whistling thrush, Nilgiri wood pigeon and Malabar parakeet (found as high as Bhimashankar wildlife sanctuary. Furthermore there is a significant crossover of populations between drier and wetter regions; thus hosting more than 300 species of birds. This landscape is also an important habitat for raptors such as the greater spotted eagle and white backed vulture. Some snakes found in this region include the common vine snake, king cobra, Russell's viper, bamboo pit




Left to right: Greater spotted eagle, olive keelback, Nilgiri wood pigeon, leopard

viper, olive keelback and common wolf snake. Large mammal species like the gaur, elephant and tiger are predominantly located in the southern sections of this ecoregion. Butterfly and insect populations follow a very seasonal pattern with less than a third of the insect population being present year round. There has also been significant local migration seen in the >50 butterfly species recorded in this landscape.

Conservation

A large proportion of forest types found in protected areas fall under the buffer zones of larger wildlife sanctuaries. Thus, face a higher anthropogenic pressures for fuel, timber and hunting of game. Compared to the southern moist deciduous this ecoregion has a lower proportion of land falling under protected areas. Annual fires play a significant role in dictating forest regime and stand structure in these regions and may result in changes in species composition holding a larger abundance of scrub forest and dry deciduous forest species in what would have once been more semi evergreen forest stands. Historic logging of trees from these areas for railroad sleepers and construction purposes has resulted in large scale erosion particularly in laterite dominated areas in the north where topsoil loss has changed ecosystem dynamics and in the present day play an important role in agrarian practices.

Ecological Restoration Projects in the Ecoregion

Ecological Restoration of Panchgani tableland

Important protected areas within the ecoregion

Bhadra Wildlife Sanctuary
Shettihalli Wildlife Sanctuary
Dandeli Wildlife Sanctuary
Bhimgad Wildlife Sanctuary
Radhanagiri Wildlife Sanctuary
Chandoli National Park
Koyna Wildlife Sanctuary
Raigad Fort Natural Reserve
Shri Bhimashankar Jyotirlinga Wildlife Sanctuary
Tansa Wildlife Sanctuary
Purna Wildlife sanctuary
Shoolpaneshwar Wildlife Sanctuary.

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[Pg 1] Steep valleys, Sahyadri: Rohitjahnavi
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[Pg 3] *Neolamarckia cadamba*: Raju Kasambe
[Pg 3] *Miliusa tomentosa*: Rajendran T.M
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[Pg 3] *Gymnema sylvestre*: FarEnd2018
[Pg 4] Lateritic formations: Glasreifen
[Pg 8] Greater spotted eagle: Вых Пыхманн
[Pg 8] Olive keelback: Anagha Devi
[Pg 8] Nilgiri wood pigeon: Navaneeth Kishor
[Pg 8] Leopard: David Raju

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One Earth Ecoregion Snapshot
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