



**BINDING
ROOTS** *trees
of ganga*



National Mission
for Clean Ganga



भारतीय वन्यजीव संस्थान
Wildlife Institute of India

VIBRANT GANGA 



trees
**BINDING
ROOTS**
of
ganga

क्वचित् तीररुहैर्वृक्षैर्मालाभिरिव शोभिताम् ।
क्वचित् फुल्लोत्पलच्छत्रां क्वचित् पद्मवनाकुलाम् ॥





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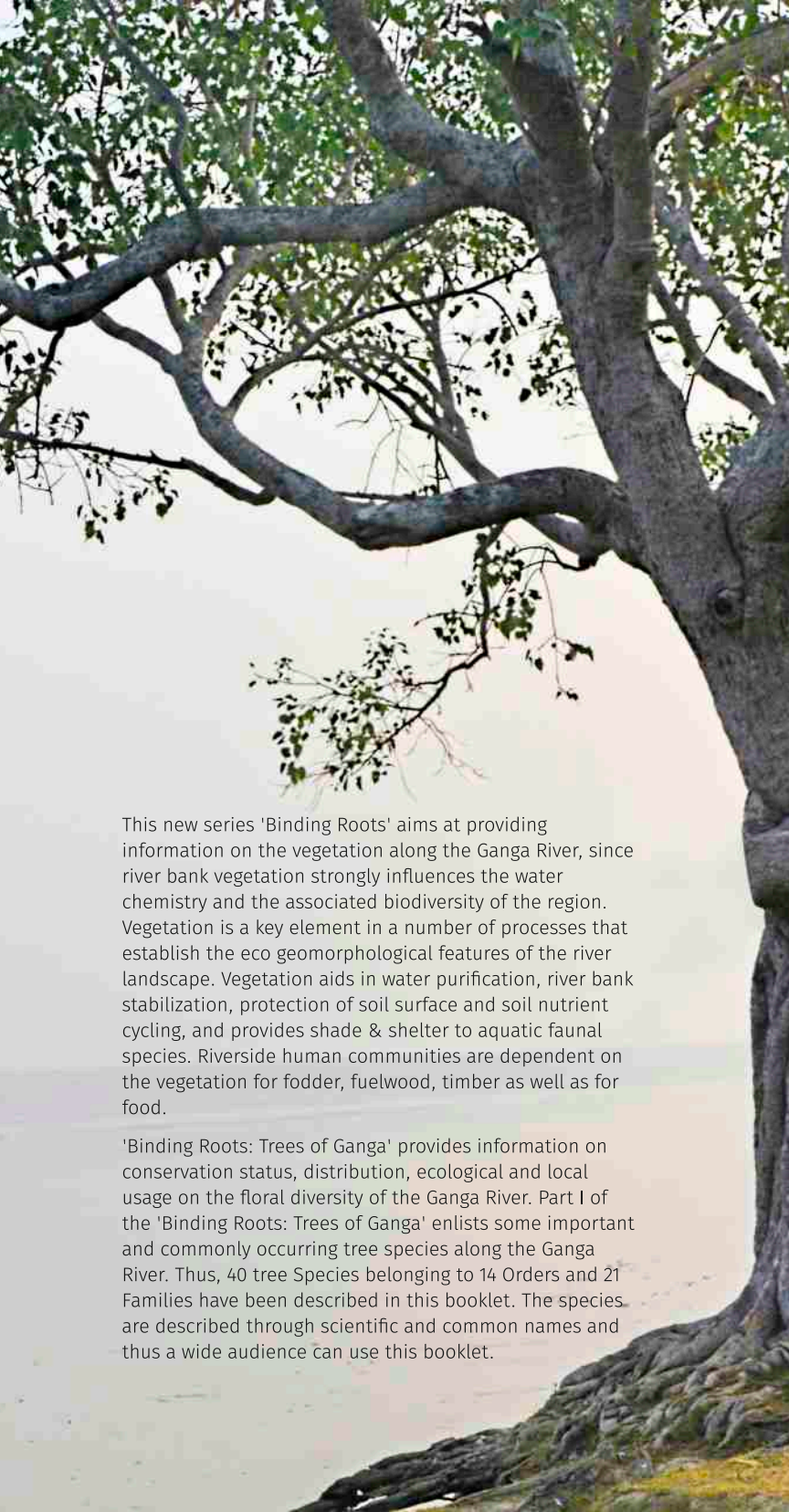
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PREFACE

The Ganga River is one of the largest and most diverse river systems of Asia with one of the highest human densities in the world. The main stem of the Ganga River (Goumukh to the Bay of Bengal) is roughly 2525 km in length and passes through the states of Uttarakhand, Uttar Pradesh, Jharkhand, Bihar and West Bengal. Encompassing five ecologically diverse biogeographic provinces viz., the Western Himalaya (2B), the Upper and Lower Gangetic plain (7A & 7B) and East coast (8B), the river harbours a unique assemblage of biodiversity, due to mosaic of habitats. This diversity of the Ganga River and their habitats are in peril due to a multitude of factors arising from conflicting and unsustainable resource use practices, climate change and pollution. The National Mission for Clean Ganga (NMCG) and Wildlife Institute of India (WII)'s project "Biodiversity Conservation and Ganga Rejuvenation" aims at aquatic species restoration plan through science-based research and knowledge sharing. "Vibrant Ganga" is one such attempt to share the science-based information to the various stakeholders with the aid of print and digital media. Under the "Vibrant Ganga" series a set of brochures and books are being published with the aim to provide information on faunal and floral diversity, their conservation status, distribution, ecology and threats.



This new series 'Binding Roots' aims at providing information on the vegetation along the Ganga River, since river bank vegetation strongly influences the water chemistry and the associated biodiversity of the region. Vegetation is a key element in a number of processes that establish the eco geomorphological features of the river landscape. Vegetation aids in water purification, river bank stabilization, protection of soil surface and soil nutrient cycling, and provides shade & shelter to aquatic faunal species. Riverside human communities are dependent on the vegetation for fodder, fuelwood, timber as well as for food.

'Binding Roots: Trees of Ganga' provides information on conservation status, distribution, ecological and local usage on the floral diversity of the Ganga River. Part I of the 'Binding Roots: Trees of Ganga' enlists some important and commonly occurring tree species along the Ganga River. Thus, 40 tree Species belonging to 14 Orders and 21 Families have been described in this booklet. The species are described through scientific and common names and thus a wide audience can use this booklet.





TREE SPECIES OF UPPER STRETCH
GANGOTRI TO HARIDWAR



Betula utilis

Vernacular name:	Bhojpatra, Bhuj
Common name:	Himalayan Birch
Order:	Fagales
Family:	Betulaceae
Genus:	<i>Betula</i>
Species:	<i>utilis</i>
IUCN Red List:	Least Concern

Distribution

The species is common throughout the Himalaya within 2500 to 4500m elevation range.

Biogeographic Provinces

Western Himalaya (2B)

Habit

Deciduous tree

Habitat

The species often grows at high altitudes (subalpine forest to treeline), frequently on slopes with unstable soils or under high snow pressure. Seedlings have been found on disturbed ground and on the rotten trunks of fallen trees. The species generally occurs in groves, and forests that receive minimal precipitation supplied by snowmelt. It is also found on northern shady slopes and ravines.

Native/Exotic : Native

Phenology :

Flowering: June-July

Fruiting: June-July

Ecological role

It helps in river bank stabilization and prevents soil erosion.

Local usage

Wood is used for timber and fuel. Leaves are used for fodder. In the past, the outer bark was used for the inscription of religious texts. The outer bark is used for roof construction, packaging purpose, making umbrella covers and various religious ceremonies. The bark has carminative and antiseptic properties, infusion of it is given for hysteria, and a paste of the resin is applied to boils.





Pinus wallichiana

Vernacular name:	Kail, Biar
Common name:	Himalayan White Pine, Blue Pine
Order:	Pinales
Family:	Pinaceae
Genus:	<i>Pinus</i>
Species:	<i>wallichiana</i>
IUCN Red List:	Least Concern



Distribution

The species is common throughout the Himalaya up to an elevation on 3400m.

Biogeographic Provinces

Western Himalaya (2B)

Habit

Coniferous tree

Habitat

The species is found in the Himalaya, sometimes in pure stands or in mixed forest in association with *Cedrus deodara* and *Pinus roxburghii*. It is a light demanding species and prefers well drained porous soils.

Phenology:

Flowering: April- June

Fruiting: April- June

Native/ Exotic

Native

Ecological role

The species grows extensively on steep slopes and controls erosion. It is also planted on wasteland and is a useful intercropping species in agroforestry.

Local usage

The timber is highly valued and is used as joinery, house fittings, light furniture, packing cases, railway sleepers etc. The species is commercially tapped for turpentine and tar. The turpentine obtained is used for various medicinal purpose.





Cedrus deodara

Vernacular name:	Devdar
Common name:	Himalayan Cedar, Deodar Cedar
Order:	Pinales
Family:	Pinaceae
Genus:	<i>Cedrus</i>
Species:	<i>deodara</i>
IUCN Red List:	Least Concern



Distribution

The species is found throughout the Himalaya within an elevation range of 1700-3000m in the western parts of its range and between 1300-3300m in the eastern part, where the climate is less dry.

Biogeographic Provinces

Western Himalaya (2B)

Habit

Coniferous tree

Habitat

It occurs on rocky precipitous slopes, and generally forms pure stands on the northern slopes. It is a light demanding species, prefers loamy soil with high organic carbon content.

Native/Exotic

Native

Phenology:

Flowering: June- August

Fruiting: September- November

Ecological role

It is a soil binder species and controls erosion.

Local usage

The presence of oil in the wood makes the species highly durable and resistant from termite attacks. Thus, the species is highly valued as timber.





Hippophae salicifolia

Vernacular name:	Amesh, Chook, Ameel
Common name:	Seabuckthorn
Order:	Rosales
Family:	Elaeagnaceae
Genus:	<i>Hippophae</i>
Species:	<i>salicifolia</i>
IUCN Red List:	Not Listed



Distribution

The species is distributed in the Trans-Himalayan regions of Jammu & Kashmir, Himachal Pradesh, Uttarakhand and North East within an elevation range of 2000-3500m.

Biogeographic Provinces

Western Himalaya (2B)

Habit

Small deciduous tree

Habitat

The species grows luxuriantly on sun facing northern aspects of steep slopes in riparian buffers. It prefers sandy and eroded soil and grows well on gravelly sand and stone on the banks of the river, streamlets and sometimes also in forest habitats. It often forms pure stands on freshly formed landslips and is a pioneer deciduous species.

Native/Exotic

Native

Phenology

Flowering: June - September

Fruiting: June- September

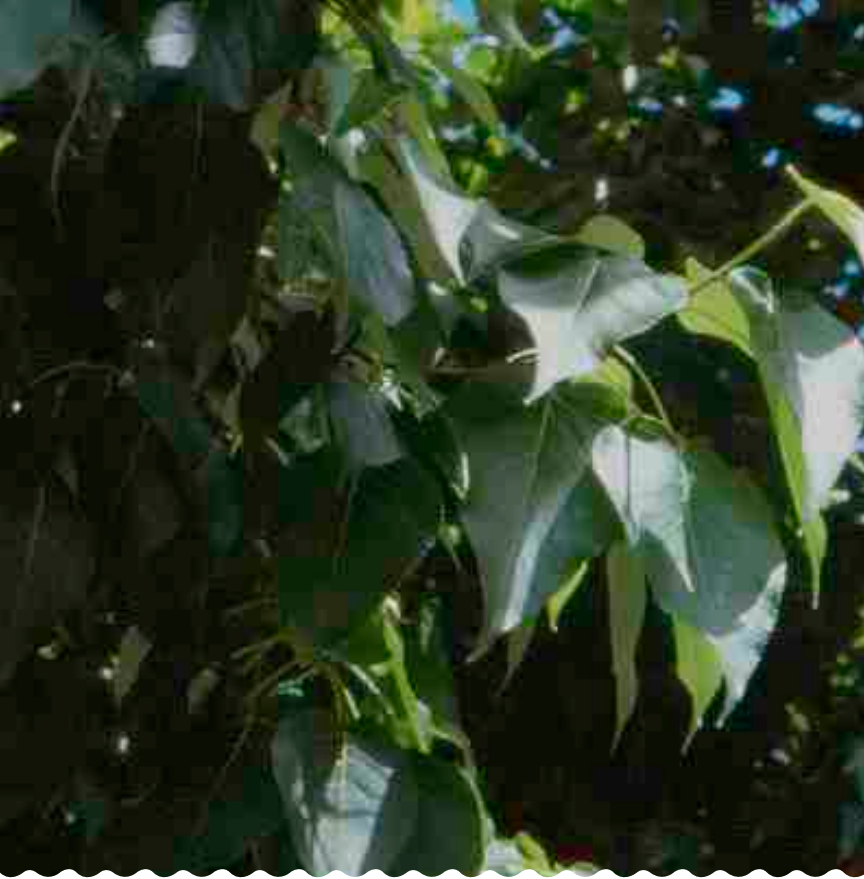
Ecological role

It is an indicator species of riparian buffer health and helps in river bank stabilization. The species has the ability to ameliorate soil and increases soil fertility being a nitrogen fixer.

Local usage

The tender branches and leaves produce oil that is used as an ointment for treating burns. Oil made from its fruit is used for cardiac disorders, heal burns, eczema, radiation injury and stomach illness.





Populus ciliata

Vernacular name:	Chalun, Biaon, Ban peepal, Pahari peepal
Common name:	Himalayan Poplar
Order:	Malphigales
Family:	Salicaceae
Genus:	<i>Populus</i>
Species:	<i>ciliata</i>
IUCN Red List:	Least Concern

Distribution

The species is common throughout the Himalaya up to an elevation of 3400m.

Biogeographic Provinces

Western Himalaya (2B)

Habit

Deciduous tree

Habitat

It is a fast growing species and can be seen growing on steep slopes, mountains in mixed montane woodland or forest. It prefers moist cool places and is able to grow on a wide range of soils.

Native/ Exotic

Native

Phenology

Flowering: March- April

Fruiting: March- April

Ecological role

The species helps in erosion control. It is a fast growing species and grows easily from branches and stem cuttings. Poplar is also planted along agricultural fields as wind break and for providing shade.

Local usage

The wood is used for fuel and timber for making packing boxes, trucks, cross beams and furniture. The fiber of the species is used for making paper. Bark of the species is used for medicinal purpose.





Alnus nepalensis

Vernacular name:	Utees
Common name:	Indian Alder, Nepal Black Alder, Himalayan Alder
Order:	Fagales
Family:	Betulaceae
Genus:	<i>Alnus</i>
Species:	<i>nepalensis</i>
IUCN Red List:	Least Concern



Distribution

The species is found throughout the Himalaya up to an elevation of 3600m.

Biogeographic Provinces

Western Himalaya (2B)

Habit

Semi-deciduous tree

Habitat

It is a pioneer species. It grows well in light but is also shade tolerant. It does not require high soil fertility and prefers permeable soils. The species occurs naturally in both pure and mixed stands, and is common in stream beds, near streams, and in ravines. It is frost tolerant.

Native/Exotic

Native

Phenology

Flowering: October- May

Fruiting: October-May

Ecological role

It is a fast growing tree and is used as a soil binder in landslide areas. It is planted as erosion control on hillsides and for land recovery in shifting cultivation.

Local usage

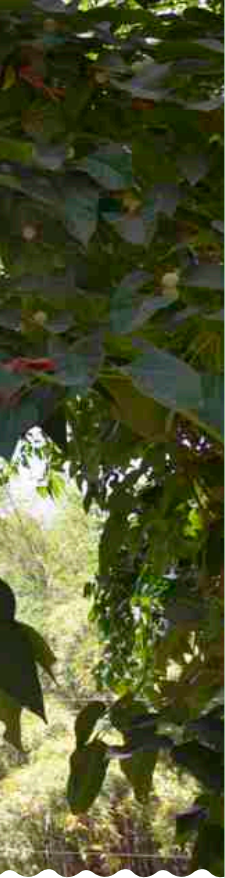
The species is used as firewood and charcoal. Timber is used for making boxes, splints, poles, and inexpensive furniture. The bark is used for tanning, dyeing and in local medicine.





Trewia nudiflora

Vernacular name:	Pindalu, Pindar, Oitali
Common name:	False White Oak tree
Order:	Malpighiales
Family:	Euphorbiaceae
Genus:	<i>Trewia</i>
Species:	<i>nudiflora</i>
IUCN Red List:	Not Listed



Distribution

The species is widely distributed throughout India, up to an elevation of 1200m.

Biogeographic Provinces

Western Himalaya (2B)

Habit

Deciduous tree

Habitat

It is a fast growing early successional dioecious tree, usually growing near streams and rivers. It prefers alluvial soil, and can grow on dry ground. Seedlings of the species are sensitive to drought and usually get killed at the exposed upland sites.

Native/Exotic

Native

Phenology

Flowering: November- March

Fruiting: November- March

Ecological role

The roots of the tree are soil binder and control erosion.

Local usage

Different parts of the plant are used for medicinal purpose. Wood is used as timber, for making drums and agricultural implements.





Acacia catechu

Vernacular name:	Khair
Common name:	Black cutch
Order:	Fabales
Family:	Fabaceae
Genus:	<i>Acacia</i>
Species:	<i>catechu</i>
IUCN Red List:	Not Listed



Distribution

The species is common throughout the sub Himalayan tract and outer Himalaya within an elevation range of 90-1200m.

Biogeographic Provinces

Western Himalaya (2B)

Habit

Deciduous tree

Habitat

The species occurs naturally in tropical moist deciduous forests along riverbanks and watersheds.

Native/ Exotic

Native

Phenology

Flowering: July- August

Fruiting: August -December, ripens in the following year by February-March

Ecological role

It is a soil binding species and helps in nitrogen fixation in the soil. The species is also used as live fence.

Local usage

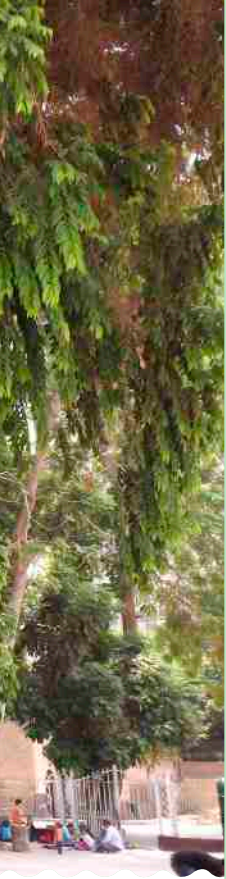
Wood is used as firewood and timber, for making house posts, agricultural implements, rice pestles and wheels. Cutch is extracted from the heartwood and is used for tanning leather, besides it also has medicinal properties. *Kattha*, obtained from cutch, is smeared on *paan* as a condiment with slaked lime.





Putranjiva roxburghii

Vernacular name:	Putijia
Common name:	Putranjiva, Lucky bean tree, Wild Olive tree
Order:	Malpighiales
Family:	Putranjivaceae
Genus:	<i>Putranjiva</i>
Species:	<i>roxburghii</i>
IUCN Red List:	Not Listed



Distribution

The species is widely distributed throughout India.

Biogeographic Provinces

Western Himalaya (2B)

Habit

Evergreen tree

Habitat

The species grows along river banks, evergreen forests and shady valleys.

Native/Exotic

Native

Phenology

Flowering: March-August

Fruiting: March- August

Ecological role

The species helps in river bank stabilization and prevents erosion.

Local usage

The exudates of the species is used to treat liver complaints, colds, fevers and rheumatism. Wood is sometimes used as timber for making tools, and turnery. Seeds are used for making rosaries and necklaces.





Phoenix sylvestris

Vernacular name:	Khajur
Common name:	Wild date palm, Indian wild date palm, Date sugar palm
Order:	Arecales
Family:	Areaceae
Genus:	<i>Phoenix</i>
Species:	<i>sylvestris</i>
IUCN Red List:	Not Listed



Distribution

The species is widely distributed throughout India, up to an elevation of 1500m.

Biogeographic Provinces

Western Himalaya (2B)

Habit

Evergreen tree

Habitat

The species is generally found in open forests and grasslands. It also occurs along river banks, moist well drained depressions, rocky cliffs and along bunds of paddy fields.

Native/Exotic

Native

Phenology

Flowering: March-May

Fruiting: September-October

Ecological role

The species helps in erosion control and fruits are eaten by many faunal species.

Local usage

Different parts of the plant is used for making mats, baskets and brooms. Sugary sap exudate from the top of the trunk, is boiled and made into jaggery.







TREE SPECIES OF MIDDLE STRETCH
HARIDWAR TO VARANASI



Terminalia arjuna

Vernacular name:	Arjun
Common name:	Arjuna Tree
Order:	Myrtales
Family:	Combretaceae
Genus:	<i>Terminalia</i>
Species:	<i>arjuna</i>
IUCN Red List:	Not Listed

Distribution

The species is found throughout India within an elevation range of 0-1200m.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Evergreen tree

Habitat

The species is characteristic of riverine forests and occurs naturally along banks of streams, rivers and seasonally dry water courses at low elevations. It grows well on fertile, neutral soils, especially loose, moist, alluvial loam with good water supply and drainage.

Native/Exotic

Native

Phenology

Flowering: April- May

Fruiting: February- May of the following year

Ecological role

It helps in erosion control through its root mass. It is also used in agro and social forestry for reclamation of saline, alkaline soils and deep ravines. It is often intercropped with coconut, citrus and as a shade tree in coffee plantations.

Local usage

It is a popular shade tree, planted in avenues, parks and also for ornamental purpose. The species is used as timber for making carts, agricultural implements, water troughs, traps, boat building, house building, electric poles, tool-handles and jetty-piles. It is also used as fodder, fuelwood and for the treatment of cancer, dermatological, cardiac and urinary disorders.





Gmelina arborea

Vernacular name:	Gamhar, Madhumati, Gamari
Common name:	White teak
Order:	Lamiales
Family:	Lamiaceae
Genus:	<i>Gmelina</i>
Species:	<i>arborea</i>
IUCN Red List:	Not Listed

Distribution

The species is widespread throughout India, within an elevation range of 0-1200m.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Deciduous tree

Habitat

The species grows in a variety of forest habitats, including tropical semi-evergreen, moist teak, deciduous, sal and dry teak forests. It also grows well on high silt deposits near rivers.

Phenology

Flowering: March

Fruiting: April-July

Ecological role

The species is preferred for large-scale afforestation programme and is also planted as an avenue tree. The tree's low dense canopy, acts as an effective weed control.

Local usage

The leaves and young shoots of the species are used as fodder. It is also used as fuelwood and as timber for making furniture, plywood core stock, mine props and matches. The species is also used for apiculture and silkworm culture. Bark, roots and leaves are used for medicinal purpose. The fruits and wood ash yield persistent yellow dye.





Bombax ceiba

Vernacular name:	Semal, Simul, Roktosimul
Common name:	Silk cotton tree, Red silk cotton tree
Order:	Malvales
Family:	Malvaceae
Genus:	<i>Bombax</i>
Species:	<i>ceiba</i>
IUCN Red List:	Not Listed



Distribution

The species is widely distributed throughout India.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Deciduous tree

Habitat

The species generally occurs along streams and rivers. It prefers deep, rich, well-drained soil. Young trees can be coppiced.

Phenology

Flowering: January- March

Fruiting: April- May

Ecological role

It helps in erosion control, as young plant produces suckers. It is a pioneer species for restoration of native woodland. Flowers and fruits are eaten by many faunal species.

Local usage

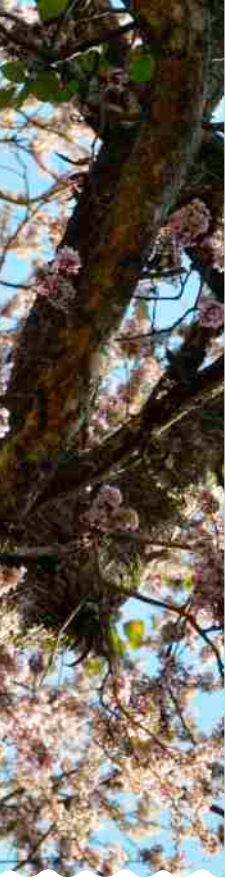
The wood is used for making match boxes, packing cases, canoes and light duty boats. The fruits slit open, and the seed floss known as silk cotton is used for stuffing pillows and cushions. Different parts of the plant are used for medicinal purpose.





Desmodium oojeinense

Vernacular name:	Sandan, Sanaan, Pandhan
Common name:	Sandan
Order:	Fabales
Family:	Fabaceae
Genus:	<i>Desmodium</i>
Species:	<i>oojeinense</i>
IUCN Red List:	Not Listed



Distribution

The species is common throughout India, within an elevation of 300-1500m.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Semi-deciduous tree

Habitat

The species is found in sub-tropical, mixed deciduous and Sal forests. It grows well on dry exposed sites, eroded hills and lowland alluvial soils.

Native/ Exotic

Native

Phenology

Flowering: February- May

Fruiting: May-June

Ecological role

The species is useful in controlling erosion along steep banks and eroded hillsides, owing to the presence of abundant root suckers. It helps in nitrogen fixation in the soil.

Local usage

The leaves and young shoots are used as fodder. It is also used as fuelwood and timber for making agriculture implements, furniture and textile mill implements. Juice of the roots and bark is used for medicinal purposes.





Holoptelea integrifolia

Vernacular name:	Anjan, Arjan, Chirrhoh, Papri, Nata karanja, Chilbil
Common name:	Indian elm
Order:	Rosales
Family:	Ulmaceae
Genus:	<i>Holoptelea</i>
Species:	<i>integrifolia</i>
IUCN Red List:	Not Listed



Distribution

The species is distributed widely throughout India.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Deciduous tree

Habitat

It is found in dry forest areas and along agricultural fields. It grows well on properly drained sites with loamy, sandy soil or gravelly alluvium.

Native/Exotic

Native

Phenology

Flowering: January - February

Fruiting: April-may

Ecological role

The species helps in erosion control and land reclamation. It is also planted as an avenue tree.

Local usage

Wood is used as fuel and timber for making cheap furniture, carts and for carving small articles. Leaves are used for fodder. Several parts of the plant are also used for medicinal purpose.





Albizia procera

Vernacular name:	Safed Siris
Common name:	White Siris, Tall Siris
Order:	Fabales
Family:	Fabaceae
Genus:	<i>Albizia</i>
Species:	<i>procera</i>
IUCN Red List:	Not Listed

Distribution

The species is widely distributed throughout India.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Deciduous tree

Habitat

The species generally occurs in mixed deciduous forest, grasslands and open secondary forests. It inhabits swampy places, banks of perennial streams and rivers.

Native/Exotic

Native

Phenology

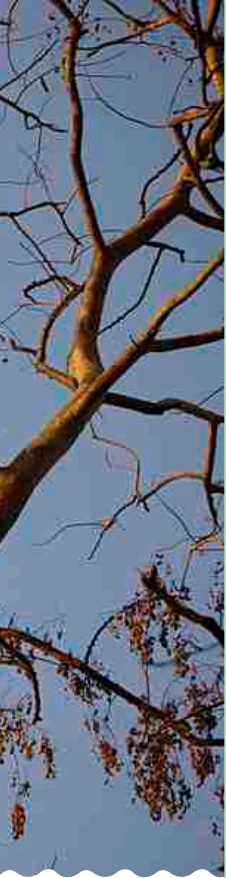
Flowering: August- September
Fruiting: December

Ecological role

It has soil binding capacity and helps in erosion control, therefore is used for afforestation of degraded lands. It is planted as a shade providing, fire and wind break species along agricultural fields and also along roadsides. The species also helps in nitrogen fixation in soil.

Local usage

Wood is used for fuel and timber for making furniture, veneer, cabinet work, flooring and agricultural implements. Leaves are used for fodder. Bark produces tannin and gum/resin. Various parts of the plant are used in traditional medicine.





Lannea coromondolica

Vernacular name:	Gurjan, Gurj, Goonja, Moyan, Moi
Common name:	Indian Ash tree
Order:	Sapindales
Family:	Anacardiaceae
Genus:	<i>Lannea</i>
Species:	<i>coromondolica</i>
IUCN Red List:	Not Listed



Distribution

The species is found throughout India up to an elevation of 1700m

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Evergreen tree

Phenology

Flowering: March- April

Fruiting: March- April

Habitat

The species occurs in open, deciduous forests, in moist area, along rivers or streams.

Ecological role

The deep extensive root system aids in slope, gully and river bank stabilization. Fruits are relished by a variety of birds. It is also planted as a shade tree.

Local usage

Timber is of low quality and is used for making cheap furniture, packing cases and fruit crates. Bark, stem, roots and leaves are used in traditional medicine. Fruits are eaten raw or cooked.





Ziziphus mauritiana

Vernacular name:	Indian Jujube, Indian plum
Common name:	Ber
Order:	Rosales
Family:	Rhamnaceae
Genus:	<i>Ziziphus</i>
Species:	<i>mauritiana</i>
IUCN Red List:	Not Listed



Distribution

The species is widely distributed throughout India.

Biogeographic Province

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Evergreen tree

Habitat

The species is generally found in humid forests, along river banks, hills, slopes and dry limestone woodlands.

Native/Exotic

Native

Phenology

Flowering: September-October

Fruiting: December- March

Ecological role

The species helps in erosion control and reclamation of land. It is also planted as shade, windbreak and live fence species. Fruits are eaten by birds and mammals.

Local usage

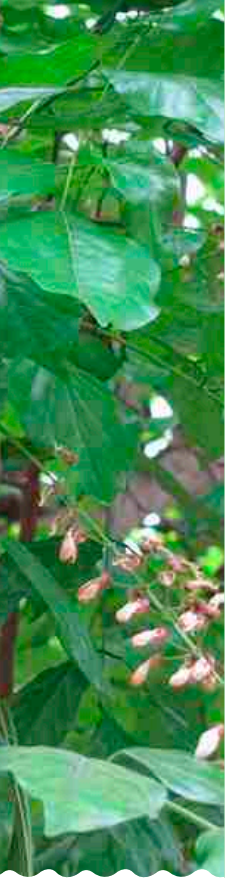
Leaves are highly favored for fodder. Wood is used for fuel and timber for making furniture, cabinet works, tool handles, agricultural implements, baseball bats and chisels. The fruits are a rich source of Vitamin C and are eaten fresh or dried. It is also a host tree for lac insects.





Pongamia pinnata

Vernacular name:	Karanja, Karanj,Kanji, Papar
Common name:	Karum tree, Indian Beech, Pongam
Order:	Fabales
Family:	Fabaceae
Genus:	<i>Pongamia</i>
Species:	<i>pinnata</i>
IUCN Red List:	Least Concern



Distribution

The species is widely distributed throughout India up to an altitude of 2170m.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Evergreen tree

Habitat

The species is found in humid and sub-tropic environment, along water bodies and rivers. The species is also drought resistant and shade bearer. It can grow on most soil types.

Native/ Exotic

Native

Phenology

Flowering: April-May

Fruiting: April-May of the following year

Ecological role

The species helps in erosion control owing to its extensive network of lateral roots and nitrogen fixation in the soil. It is planted along roads and agriculture fields.

Local usage

Timber is used for making cartwheels, posts, agricultural implements and toll handles. It is also a source of pulp for making paper. Leaves are used for fodder. Bark, seeds and roots are used in traditional medicine.





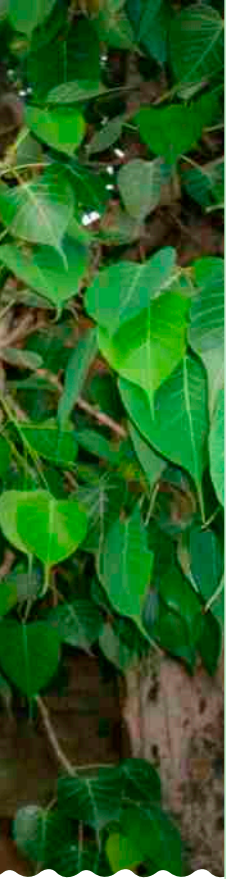


TREE SPECIES OF LOWER STRETCH
VARANASI TO HALDIA



Ficus religiosa

Vernacular name:	Peepal, Asvattha
Common name:	Sacred Fig tree
Order:	Rosales
Family:	Moraceae
Genus:	<i>Ficus</i>
Species:	<i>religiosa</i>
IUCN Red List:	Not Listed



Distribution

The species is widely distributed throughout India up to an elevation of 1500m.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Deciduous to semi-evergreen tree

Habitat

The species thrives in hot, humid weather. In forests it is found scattered and mainly propagates as an epiphyte.

Phenology

Flowering: March-June

Fruiting: March- June

Ecological role

The tree provides shelter and food to many faunal species. Besides, the tree is an excellent soil binder. It is an excellent shade tree, owing to its dense and wide crown.

Local usage

Leaves are used for fodder. Timber is used for making packing cases, yokes, spoons and bowls. Fruit and bark are used in traditional medicine.





Madhuca longifolia

Vernacular name:	Mahua, Mowa, Moha
Common name:	Honey tree, Butter tree
Order:	Ericales
Family:	Sapotaceae
Genus:	<i>Madhuca</i>
Species:	<i>longifolia</i>
IUCN Red List:	Not Listed

Distribution

The species is found from the Himalayan foothills, Gangetic plains and central India within an elevation range of 0-1200m

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Deciduous tree

Habitat

The species is found in the deciduous forests and dry sal plain forests. It is found scattered in pastures and cultivated fields.

Native/Exotic

Native

Phenology

Flowering: February- April

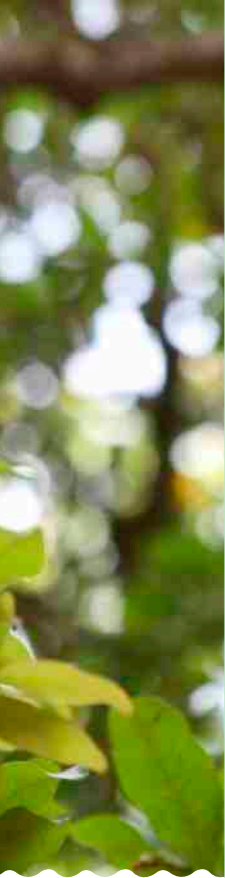
Fruiting: June-August

Ecological role

It is used for erosion control, due to the presence of large spreading superficial root system. It is planted as barrier and shade tree. It also helps in nitrogen fixation, due to the presence of vesicular arbuscular mycorrhizal associations and root colonization.

Local usage

The flowers of Mahua are sweet and fleshy, are either eaten fresh or dried, powdered and cooked with flour. The fruit is edible and ripe fruits are used for fermenting liquor. The leaves are used for fodder. Timber is used for house construction.





Dalbergia sisoo

Vernacular name:	Shisham, sissoo, Sisam, Shishu
Common name:	Shisham
Order:	Fabales
Family:	Fabaceae
Genus:	<i>Dalbergia</i>
Species:	<i>sissoo</i>
IUCN Red List:	Not Listed

Distribution

The species is found along the sub-Himalayan tracts of Uttarakhand, Himachal Pradesh and West Bengal, within an elevation range of 0-1500m.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Deciduous tree

Habitat

The species grows along riverine habitats, where sunlight and moisture are plentiful.

Native/ Exotic

Native

Phenology

Flowering: January- February

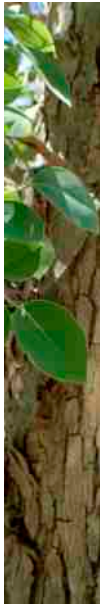
Fruiting: January- February

Ecological role

The species is useful for stabilizing eroded sites and also improves soil fertility owing to the presence of nodules in its roots. The heavy litter fall decomposes to enrich the soil with nitrogen, phosphorus and organic carbon. It also hosts a wide variety of orchids and is used as intercrop.

Local usage

Foliage and young shoots are extensively used as fodder. The species is used as fuelwood and timber for making high quality furniture and aircraft grade plywood. Oil obtained from the seeds have medicinal properties.





Ficus benghalensis

Vernacular name:	Bargad, Bat, Barh
Common name:	Banyan tree
Order:	Rosales
Family:	Moraceae
Genus:	<i>Ficus</i>
Species:	<i>benghalensis</i>
IUCN Red List:	Not Listed



Distribution

The species is found throughout India up to an elevation of 1200m.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Evergreen tree

Habitat

The species prefers wet habitats and well drained sandy loam soil. It also grows as an epiphyte on other trees or crevices of old buildings.

Native/ Exotic

Native

Phenology

Flowering: April- June
Fruiting: April- June

Ecological role

It is a keystone species, providing shelter and food to a range of other faunal species. The extensive aerial root system acts as a soil binder and helps in erosion control. It is planted along roadsides and agriculture fields as the dense canopy provides shade. Figs are relished by birds.

Local usage

Timber is used for making boxes and furniture. Several parts of the tree like bark, leaves, root-fibers, and milky juice (latex) are used in traditional medicine. Leaves are excellent fodder species. Banyan is the "National Tree of India" and is considered sacred.





Azadirachta indica

Vernacular name:	Neem
Common name:	Indian Lilac, Neem
Order:	Sapindales
Family:	Meliaceae
Genus:	<i>Azadirachta</i>
Species:	<i>indica</i>
IUCN Red List:	Least Concern

Distribution

The species is widely distributed throughout India.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Evergreen tree

Habitat

The species occurs in mixed forests in association with *Acacia* sp. and *Dalbergia sissoo*. It has deep tap roots and is able to survive in drought conditions and in sandy, leached soils.

Native/Exotic

Native

Phenology

Flowering: March- May

Fruiting: June- August

Ecological role

It helps in erosion control due to the presence of a well-developed root system. It is an effective shade tree, and is planted widely along agricultural fields and as an avenue tree in towns and villages. Neem cake (made from seeds after extraction of oil) is used as an organic manure.

Local usage

The species is used as fuelwood and fodder (during the dry season). Timber is used for making wardrobes, bookcases and closets. Almost all parts of the plants are utilised for medicinal purpose. Neem oil is used for treating several skin diseases. Neem is used for manufacturing pesticides and insect repellants.





Mangifera indica

Vernacular name:	Aam
Common name:	Mango tree
Order:	Sapindales
Family:	Anacardiaceae
Genus:	<i>Mangifera</i>
Species:	<i>indica</i>
IUCN Red List:	Data Deficient



Distribution

The species is widely distributed throughout India, up to an elevation of 1200m.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Evergreen tree

Habitat

It grows widely in sub-tropical and tropical forests. The species prefers well drained deep soil.

Native/Exotic

Native

Phenology

Flowering: January- March

Fruiting: April- July.

Ecological role

It helps in improving soil quality, when used as mulch. It is also used as a shelter and fire break species and planted as an avenue tree.

Local usage

The fruit is edible and highly valued all over the world. The leaves are used as fodder. It also provides fuelwood and timber for making furniture. Various parts of the plant like leaves, bark and seeds are used for medicinal purpose.





Anogeissus latifolia

Vernacular name:	Dhavda, Dhau, Chakwa
Common name:	Axle wood, Button tree
Order:	Myrtales
Family:	Combretaceae
Genus:	<i>Anogeissus</i>
Species:	<i>latifolia</i>
IUCN Red List:	Not Listed



Distribution

The species is found throughout India except for the driest regions in the west and the moist rainforest zones, up to 1200m elevation.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Deciduous tree

Habitat

The species is found in deciduous or semi-evergreen forests

Native/Exotic

Native

Phenology

Flowering: May- July

Fruiting: November-March.

Ecological role

The species is used for river bank stabilization and survives well on eroded land. It also contributes to soil nutrient due to high leaf litter decomposition.

Local usage

The species is utilized for fodder and fuelwood. Tussar silkworms are cultured on its foliage. It also produces tannin and gum.





Terminalia bellirica

Vernacular name:	Baheda
Common name:	Bedda Nut tree
Order:	Myrtales
Family:	Combretaceae
Genus:	<i>Terminalia</i>
Species:	<i>bellirica</i>
IUCN Red List:	Not Listed

Distribution

The species is found wild in most parts of India within an elevation range of 0-1000m.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Deciduous tree

Habitat

The species is found in monsoon forests, mixed deciduous forests or dry deciduous dipterocarp forests. It is generally associated with Teak. The species grows best on fertile, loam soils with good drainage, however it performs reasonably well on poor soils where the choice of tree species is limited.

Native/Exotic

Native

Phenology

Flowering: October- November

Fruiting: November -December

Ecological role

It is grown as an avenue tree and also as an intercropping species, grown with other agricultural crops.

Local usage

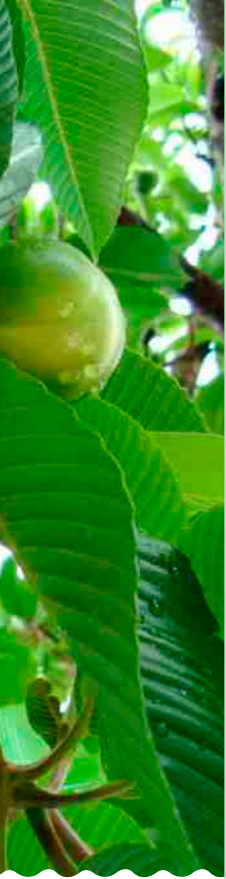
It is used as timber for making furniture and construction purpose. Leaves are highly valued as fodder. The kernels of the fruits are sometimes used for soap making.





Dillenia indica

Vernacular name:	Chalta, Karambel
Common name:	Elephant apple
Order:	Dilleniales
Family:	Dilleniaceae
Genus:	<i>Dillenia</i>
Species:	<i>indica</i>
IUCN Red List:	Not Listed



Distribution

The species is widely distributed throughout India, up to an elevation of 1100m.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Evergreen tree

Habitat

The species is generally found in evergreen and tropical rain forest, along rivers and streams. It prefers well drained sandy loam soil and a sunny position.

Phenology

Flowering: July- November

Fruiting: July- November

Ecological role

It helps in river bank stabilization and prevents soil erosion. Fruits are eaten by birds, monkeys and other faunal species.

Local usage

The fruit of the species is edible and has medicinal properties. The calyces are made into curries, jellies and sherbet. Wood is used as fuel and timber for making railway sleepers and plywood. Stem bark, leaves and fruits are used for medicinal purpose.





Acacia farnesiana

Vernacular name:	Guh Babool, Gukikar, Guya babul
Common name:	Mimosa bush, Fragrant acacia
Order:	Fabales
Family:	Fabaceae
Genus:	<i>Acacia</i>
Species:	<i>farnesiana</i>
IUCN Red List:	Not Listed

**Distribution**

The species is found throughout India, except the Himalaya.

Biogeographic Provinces

Upper & Lower Gangetic Plain (7A & 7B)

Habit

Deciduous small tree

Habitat

The species is generally found in dry deciduous forests, on dry sandy soils.

Native/Exotic

Exotic

Phenology

Flowering: March- June

Fruiting: July- December

Ecological role

The species is planted as a windbreak and for erosion control in sandy soils. It also helps in nitrogen fixation of soil. The flowers are scented and highly attractive to bees.

Local usage

Stem gum is used in confectionery, essential oil extracted from the flowers are used in perfume making.







TREE SPECIES OF COASTAL STRETCH
HALDIA TO GANGA SAGAR



Bruguiera cylindrica

Vernacular name:	Bakul Kakra
Common name:	White Burma Mangrove
Order:	Rhizophorales
Family:	Rhizophoraceae
Genus:	<i>Bruguiera</i>
Species:	<i>cylindrica</i>
IUCN Red List:	Least Concern



Distribution

Species is found in the coastal mangroves of Sundarbans, Mahanadi delta and Andaman and Nicobar Islands.

Biogeographic Provinces

East Coast (8B)

Habit

Tall tree, a true mangrove species

Habitat

Grows abundantly in the intermediate estuarine zone; shade tolerant; possess high regeneration potential, although has slow growth rate; species can be found in pure stand. Viviparous germination.

Native/ Exotic

Native

Phenology

Flowering during winter and summer and fruiting occurs during monsoon

Ecological role

The species aids in soil stabilization and coastal protection.

Local usage

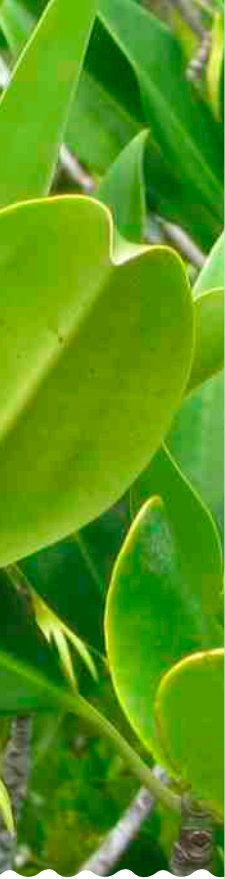
The species is used for timber, as it grows straight and is considered good for construction and charcoal production. It produces bark tannin - 17.8%, which is useful for fisherman's nets and leather industries and is also used for medicinal purpose.





Bruguiera gymnorhiza

Vernacular name:	Kankra
Common name:	Burma Mangrove
Order:	Rhizophorales
Family:	Rhizophoraceae
Genus:	<i>Bruguiera</i>
Species:	<i>gymnorhiza</i>
IUCN Red List:	Least Concern



Distribution

The species occurs throughout the coastal mangrove areas in India, both east and west coast; in Andaman and Nicobar islands

Biogeographic Provinces

East Coast (8B)

Habit

Tall tree, a true mangrove species

Habitat

Species grows along river banks, in the inter-tidal mangrove forests of the Sundarbans. It is shade tolerant and is found in association with *Kandelia candel* on muddy deep shore.

Native/ Exotic

Native

Phenology

Flowers during winter, with the fruits hanging till next monsoon

Ecological role

The species provides protection to the coasts.

Local usage

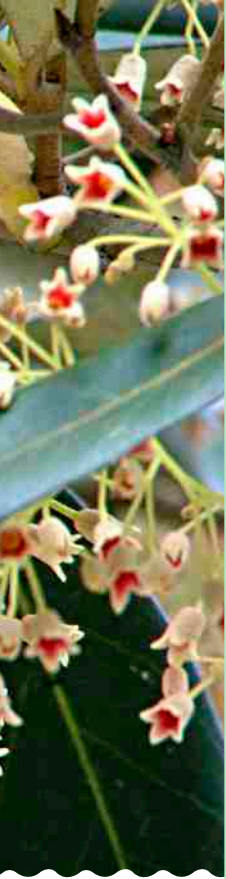
The species is used for timber and for fuel wood purpose. It produces 36% tannin.





Heritiera fomes

Vernacular name:	Sundari
Common name:	Sundri
Order:	Malvales
Family:	Malvaceae
Genus:	<i>Heritiera</i>
Species:	<i>fomes</i>
IUCN Red List:	Endangered



Distribution

The species is common in Sundarbans of Bangladesh, India and Irrawady delta of Burma. It is believed that the name of the Gangetic delta is based on the vernacular name 'Sundari' of *H. fomes*, since this was the most abundant species during early periods.

Biogeographic Provinces

East Coast (8B)

Habit

Tall tree, a true mangrove species

Habitat

This species is found in the upstream estuarine zone in the high intertidal region. It prefers freshwater, and is fast-growing in low-saline environments. It occurs in stands and grows up to 25 m. It is the only *Heritiera* species that produces pneumatophores.

Native/ Exotic

Native

Phenology

Flowering and fruiting occurs from January to April.

Ecological role

Sundari helps to check soil erosion in the tidal forests and loosely consolidated silted up soil. The species along with the associated mangrove species provide habitat for crabs and other faunal species.

Local usage

The timber of this species is highly valued and is considered superior to teak. Timber is used for boat building and other domestic furniture. It is also used as fuelwood.





Nypa fruticans

Vernacular name:	Golpata
Common name:	Mangrove Palm, Nipa Palm, Nypa Palm
Order:	Arecales
Family:	Areaceae
Genus:	<i>Nypa</i>
Species:	<i>fruticans</i>
IUCN Red List:	Least Concern



Distribution

The species is found along the swampy mangrove delta of the Ganga-Brahmaputra estuary, Sundarbans, Andaman & Nicobar Islands.

Biogeographic Provinces

East Coast (8B)

Habit

Tree, a true mangrove species

Habitat

The species is found in the upstream estuarine zone in low, mid and high intertidal regions. It forms extensive belts along brackish to tidal freshwater creeks and rivers.

Native/ Exotic

Native

Phenology

Flowering and fruiting occurs throughout the year.

Ecological role

The species provides protection to coasts during strong storm surges.

Local usage

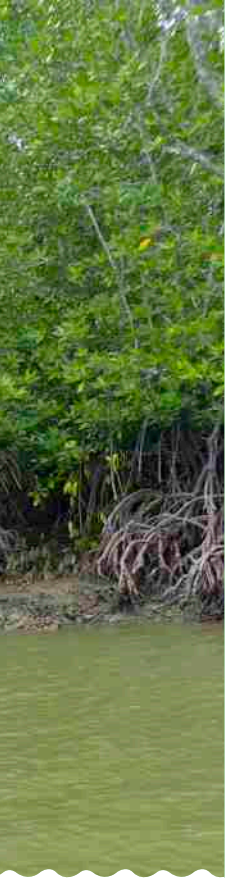
The isothermic leaves of the species are highly durable for house thatching and the inflorescence sap or juice is used for making alcohol and molasses.





Rhizophora apiculata

Vernacular name:	Garjan
Common name:	Tall- Stilt Mangrove
Order:	Rhizophorales
Family:	Rhizophoraceae
Genus:	<i>Rhizophora</i>
Species:	<i>apiculata</i>
IUCN Red List:	Least Concern



Distribution

The species is common almost throughout the tidal mangrove area in the coastal India; Andaman & Nicobar Islands.

Biogeographic Provinces

East Coast (8B)

Habit

Tree, a true mangrove species

Habitat

The species is found in the intermediate estuarine zone and grows on the inter tidal river banks and river flats on the newly formed sediment soil. It is a hardy and fast growing species.

Native/ Exotic

Native

Phenology

Flowering occurs during winter and the hanging viviparous germinated radical remains up to the end of the monsoon or next winter.

Ecological role

The species provides protection to coasts during strong storm surges.

Local usage

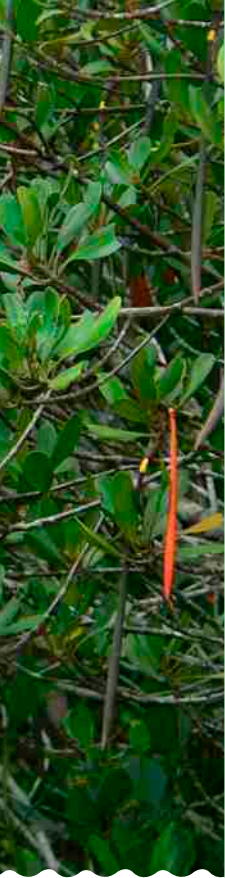
It produces high quality timber and fuel woods. The tannin content of the bark is 33%.





Ceriops decandra

Vernacular name:	Goran
Common name:	Yellow Mangrove
Order:	Rhizophorales
Family:	Rhizophoraceae
Genus:	<i>Ceriops</i>
Species:	<i>decandra</i>
IUCN Red List:	Near Threatened



Distribution

The species is found throughout the coastal, deltaic and estuarine tracts of India including Andaman & Nicobar Islands.

Biogeographic Provinces

East Coast (8B)

Habit

Tree, a true mangrove species

Habitat

The species occurs in the intermediate estuarine zone in mid to high intertidal regions. In the Sundarbans it grows in the inter-tidal ridge forests and river slopes. It is a slow growing species and can tolerate extreme environmental conditions.

Native/ Exotic

Native

Phenology

Flowering during winter and fruiting during summer and monsoon months.

Ecological role

The species provides protection to coasts during strong storm surges.

Local usage

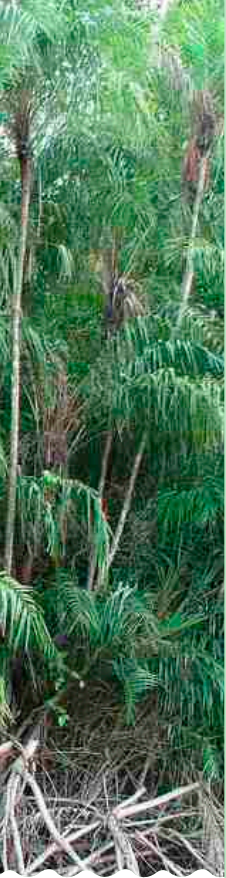
The species is used for timber and fuelwood purpose. It contains 19% tannin and is used by fisherman for tanning their fishing nets.





Phoenix paludosa

Vernacular name:	Hental
Common name:	Mangrove Date Palm
Order:	Arecales
Family:	Areaceae
Genus:	<i>Phoenix</i>
Species:	<i>paludosa</i>
IUCN Red List:	Near Threatened



Distribution

The species is found almost throughout the coastal mangrove forests on inter-tidal zone of the Indian East Coast including the Andaman & Nicobar Islands.

Biogeographic Provinces

East Coast (8B)

Habit

Tree, a true mangrove species

Habitat

The species commonly occurs on the tidal and inter-tidal mangrove forests of the Sundarbans. It grows on the porous and mature soil of the riversides and forms ridge dense forests.

Native/ Exotic

Native

Phenology

Flowering and fruiting occurs from March till July.

Ecological role

The species provides protection to coasts during strong storm surges.

Local usage

Stem is used for building cottages and for fire wood. Young shoots are edible. Leaves are used for making mats, ropes and umbrellas





Avicennia alba

Vernacular name:	Kal-Bain
Common name:	White Mangrove
Order:	Lamiales
Family:	Avicenniaceae
Genus:	<i>Avicennia</i>
Species:	<i>alba</i>
IUCN Red List:	Least Concern



Distribution

The species is found almost throughout the mangrove forests in the coastal areas including Andaman & Nicobar Islands.

Biogeographic Provinces

East Coast (8B)

Habit

Tree, a true mangrove species

Habitat

The species commonly occurs in the inter-tidal forests of the coastal areas and ridge forests of the Sundarbans.

Native/ Exotic

Native

Phenology

Flowering and fruiting occurs from April till September

Ecological role

The species provides protection to coasts during strong storm surges. It aids in soil development in the newly silted up soils and also adds litter nutrients to the mangrove soil and water phases.

Local usage

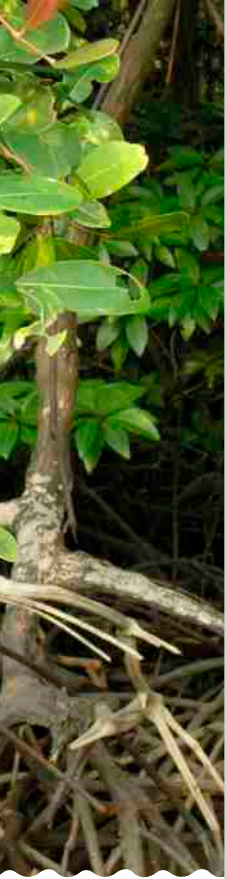
Used as fire wood and contains very low bark tannin.





Xylocarpus granatum

Vernacular name:	Dhundhul
Common name:	Cannonball Mangrove
Order:	Sapindales
Family:	Meliaceae
Genus:	<i>Xylocarpus</i>
Species:	<i>granatum</i>
IUCN Red List:	Least Concern



Distribution

The species is found in the tidal forests of Sundarbans, Andaman & Nicobar Islands and other mangrove forests.

Biogeographic Provinces

East Coast (8B)

Habit

Tree, a true mangrove species

Habitat

The species commonly occurs in the tidal creeks, river sides and inter tidal mangrove forests of the Sundarbans. It is mostly found scattered.

Native/ Exotic

Native

Phenology

Flowering and fruiting occurs from July till December

Ecological role

The species provides protection to coasts during strong storm surges.

Local usage

The timber is an excellent hard wood for furniture and carvings due to the presence of anti-ant properties. It is also used as firewood, ointment and medicinal purpose.





Aegialitis rotundifolia

Vernacular name:	Tora, Nuniagach
Common name:	Club Mangrove
Order:	Plumbaginales
Family:	Plumbaginaceae
Genus:	<i>Aegialitis</i>
Species:	<i>rotundifolia</i>
IUCN Red List:	Neat Threatened



Distribution

The species is found in the tidal forests of Sundarbans, Andaman & Nicobar Islands and other mangrove forests.

Biogeographic Provinces

East Coast (8B)

Habit

Small tree, a true mangrove species

Habitat

The species is found in the downstream estuarine zone, in the inter- tidal ridge forests.

Native/ Exotic

Native

Phenology

Flowering and fruiting occurs from January till May

Ecological role

It is one of the pioneer species of the mangrove forests of the newly silted up soils and provides protection to coasts during strong storm surges.

Local usage

It is used for firewood and contains 12.2-15% tannin.



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NMCG

National Mission
for Clean Ganga,
Ministry of Water
Resources, River
Development &
Ganga Rejuvenation

GACMC

Ganga Aqualife
Conservation
Monitoring
Centre

Wildlife Institute of India

Chandrabani,
Dehradun-248001
Uttarakhand

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www.wii.gov.in/national_mission_for_clean_ganga

