



# Mangroves of Odisha

*- A Pictorial Guide*



Forest & Environment Department  
Government of Odisha



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## MESSAGE

Forests of Odisha are distributed along the coast of Bay of Bengal in Deltas of Mahanadi, Bramhani, Baitarani, Devi, Budhabalanga rivers in the district of Kendrapara (maximum), Bhadrak and small part of Puri.

Bhitarkanika National Park and Bhitarkanika Sanctuary notified as Protected Areas under “Wildlife Protection Act, 1972” are home to these mangrove forests.

Odisha’s mangroves are very rich in biodiversity & protect the local communities from adverse impact of climate change in addition to providing economic and ecological services significant role in maintaining the coast line.

I am happy that mangrove forest division (Wildlife, Rajnagar) is bringing out the revised edition of the book titled “Mangrove of Odisha-A Pictorial Guide” which will be an important reference document for Researchers and nature lovers having keen interest in mangrove species identification and conservation.

**(Dr. Mona Sharma)**





**Sushil Kumar Popli, IFS**  
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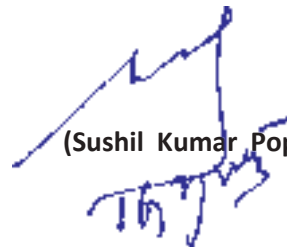
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## FOREWORD

Mangrove ecosystem plays a dynamic and significant role in the estuarine mouth of both the tropical and subtropical areas world over. Mangrove forest ecosystem though fragile, are most productive that cater to even the immediate need of local communities.

Mangrove Forest Division (Wildlife) Rajnagar had earlier brought out a pictorial guide on Mangrove Flora of Odisha in the year 2015. This publication has been appreciated as a ready reckoner to understand Mangrove diversity and its identification. Considering the pivotal importance of such plant diversity in formulation of conservation strategy for the mangroves, the said pictorial guide has now been thoroughly revised and update information is provided in this new edition.

I am confident that this book with updated information will be of immense help to all foresters, nature lovers, researchers, academicians, students and those interested in Conservation of Mangrove ecosystem.

  
(Sushil Kumar Popli)

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## INTRODUCTION

Mangroves are salt tolerant plant communities found in tropical and sub-tropical intertidal regions of the world. Such areas are characterized by high rainfall (between 1,000 to 3,000 mm) and temperature (ranging between 26°C-35°C). Mangrove species exhibit a variety of adaptations in morphology, anatomy and physiology to survive in water logged soils, high salinity and frequent cyclonic storms and tidal surges. Mangroves are important refuges of coastal bio-diversity and also act as bio-shields against extreme climatic events. Large populations, primarily rural, depend on Mangrove ecosystems for a wide variety of biomass dependent livelihoods. (ISFR 2021)

Mangroves live life on the edge. With one foot on land and another in the water, these botanically amphibians occupy a zone of desiccating heat, choking mud and salt levels that would kill an ordinary plant within hours. Yet the forests mangroves form is among the most productive and biologically complex ecosystems under the sun. Birds roost in the canopy, shellfish attach themselves to the roots, and snakes and crocodiles come to hunt. Mangroves provide nursery grounds for a wide range of faunal diversity right from arthropod to large mammals.

Mangroves are a group of vascular plants that have special morphological, physiological and other non-visible adaptations to live in a saline intertidal environment dominated by low dissolved oxygen or sometimes anoxic fine sediments. These plants, together with their complement of microorganisms and animals, form the mangrove ecosystem. The term mangrove thus refers both to the plants themselves as well as to the ecosystem. Often, plants which occur in the non-mangrove ecosystem (usually in strand or beach vegetation) and with none or only a few of these morphological adaptations are also found in the mangrove forests.

Thus mangrove plants are sometimes classified as either true mangroves or mangrove associates (Tomlinson, 1986). True mangroves are plants with many morphological adaptations and found almost exclusively in the mangrove ecosystem. No classification system is perfect and Tomlinson (1986) had himself admitted: Of course, the groups are not sharply circumscribed and the assessment is somewhat subjective, since there is a continuum of possibilities. For example, *Excoecaria agallocha* has only a single morphological adaptation (lenticels) but because it is rarely found in other coastal ecosystems, it is considered by most to be a true mangrove (Wang *et al.*, 2010). Yet there are some who do not consider *Nypa fruticans* to be a true mangrove despite its having viviparous fruits because it occurs extensively in freshwater, a distinct ecosystem on its own.

*Diospyros ferrea* is considered by Tomlinson (1986) to be a mangrove associate. This, like the other *Diospyros* species or varieties found in back mangroves do not have any of the characteristics that make them true mangroves. They are only occasionally found (but not exclusively) in back mangroves. Yet *Diospyros littorea* (considered a variety of *Diospyros ferrea*) is listed as a true mangrove in the World Atlas of Mangroves (Spalding *et al.*, 2010) and in the IUCN Mangrove Red List (Polidoro *et al.*, 2010). Both these lists were based on Duke (2006).

The mangrove ecosystem is ephemeral in terms of its location, in that it moves in response to changes in sea level. The fact that mangrove plants have existed for millions of years, through numerous glacial and interglacial periods shows that this ecosystem is well adapted to global climate changes. Since man is a very recent inhabitant of Earth, their impact was not noticeable in the last shift from glacial to the present interglacial but their ability to change the environment, especially in the past couple of hundred years, has been profound. It is thus not moot as to whether this ecosystem can adequately respond to global changes brought on by man. Equally important is to consider what actions should be taken to minimise damage to this ecosystem.

## MANGROVES OF ODISHA COAST

As per Global Forest Resource Assessment, 2020 (FRA 2020), world over, 113 countries have Mangrove forest covering an estimated 14.79 million hectares. The largest Mangrove area is reported in Asia (5.55 million hectares), followed by Africa (3.24 million hectares). More than 40 percent of the total area of Mangroves was reported to be in just four countries: Indonesia (19 percent of the total), Brazil (9 percent), Nigeria (7 percent) and Mexico (6 percent).

Important species of Mangrove ecosystems in India include *Avicennia officinalis*, *Rhizophora mucronata*, *Sonneratia alba*, *Avicennia alba*, *Bruguiera cylindrica*, *Heritiera littoralis*, *Phoenix paludosa*, *Morinda citrifolia* & *Ceriopstagal*.

According to Champion & Seth Classification (1968), Mangroves are included in Type Group-4 Littoral & Swamp Forests and are covered under,

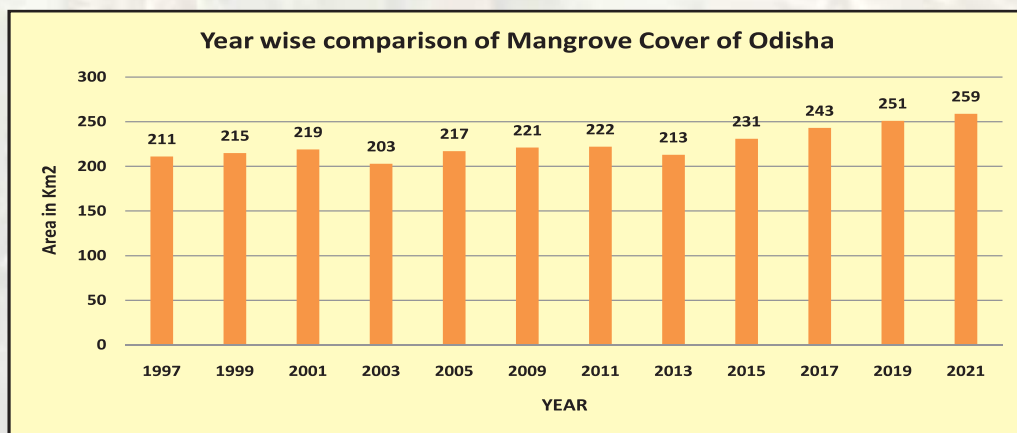
- 4A/L1 Littoral forest,
- 4B/TS1 Mangrove scrub,
- 4B/TS2 Mangrove forest,
- 4B/TS3 Saltwater mixed forest (*Heritiera*) and
- 4B/TS4 Brackish water mixed forest (*Heritiera*) types.

The Mangrove cover in this assessment (ISFR 2021) has been categorized into very Dense (canopy density of 70% and above), Moderately Dense (canopy density of

40% and more but less than 70%) and Open categories (canopy density of 10% and more but less than 40%).

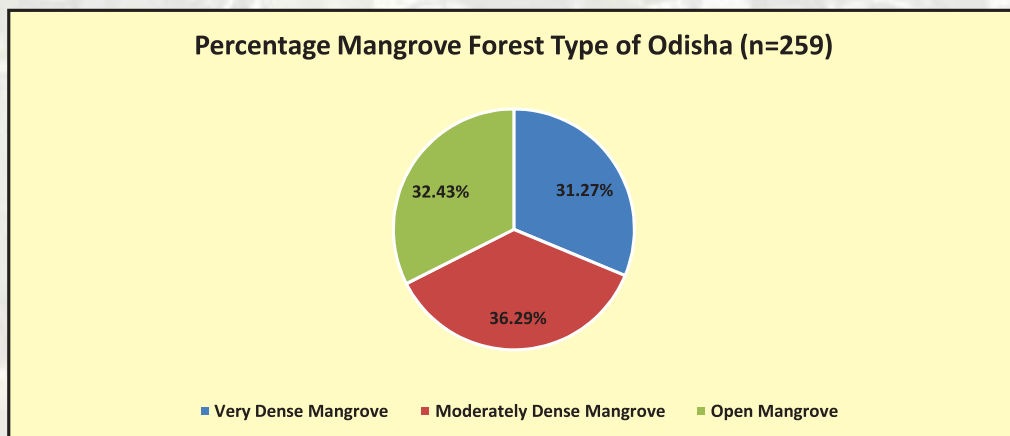
The current assessment shows that Mangrove cover in the India is 4,992 Sq Km, which is 0.15% of the country’s total geographical area. Very Dense Mangrove comprises 1,475 Sq Km (29.55%) of the Mangrove cover; Moderately Dense Mangrove is 1,481 Sq Km (29.67%) while open Mangroves constitute an area of 2,036 Sq Km (40.78%). There has been a net increase of 17 Sq Km in the mangrove cover of the country as compared to 2019 assessment. The States that show significant gain in mangrove cover are Odisha (8 Sq. Km) and Maharashtra (4 Sq. Km). (ISFR 2021).

**Table 3.1** Presents status of Mangrove cover in Odisha since 1997 onwards.



\* Area in Km<sup>2</sup> as per the India State of Forest Report 2021

**Table 3.2** Presents extent of Mangrove cover in the three canopy density classes along the coast of Odisha.



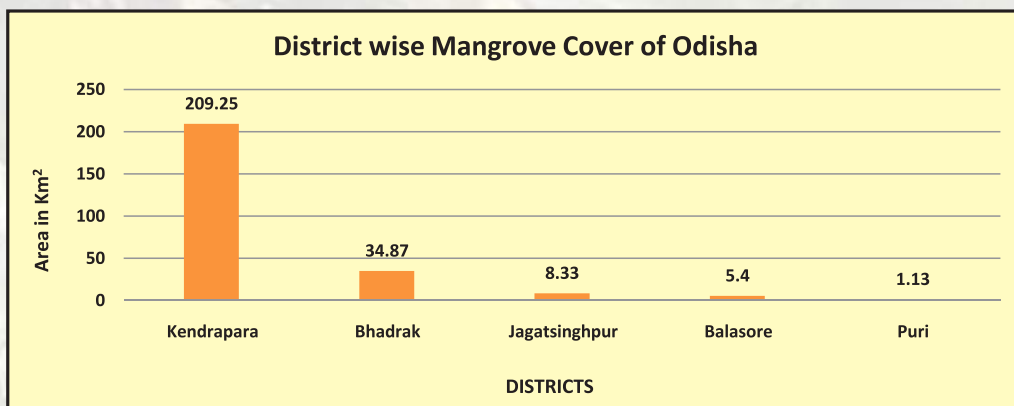
\* Area in Km<sup>2</sup> as per the India State of Forest Report 2021

Nearly 57% of the mangroves are found along the east coast. The mangroves of Odisha coast are situated within the latitude 19°N and 22°N and longitude 85°E and 87°E. The reason for the increase in Mangrove cover in Odisha, is mainly due to the natural regeneration, plantation activities in suitable land like on the banks of the rivers near the estuary and on intertidal mud-flats associated with the areas that are inundated by sea water on a daily cycle. The increase in Mangrove cover has been observed in the districts of Kendrapara, Jagatsinghpur and Balasore in Odisha. The mangroves all along the Odisha coast are threatened due to high density of population in these areas and competing demand on land for agriculture and prawn farming.

The mangroves of the Odisha are distributed in the following three major zones:

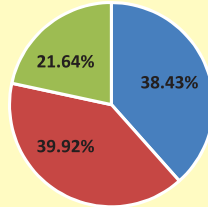
1. Mangroves of Mahanadi Delta.
2. Mangroves of the Brahmani and Baitarani Delta (Bhitarkanika).
3. Mangroves of the Balasore-Bhadrak coast.

**DISTRICT WISE MANGROVE FORESTS COVER IN ODISHA:  
(Area in km<sup>2</sup> as per the India State of Forest Report 2021)**



\* Area in Km<sup>2</sup> as per the India State of Forest Report 2021

### Percentage Mangrove Forest Type of Bhitarkanika (n=209.25)



■ Very Dense Mangrove ■ Moderately Dense Mangrove ■ Open Mangrove

\* Area in Km<sup>2</sup> as per the India State of Forest Report 2021

Bhitarkanika mangroves are most important due to its largest stretch and unique biodiversity. It is also considered as the third largest mangrove zone of the country followed by Sundarban and Andaman & Nicobar Island. This area is luxuriant due to beneficial influence exerted by Brahmani and Baitarani rivers and their distributaries upon the terrain. This belt located in Kendrapara district comprises of coastal areas between Dhamra mouth and Barunei and has been notified as Bhitarkanika Sanctuary (672 Km<sup>2</sup>). Part of this area (145 Km<sup>2</sup>) has also been notified as National Park. This stretch of mangrove is relatively well preserved.

Mangrove vegetation in Mahanadi delta region between Barunei mouth to Mahanadi mouth (Paradeep) is fragmented and degraded due to large-scale encroachment over these areas.

Further south, sparse mangrove vegetation within Jagatsingpur and Puri Districts occurs along the coast from Mahanadi river mouth to Devi-Kadua river mouth. Degraded mangroves also occur to the north of Dhamra river mouth upto Chudamani in Bhadrak district coast and also on Subarnarekha river mouth in Balasore district in and around Bichitrapur. Small patches of mangroves of plantation origin exist in outer channel of Chilika lagoon. Similarly tiny areas with mangrove vegetation is noticed in Bahuda River Mouth in Ganjam district.

The Bhitarkanika Mangroves were Kanika Zamindari forests until 1951, when the Government of Odisha abolished the Zamindari system and put the Zamindari forests under the control of the state forest department since 1957. In 1975, an area of 672 Km<sup>2</sup> was notified the Bhitarkanika Wildlife Sanctuary. The core area of 145 Km<sup>2</sup> was declared Bhitarkanika National Park in September 1998. The Gahirmatha Marine Wildlife Sanctuary, which encompasses Gahirmatha Beach and coastal waters to the east of Bhitarkanika Wildlife Sanctuary, was created in September 1997 to

conserve the nesting Olive Ridley sea turtles. Bhitarkanika Mangroves were designated as a Ramsar Site (Wetland of International Importance) in 2002. According to Jagtap *et al.* (1993), there are 36 number of mangrove species present in Odisha coast. Haines (1921-25), the then Conservator of Bihar and Odisha has reported occurrence of 45 mangrove taxa and associates in Odisha Coast. Mooney (1950) during his visit to Mahanadi delta has added another 12 mangrove taxa to this list. The floral diversity of Bhitarkanika includes more than 300 plant species (Banerjee, 1984). It includes a total of both mangrove and non-mangroves belonging to 80 families. However, 73 species of mangroves and its associates are reported recently to found in Bhitarkanika. The major mangrove species are *Avicennia alba*, *Avicennia officinalis*, *Rhizophora mucronata*, *Excoecaria agallocha*, *Acanthus ilicifolius*, *Sonneratia apetala* and *Heritiera fomes*. The palm *Phoenix paludosa*, the fern *Acrostichum aureum* and *Hibiscus tiliaceus* are widespread throughout the forest (Kar and Bustard, 1986).

This mangrove area harbours one of India's largest populations of saltwater crocodiles some of them measuring an estimated length of 21 feet (7.0 metres). This wetland also hosts a large and diverse population of resident and migratory birds. *Rhesus macaque*, fishing cat, jungle cat, small Indian civet cat, common mongoose, jackal, striped hyena, Indian fox, wild pig, Indian porcupine, mole rat, long tailed tree mouse, spotted deer, sambar, common otter, smooth Indian otter are also found here. Gahirmatha Marine Sanctuary is just adjoining and it is the world's most important nesting beach for Olive Ridley Sea Turtles. This coastal stretch is a rich repository of marine faunal assemblage including Horse shoe crabs, Dolphins etc.

## **MANGROVE ECOSYSTEM**

The mangrove ecosystem is an intertidal ecosystem which is inundated by seawater and the salinity can vary from 0–35 psu (practical salinity unit) or even higher in certain hyper-saline habitats. The substrate often consists of soft sediments which are waterlogged where low oxygen conditions occur. Plants and animals which live in the mangroves have various adaptations to allow them to survive under these stressful conditions. These adaptations have been described comprehensively in a companion volume to this book by Clough (2013), so only a concise account is given here.

### **PLANT ADAPTATIONS**

True mangrove species are those which possess structural and physiological adaptations that allow them to live in a saline and low-oxygen environment. Many of the structural adaptations in mangroves are quite spectacular (from massive stilt root systems to propagules up to about a metre in length – both of these are seen in *Rhizophora*

*mucronata*). Adaptations in mangrove plants can be grouped into those dealing with saline conditions, those dealing with the soft substrate and others dealing with anaerobic conditions.

### **ADAPTATION TO THE SALINE ENVIRONMENT**

Mangroves are halophytes or plants which complete their life cycles in saline waters. However, many species of mangroves can survive in freshwater, suggesting that their ability to live in saline waters gives them a competitive advantage in saline environments. However, some species like *Ceriops decandra* and *Sonneratia alba* could be obligate halophytes (Ball, 1988a) since they showed extremely poor growth and time-dependent vigour in freshwater. Different species vary in their tolerance to salinity, and even within one species, tolerance to salinity can be different depending on the developmental stage of the plant (Ball, 1988b), as seedlings often have food reserves which allow them to grow well even under unfavourable conditions. The optimal salinity for growth of seedlings which have exhausted their food reserves ranges from 10–25% seawater (Clough, 1984; Ball, 1988a). There are three main ways by which mangroves can deal with salt.

#### **SALT EXCLUSION**

One way is to reduce or exclude the uptake of salt. All of the mangroves exclude salt at the roots to some extent but the amount excluded varies and is usually less in the species which possess salt-secreting glands (Clough, 1984). However, if most of the salt is excluded, it is not possible to obtain a positive osmotic potential. So, another mechanism to increase the osmotic potential within these plants is to increase the content of colloidal organic molecules from simple sugars to amino acids (Popp 1984a, 1984b). Since these molecules are normal constituents of cells, small increase do not affect any physiological tolerance problems. In other words, the osmotic pressure in the plant is generated jointly by ionic and colloidal particles. Hence the plant sap of these plants will have a much greater osmotic pressure than can be accounted for by just its ionic (salt) content. Examples of salt excluders are *Rhizophora*, *Bruguiera* and *Ceriops* of the family Rhizophoraceae.

#### **SALT SECRETING GLANDS**

Another mechanism for dealing with the excess salt is to excrete the salt taken in via salt secreting glands. Species in the genera *Acanthus*, *Aegialitis*, *Aegiceras* and *Avicennia* have these salt-secreting glands and crystals of salt are often visible on the leaf surface. Some of the salt carried in the transpiration stream to the leaves is absorbed by the growing tissues for osmoregulation purposes and the excess salt is secreted by the glands so that the ion concentrations are maintained within

physiologically tolerable levels (Ball, 1988b). These mangroves are usually more salt tolerant than other mangroves.

### **SALT ACCUMULATION**

All mangroves accumulate inorganic ions (Popp 1984a) for the osmoregulation of leaves and other tissues. This is especially so for species which are unable to exclude salt at the root level or excrete salt from salt glands in their leaves. These salt accumulators are species coming under genera *Sonneratia*, *Xylocarpus* and *Excoecaria* that employ the strategy of dropping their leaves (thus eliminating salt and excess organics) when the osmotic particles level becomes intolerable. These three genera also deposit sodium and chloride in the stem and pneumatophore bark.

### **ADAPTATION TO THE SOFT SUBSTRATE/AQUATIC ENVIRONMENT**

#### **VIVIPARY AND CRYPTOVIVIPARY**

Vivipary is a reproductive condition where the seed germinates whilst still attached to the parent plant – these germinated seeds are called propagules. Vivipary is particularly obvious in the family Rhizophoraceae. The embryo develops within a small fruit and the embryonic axis, called the hypocotyl, elongates through the surrounding pericarp. The hypocotyl can grow to great length whilst on the parent plant, reaching a metre in *Rhizophora mucronata*. It is often said that these propagules have an advantage in establishing in a soft substrate because the elongated hypocotyls can penetrate the substrate and develop root quickly. However, many of the propagules can be seen floating in the mangrove waterways, and will eventually establish away from the parent plant.

Cryptovivipary in *Avicennia*, is similar to vivipary in that the seed also germinates on the parent tree. However, in this case, the developing hypocotyl does not penetrate the pericarp and protrude beyond. The cryptoviviparous seedlings of *Avicennia* can often be seen deposited on the coast (including sandy beaches), and some of these have already developed roots which will help them establish in the new habitat.

#### **WATER DISPERSION OF SEEDS AND PROPAGULES**

Other mangrove species (in addition to Rhizophoraceae and Avicenniaceae) which have seeds that are water-borne and dispersed away from the parent plant include *Heritiera*, *Xylocarpus* and *Nypa*. The fruit of *Heritiera littoralis* (and *H. fomes*) has a keel. Our observations suggest that often, the keel actually serves as a sail as it is on the upper surface of the floating fruit!



## STILT AND BUTTRESS ROOTS

Mangrove trees have to adapt to live in soft, muddy habitats and many do so by having aerial roots. *Rhizophora* species are characterised by their prominent stilt roots which diverge from the tree sometimes as high as 2 metres and even up to 3-4 metres as in Gambia (François Blasco, pers. comm.) above ground. These roots can spread and penetrate the soil up to 4 metres from the main stem. These roots thus act much as guy ropes in anchoring the tree in the soft substrate. Other species, like *Heritiera littoralis* and *Xylocarpus granatum*, have very prominent sinuous buttress roots which also help support these plants in the muddy environment.

## ADAPTATION TO ANAEROBIC CONDITIONS

### LENTICELS

These are pores, equivalent to stomata in the leaves, which occur on the trunks and exposed roots. Their function is to allow gas exchange. Large lenticels look like small eyes, hence *Bruguiera hainesii* which has numerous of these large lenticels on its trunk, is known locally in Malaysia as ‘mata buaya’ or ‘crocodile eyes’.

### PNEUMATOPHORES

These are breathing roots that stick up from shallow horizontal roots (called cable roots), out of the low-oxygen mud into the air or oxygenated water. Pneumatophores vary in shape and size for different species and in different environmental conditions. The pneumatophores of *Avicennia* are usually around 30 cm high whilst those of *Sonneratia* are thicker and higher. The pneumatophores have abundant lenticels which allow gas exchange. In addition, the pneumatophores (and also the part of the stilt roots in *Rhizophora* that penetrates the soil) are largely composed of aerenchyma – a spongy plant tissue with air spaces. The air spaces enable gas exchange to take place by diffusion with the underground roots (Hogarth, 1999). Thus *Avicennia* has a cable root system which grows just below the soil surface and spreads out horizontally. This cable root system helps in anchoring the tree in the soft substrate. Then there are the pneumatophores which grow up from these cable roots and allow gas exchange.

Finally, there are roots which grow into the substrate and absorb nutrients. The pneumatophores of *Bruguiera* are known as knee roots because they grow out of the mud from cable roots and bend back down like a knee, going back into the mud and then out and back again.

## CLASSIFICATION OF MANGROVES:

### Mangroves can be classified as:

1. True mangroves
2. Mangrove associates
3. Back mangroves
4. Beach flora

(Ghosh *et al.* 2003)

The classification of Mangrove species relevant to Bhitarkanika are as follows:

### TRUE MANGROVE SPECIES

**Family :** Plumbaginaceae

**Species :** *Aegialitis rotundifolia* Roxb.

**Common Name :** Banarua

**English Name :** Club mangrove

**Occurrence :** Common in areas nearer to sea in Bhitarkanika South & Hetamundia forest block in Mahanadi delta.

**Germination :** Crypto-viviparous.

**Flowering :** April to October in Sundarbans. March to April in Bhitarkanika.

**Fruiting :** March to September in Bhitarkanika.

**Distinguishing** Shrub, characteristic leaves, central

**Features :** vein conspicuous, leaves shining above, calyx 13 mm long, corolla with 12 lobes, twigs are with conspicuous annual leaf scars, leaves broadly ovate with flat stem capping leaf petiole, extended hypocotyl upto 7 cm long, can tolerate high saline condition in sea facing estuaries.

**Root System :** No aerial root, trunk base broad & spongy due to basal fused upright roots.



**Family :** Myrsinaceae

**Species :** *Aegiceras corniculatum* (L.) Blanco

**Common Name :** Kharsi

**English Name :** River mangrove

**Occurrence :** Very common in Bhitarkanika particularly in Dangmal forest block and fairly common in Mahanadi delta.

**Germination :** Crypto-viviparous.

**Flowering &** January to September in

**Fruiting :** Sundarbans. Flowering from January to March in Bhitarkanika, while fruiting from March to September.

**Distinguishing Features :** Sweet scented white flowers, producing honey, non-capsular, non-fleshy, single seeded fruit, flowers all on first order branches, fruit 5 to 8 cm long, curved with a persistent calyx, turning yellowish brown on maturity.

**Root System :** Trunk base swollen without aerial roots, stem densely branched.



**Family :** Avicenniaceae

**Species :** *Avicennia alba* Blume

**Common Name :** Dhala Bani

**Occurrence :** Abundant in areas nearer to sea in Mahanadi delta like in Hetamundia & Kansaridiha blocks. Also along river Maipura & Baunsagarh but absent in and around Dangmal.

**Germination :** Crypto - Viviparous germination.

**Flowering &** March to October in Sundarbans.

**Fruiting :** Gregarious flowering in Bhitarkanika during monsoon. June- August, fruiting from July to November, rarely in December.

**Distinguishing Features :** Leaves lanceolate or linear with pointed apex, ventral surface bright silvery, flowers less than 0.4 cm in across, fruit 4.0 cm long conical, tapering.

**Root System :** Pneumatophores numerous, erect pencil like, attain height up to 30 cm.

**Family :** Avicenniaceae

**Species :** *Avicennia marina* (Forsk.) Vierh.

**Common Name :** Singala Bani

**Occurrence :** Abundant in areas nearer to sea in Jamboo & Hetamundia blocks in Mahanadi delta. Also along river Maipura & Baunsagarh but absent in and around Dangmal.

**Germination :** Crypto-Viviparous germination.

**Flowering &** March to October.

**Fruiting :** Gregarious during monsoon, often from May to August while fruiting from July to December.

**Distinguishing Features :** Leaves ovate-lanceolate, not much silvery like *A. alba*, flowers orange yellow 0.4 cm - 0.5 cm in across, sweet scented, and bark peeling like guava, fruit rounded with shortly beaked.

**Root System :** Pneumatophores numerous, erect pencil like, attain height up to 30cm.



**Family :** Avicenniaceae

**Species :** *Avicennia officinalis* L.

**Common Name :** Bada Bani

**Occurrence :** Very common in most of the forest blocks, more so in inter-tidal zones away from sea in Bhitarkanika and Mahanadi delta.

**Germination :** Crypto-Viviparous germination.

**Flowering &** March to October in Sundarbans.

**Fruiting :** Gregarious flowering during May to July & fruiting from July to September in Bhitarkanika.

**Distinguishing Features :** Pneumatophores longer, leaves obovate-oblong, round apically, never silvery beneath, flowers 1.0 cm -1.5 cm in across, fruit 2.5 cm - 3.0 cm long with a short narrow beak, almond shaped.

**Root System :** Pneumatophores numerous, erect pencil like, attain height up to 30 cm.

**Family :** Tiliaceae

**Species :** *Brownlowia tersa* (L.) Kosterm.

**Common Name :** Lati Sundari

**Occurrence :** Very common along the creeks of Bhitarkanika and in Kharnasi block in Mahanadi delta.

**Germination :** Small seeded without vivipary.

**Flowering :** June to September in Sundarbans. April to August in Bhitarkanika.

**Fruiting :** June to September in Bhitarkanika.

**Distinguishing Features :** Leaves alternate, brownish scale on under surface, shrub upto 2 m, petiole 1 to 2 cm without pulvinus, flowers small, in compact axillary clusters.



**Family :** Rhizophoraceae

**Species :** *Bruguiera cylindrica* (L.) Blume

**Common Name :** Kaliachua

**Occurrence :** Abundant in Hetamundia & Kansaridiha forest blocks in Mahanadi delta, uncommon in Kalibhanjdia, Ekakula & Krishnapriyapur.

**Germination :** Viviparous germination, 16 cm long hypocotyl at maturity grooved or angled.

**Flowering :** April to June.

**Fruiting :** April to July.

**Distinguishing Features :** 3 flowers in each group, petal

white, calyx lobes 8 and completely reflexed in fruit (folding inversely), petals 3mm - 4mm long with 2 or 3 bristles at the apex of each lobe, flower greenish, erect at anthesis.

**Root System :** Stilt roots fused at trunk base, buttress root.

**Status :** Common in Mahanadi delta but rare in Bhitarkanika.

**Family :** Rhizophoraceae

**Species :** *Bruguiera gymnorhiza* (L.) Lamk.

**Common Name :** Bandari

**Occurrence :** Common in Kansaridiha forest block in Mahanadi delta, rare in Bhitarkanika particularly Baunsagarh creek in Krushnapriyapur Beat.

**Germination :** Viviparous germination, hypocotyl upto 18 cm long, ridged.

**Flowering & Fruiting :** March to October in Sundarbans, Throughout the year in Bhitarkanika.

**Distinguishing Features :** Leaves reddish beneath, calyx reddish with 12-14 lobes, hypocotyl upto 25 cm long, cigar shaped, blunt apically, slightly angular, tips of petal lobes acute, each extended into 3 filamentous appendages, twigs and petioles glaucous with white wax.

**Root System :** Supported by basal fused stilt roots on the trunk base and form conical base with fused aerial roots, occasionally form buttresses and horizontal knee roots.



**Family :** Rhizophoraceae

**Species :** *Bruguiera parviflora* Wt. & Arn.

**Common Name :** Dot

**Occurrence :** Restricted to Hetamundia, Kansaridiha & Kharnasi forest blocks in Mahanadi delta & Kalibhanjdia island.

**Germination :** Viviparous germination, 25 cm long hypocotyle, smooth, 5 mm in diameter.

**Flowering & Fruiting :** April & May.

**Distinguishing Features :** Calyx lobes slender, short, less than 3 mm, petals 1.5 mm - 2.0 mm long, yellowish, medium tree, slightly yellowish, 4-7 flowers in groups.

**Status :** Abundant in Mahanadi delta, uncommon in Kalibhanjdia but absent in Bhitarkanika.

**Family :** Rhizophoraceae

**Species :** *Bruguiera sexangula* (Lour.) Poir.

**Common Name :** Bandari

**Occurrence :** Very common in almost all the forest blocks in Bhitarkanika but rare in Mahanadi delta.

**Germination :** Viviparous germination, hypocotyl 10 cm long.

**Flowering &** Summer to monsoon months in

**Fruiting :** Sundarbans, Flowering throughout the year while fruiting in January to August in Bhitarkanika.

**Distinguishing Features :** Tips of petal lobes blunt without filamentous appendages, calyx smaller and distinctly ribbed, twigs and petioles lack white waxy covering, calyx is not conspicuously scarlet with 10 lobes, yellowish distinct mid vein.

**Root system :** Trunk base conspicuous, supported by aerial fused roots, form buttresses and horizontal knee roots.



**Family :** Rhizophoraceae

**Species :** *Ceriops decandra* (Griff.) Ding Hou

**Common Name :** Garani (Yellow mangrove)

**Occurrence :** Common in almost all the forest blocks but abundant in areas nearer to sea like Hukitola, Kansaridiha, Kantilo forest blocks & Habalikhati.

**Germination :** Viviparous germination, 12cm long hypocotyl.

**Flowering :** February to September in Sundarban. December to August in Bhitarkanika.

**Fruiting :** Hypocotyl found almost throughout the year in Sundarban. February to August in Bhitarkanika.

**Distinguishing Features :** Hypocotyl sharply ridged with blunt apex, calyx erect in fruit, inflorescence axis short, wide, stout, expanded distally (10 mm or less), petals not enclosing stamens at anthesis, with a fringe of filamentous appendage, stamens with a short filament equal or exceeded by anther.



**Family :** Rhizophoraceae

**Species :** *Ceriops tagal* (Perr.) C.B. Robinson

**Common Name :** Garani (Yellow mangrove)

**Occurrence :** Found in Kakaranasi Forest Block of Rajnagar Range.

**Germination :** Viviparous germination.

**Flowering :** April to September in Andamans.

**Fruiting :** April to September in Andamans.

**Distinguishing Features :** Hypocotyl upto 25 cm, inflorescence axis long and uniformly slender (10-20 mm by 2 mm). Apex of the petal with 3 clavate appendages, stamens with long, slender filaments much exceeding the blunt anthers, hypocotyl slightly ridged.



**Family :** Euphorbiaceae

**Species :** *Excoecaria agallocha* L.

**Common Name :** Guan

**English Name :** Blinding Mangrove

**Occurrence :** Abundant all over the Park, also in Mahanadi delta.

**Germination :** Small-seeded, non-viviparous.

**Fruiting & Flowering :** April to August in Sundarbans, in Bhitarkanika, flowering during June-July and fruiting from July to August.

**Distinguishing Features :** Exudes white latex on injury, leaves red before shedding, fruit 3 lobed schizocarp, a pair of glands at leaf base, flowers catkin (male) and axillary (female).

**Root System :** Spreading horizontal roots on surface in eroded soil.



**Family :** Sterculiaceae

**Species :** *Heritiera fomes* Buch. - Ham.

**Common Name :** Bada Sundari

**Occurrence :** Abundant in all the forest blocks in Kanika Range including Kalibhanjdia island in Bhitarkanika North away from sea. Uncommon in Mahanadi delta except in Kharnasi block.

**Germination :** Hypogeal germination.

**Flowering &** May to October in Sundarbans, in

**Fruiting :** Bhitarkanika, flowering in March-August. & fruiting in May-August

**Distinguishing Features :** Bark-inner brown, turn reddish on peeling, fruit knobby with a ventral ridge together with a transverse, circular ridge, prefers well drained less saline soil where fresh water supply is abundant.

**Root System :** Blunt end peg like pneumatophores, exposed plank like horizontal roots with stem buttresses in mature trees.



**Family :** Sterculiaceae

**Species :** *Heritiera kanikensis* Majumdar & Banerjee

**Common Name :** Kanika Sundari

**Occurrence :** Rare & restricted to Kanika Range ?

**Germination :** Hypogeal germination.

**Flowering :** May to August.

**Fruiting :** May to August.

**Distinguishing Features :** The species is similar to *H. fomes* but is easily recognized from others by its rough globose fruits devoid of transverse circular ridge and apical crest.

**Root System :** Pneumatophore exists.

**Status :** The author has not been able to locate the species.

**Family :** Sterculiaceae

**Species :** *Heritiera littoralis* Dryand ex Ait.

**Common Name :** Dhala Sundari

**English Name :** Water coconut

**Occurrence :** Rare but common in Bhitarkanika-North particularly in Dangmal & Bhitarkanika forest blocks.

**Germination :** Hypogeal germination.

**Flowering :** July to October in Bhitarkanika.

**Fruiting :** September to January in Bhitarkanika while November to March in Andamans.

**Distinguishing Features :** Fruit smooth with a rudder like crest, but without a transverse circular ridge.

**Root System :** Pneumatophores absent with stem buttresses in mature trees.



**Family :** Rhizophoraceae

**Species :** *Kandelia candel* (L.) Druce

**Common Name :** Sinduka

**Occurrence :** Abundant in almost all the forest blocks in Bhitarkanika, Kalibhanjdia & fairly common in Petchhela & Kharnasi forest blocks in Mahanadi delta.

**Germination :** Viviparous.

**Flowering :** Throughout the year.

**Fruiting :** Throughout the year. Hypocotyls fall off during July.

**Distinguishing Features :** Hypocotyl upto 40 cm long at maturity, pointed apically and tapered at each end, pneumatophores absent, flower white.

**Root System :** Fused broom like stilt roots form buttresses on the trunk base.

**Family :** Combretaceae

**Species :** *Lumnitzera racemosa* Willd.

**Common Name :** Churunda

**Occurrence :** Less common but spread over throughout the Park, more in Bhitarkanika forest block, at Habalikhati and also in Hukitola block in Mahanadi delta.

**Germination :** Small viviparous seeds.

**Flowering &** May to November in Sundarbans,

**Fruiting :** In Bhitarkanika, flowering from May to July & fruiting from June to September.

**Distinguishing Features :** Flowers white and sessile, inflorescence axillary, stamens equaling or only slightly exceeding the petals, leaf blade hairy when young, fibrous fissured bark, calyx 5, petals 5, stamens usually 10, evergreen tree, fruits are flattened, 1 seeded drupe with persistent sepals and style, two distinct notches at the mid side of the fruit.



**Family :** Arecaceae

**Species :** *Nypa fruticans* (Thunb.) Wurmb.

**Common Name :** Nypa Palm

**Occurrence :** Once found in Bhitarkanika and Mahanadi delta but now extinct. The species has been introduced at Dangmal.

**Germination :** Viviparous germination.

**Flowering :** November to July in Sundarbans, March to July in Bhitarkanika.

**Fruiting :** Fruits found almost throughout the year in Sundarbans, but from July to January in Bhitarkanika.

**Distinguishing features :** Rhizomatous palm, looks like sunken coconut palm, several spathe, male inflorescence-catkin, carpels-3, aggregate, fruits up to 12 cm long.

**Family :** Arecaceae

**Species :** *Phoenix paludosa* Roxb.

**Common Name :** Hental

**English :** Sea date

**Occurrence :** Very common throughout the Park. Extensive patch from Krishnapuriyapur to Chinchiri mouth and in Petchhela block in Mahanadi Delta

**Germination :** Medium seeded non-viviparous.

**Flowering :** March to June in Sundarbans, in Bhitarkanika, February to March.

**Fruiting :** March-July in Bhitarkanika.

**Distinguishing Features** : Leaves like date palm, trunk

erect, stem annular, single spathe, male inflorescence not catkin, carpels-3, united, fruit small upto 1.5 cm long.

**Root System :** Aerial pneumatophodes develop up to 25 cm in compact soil inundated with tidal water.



**Family :** Rhizophoraceae

**Species :** *Rhizophora apiculata* Blume

**Common Name :** Rai

**Occurrence :** Common in Kansaridiha & Hetamundia forest blocks in Mahanadi delta, rare in Kanika Range.

**Germination :** Viviparous, 50 cm long hypocotyl, smooth.

**Flowering & Fruiting :** March to September in Sundarbans, February to July and September to November (twice a year) in Bhitarkanika.

**Distinguishing Features** : Leaves without acute apex, short petiole, young leaves with red venation, flowers in 2's, flowers and fruits well below the leaf rosette, petal yellowish and glabrous, stamens usually 12, sessile.

**Root system :** Prominent stilt roots from the trunk bases and hanging aerial roots.

**Family :** Rhizophoraceae

**Species :** *Rhizophora mucronata* Lamk.

**Common Name :** Rai

**Occurrence :** Common in Kansaridiha forest block in Mahanadi delta, along Baunsagarh river in Rajnagar Range, Gokhani creek & Bhitarkanika forest block in Kanika Range.

**Germination :** Viviparous, 75 cm long hypocotyl, warty.

**Flowering & Fruiting :** February to October in Sundarbans, February to July and September to November (twice a year) in Bhitarkanika.

**Distinguishing Features :** Leaf with acute mucronate apex, longer petiole, flower in 4's on slender peduncles, flowers/ fruits borne within the leafy crown, petal whitish and hairy on margin, stamens 8.

**Root system :** Prominent stilt roots from the trunk bases and hanging aerial roots.



**Family :** Rhizophoraceae

**Species :** *Rhizophora stylosa* Griff.

**Common Name :** Rai

**Distinguishing Features :** Stigmas on a slender style

**Features :** 4-6 mm long, hypocotyl smooth, not exceeding 30cm., leaf blade narrow upto 7cm and short upto 12 cm.

**Status :** Author has not been able to locate the tree so far.

**Root System :** Prominent stilt roots from the trunk bases and hanging aerial roots.

**Family :** Sonneratiaceae

**Species :** *Sonneratia alba* J. Smith

**Common Name :** Orua

**Occurrence :** Rare & restricted to Hukitola mouth in Mahanadi delta, Ekakula & accreted islands nearby.

**Germination :** Hypogeal germination.

**Flowering & :** Almost throughout the year.

**Fruiting**

**Distinguishing** Calyx cup shaped, ribbed, white

**Features** : petals that are tinged red apically present, leaves ovate with short thick petiole.

**Root System** : Conspicuous negatively geotropic aerial roots, pneumatophores numerous, erect with secondary growth, attain height up to 1.5 m.



**Family :** Sonneratiaceae

**Species :** *Sonneratia apetala* Buch. - Ham.

**Common Name :** Keruan

**Occurrence** : Abundant along the river Bhitarkanika & other creeks in North Bhitarkanika away from sea. Common in Jamboo forest block in Mahanadi delta.

**Germination** : Hypogeal germination.

**Flowering &** June to October in Sundarbans.

**Fruiting** : In Bhitarkanika, flowering in March-April and fruiting from May- August.

**Distinguishing** Calyx 4 lobed, not exceeding

**Features** : 2 cm. stigma is broad and mushroom-shaped at anthesis, fruits clustered in branch like *Areca* nut.

**Root System** : Pneumatophores numerous, erect with secondary growth, attain height up to 1.5 m.

**Family :** Sonneratiaceae

**Species :** *Sonneratia caseolaris* (L.) Engler

**Common Name :** Orua

**Occurrence :** Only restricted to Khola creek, Thanapati creek & Mahisamada creek in North Bhitarkanika. Rare in Kansaridiha forest block in Mahanadi delta.

**Germination :** Hypogeal germination.

**Flowering &** March to October in Sundarbans.

**Fruiting :** In Bhitarkanika flowering from March to September & fruiting from April to December.

**Distinguishing Features :** Petiole short or almost absent, veins inconspicuous, petals present, red in colour, alternate with calyx, filaments red below, white above, adult leaves usually with a blunt apex, calyx flat, obscurely ribbed.

**Root System :** Conspicuous negatively geotropic aerial roots, pneumatophores numerous, erect with secondary growth, attain height up to 1.5 m.



**Family :** Sonneratiaceae

**Species :** *Sonneratia griffithii* Kurz

**Common Name :** Orua

**Occurrence :** Probably in Hukitola forest block in Mahanadi delta, may be in Ekakula & newly accreted islands nearer sea.

**Germination :** Hypogeal germination.

**Flowering &** April to October.

**Fruiting**

**Distinguishing Features :** Vein conspicuous, petals absent, filaments white, calyx flat obscurely ribbed.

**Root System :** Conspicuous negatively geotropic aerial roots, pneumatophores numerous, erect with secondary growth, attain height up to 1.5 m.

**Status :** Likely to be confused with *S. alba*. The author has not been able to locate the species.

**Family :** Meliaceae

**Species :** *Xylocarpus granatum* Koenig

**Common Name :** Sisumar

**Occurrence :** Common all over the Park but more in Bhitarkanika forest block in Kanika Range.

**Germination :** Large fruit, many seeded, viviparous.

**Flowering :** Profusely during April to August in Sundarban. In Bhitarkanika, 1st phase in March & April, 2nd phase in November.

**Fruiting :** May to March in Bhitarkanika

**Distinguishing features :** Large fruit upto 25 cm diameter, trunk surface smooth, pale, blotched greenish or yellowish, peeling in patches, inflorescence upto 6 cm long without well developed main axis.

**Root System :** Trunk with buttresses, ribbonlike extensions of root system.



**Family :** Meliaceae

**Species :** *Xylocarpus mekongensis* Pierre

**Common Name :** Pitamari

**Occurrence :** Rare & restricted to Bhitarkanika forest block & Ragadapatia forest blocks in Kanika Range and in Hukitola block in Mahanadi delta.

**Germination :** Many seeded, viviparous.

**Flowering :** March to June in Sundarbans. In Bhitarkanika February to March.

**Fruiting :** Mature fruits found hanging from July to November in Sundarbans while from April to June in Bhitarkanika.

**Distinguishing Features :** Fully deciduous during middle of February, new leaves appear with inflorescence during Feb-March, fruit small not exceeding 12 cm in diameter, trunk surface rough, dark brown, fissured and peeling in narrow strips, buttresses very short, inflorescence exceeding 8 cm with a distinct main axis.

**Root System :** Roots develop peg like pneumatophores.



**Family :** Meliaceae

**Species :** *Xylocarpus moluccensis* (Lamk.) Roem.

**Common Name :** Pitakorua

**Occurrence :** Very rare & restricted to Bhitarkanika & Dangmal forest blocks in Kanika Range.

**Germination :** Many seeded, viviparous.

**Flowering :** February to March in Bhitarkanika.

**Fruiting :** March to June in Bhitarkanika.

**Distinguishing Features :** Plants of sandy or rocky beaches, leaflets usually 4 or 6, more or less ovate, leaves usually narrowed to a distinctly pointed apex, inflorescence less than 8 cm in length, bark longitudinally fissured, fruit about size of an orange.

**Root System :** Root system not elaborated. Buttresses absent.



## MANGROVE ASSOCIATES

**Family :** Acanthaceae

**Species :** *Acanthus ilicifolius* L.

**Common Name :** Harakancha

**Occurrence :** Abundant all over in Bhitarkanika and Mahanadi delta.

**Germination :** Hypogeal germination.

**Flowering :** May to August in Sundarbans. March to August in Bhitarkanika.

**Fruiting :** April to August in Bhitarkanika.

**Distinguishing Features :** Gregarious shrub upto 2 m tall, bluish white flower, small fruit of 3 cm, spiny margined leaves, inflorescence longer than 10 cm, bracteoles persistent in fruit upto 1 cm long.



**Family :** Acanthaceae

**Species :** *Acanthus volubilis* Wall.

**Common Name :** Harakancha

**Occurrence :** Extremely rare & restricted to Kanika Range. Author has not been able to locate the species.

**Germination :** Hypogeal germination.

**Flowering :** June to September.

**Distinguishing Features :** Deciduous during flowering,

bracteoles never present, bract longer than calyx, leaves without spines, climber, white flower, ripe fruit shorter than 2 cm, leaves widest above the middle.

**Family :** Acrostichaceae  
**Species :** *Acrostichum aureum* L.  
**Common Name :** Kharkhari  
**English Name :** Mangrove fern.

**Occurrence :** Common in Dangmal block, Ragadapatia block & Bhitarkanika block.

**Germination :** Non-viviparous.

**Reproduction :** Sporangia formation during February to April.

**Distinguishing Features :** Fern like characteristic leaves, young leaves have crimson colour, recognized few distal fertile pinnae on fertile fronds and the shape of paraphyses (symmetric, outline irregular terminal unextended).



**Family :** Meliaceae  
**Species :** *Aglia cucullata* (Roxb.) Pellegrin  
**Common Name :** Ooanra  
**Occurrence :** Rare & restricted along Bhitarkanika river & Mahisamada creek, more in Dangmal forest block  
**Germination :** Non-viviparous.  
**Flowering :** March to August in Sundarbans. In Bhitarkanika, January to March & 2nd phase in July to August which do not bear fruit.  
**Fruiting :** April to August.  
**Distinguishing Features :** Medium tree, 15 m tall, leaves compound, leaflets 2-4 pairs, oblong, elliptic, petals longer, staminal tube shorter than the petals.  
**Root System :** Occasionally form pneumatophores.

**Family :** Apocynaceae

**Species :** *Cerbera odollam* Gaertn.

**Common Name :** Paniamba

**Occurrence :** Very rare & restricted to Khola creek in Kanika Range.

**Germination :** Non-viviparous.

**Flowering &** Almost throughout the year.

**Fruiting :**

**Distinguishing** Corolla with a yellow eye, leaves

**Features :** apiculate with a fine point, primary veins perpendicular to mid-rib.



**Family :** Verbenaceae

**Species :** *Clerodendrum inerme* (L.) Gaertn.

**Common Name :** Chiani

**Occurrence :** Much branched evergreen shrub along river banks, very common in Dangmal & North Mahisamada forest blocks.

**Germination :** Non-viviparous.

**Flowering :** In Bhitarkanika, March to August.

**Fruiting :** May to October.

**Distinguishing** Scaly under surface of leaves,

**Features :** white flowers with bright red filaments, fruits 4-grooved, sepals-5, petals-5, stamens-4, carpels-2, calyx shortly toothed.

**Family :** Caesalpiniaceae

**Species :** *Cynometra iripa* Kostel

**Common Name :** Singada

**Occurrence :** Commonly spread over in almost all the forest blocks in Kanika & Rajnagar Range.

**Germination :** Large seeded, non-viviparous germination.

**Flowering :** In Bhitarkanika, December to February.

**Fruiting :** January to August

**Distinguishing Features :** Evergreen small tree, style bent, prominent lateral beak in fruit, sepals curved distally when reflexed at anthesis.



**Family :** Caesalpiniaceae

**Species :** *Cynometra ramiflora* L.

**Common Name :** Singada

**Occurrence :** Very Rare. The author has not been able to locate the species so far.

**Distinguishing Features :** Style straight, fruit without a prominent lateral beak, sepals not curved distally when reflexed at anthesis.

**Family :** Fabaceae

**Species :** *Dalbergia candenatensis* (Dennst.) Prain

**Common Name :** Katha Katira Nai

**Occurrence :** Common in Dangmal, Bhitarkanika & Ragadapatia forest blocks in Kanika Range.

**Germination :** Small seeded without vivipary.

**Flowering :** May to August in Bhitarkanika.

**Fruiting :** June to September

**Distinguishing Features :** Much branched climbing shrub,

evergreen, perennial, leaflet elliptic oblong, white flowers.



**Family :** Fabaceae

**Species :** *Dalbergia spinosa* Roxb.

**Common Name :** Gohirakanta

**Occurrence :** Abundant in Dangmal forest block in Kanika Range, Petchhela & Kandarapatia forest blocks in Mahanadi delta.

**Germination :** Small seeded without vivipary.

**Flowering :** July to February in Sundarban, in Bhitarkanika, May to August.

**Fruiting :** July to September in Bhitarkanika.

**Distinguishing Features :** Shrub, flowers purple whitish,

leaflets 9-11, alternate, obovate, two woody spines at each node, sepals-5, petals-5, stamens-10, carpels-2, fruit pod, kidney-shaped, one margin convex, the other is concave with mid-notched.

**Family :** Fabaceae

**Species :** *Derris scandens* (Roxb.) Benth.

**Common Name :** Dhala Katira Nai

**Occurrence :** Rare & restricted to Bhitarkanika forest block in Kanika Range, Kharnasi & Kandarapatia blocks in Mahakalapada Range.

**Germination :** Small seeded without vivipary.

**Flowering :** July to December in Sundarbans. In Bhitarkanika, July to October.

**Fruiting :** September to December in Bhitarkanika.

**Distinguishing Features :** Much branched climbing shrub, evergreen, perennial, leaflet elliptic oblong with acute tip, 3-6 pairs, pods 4 cm long, 1 cm wide, thin, glabrous, two seeds in each pod round with short grooved, filaments 0.65 cm long, white.



**Family :** Fabaceae

**Species :** *Derris trifoliata* Lour.

**Common Name :** Kala Katira Nai

**Occurrence :** Abundant in all the forest blocks in Kanika Range, Rajnagar Range & also in Mahanadi delta.

**Germination :** Small seeded without vivipary.

**Flowering :** April to August in Sundarban, in Bhitarkanika, March-July.

**Fruiting :** April to September in Bhitarkanika.

**Distinguishing Features :** Climber, glabrous, leaflets 3-5, alternate, rose colored flowers, pods flat and single seeded, spread by root suckers, dark red, strongly ridged younger stems with prominent lenticel, leaflets elliptic with, acuminate tip, sepals-5, petal- 5, stamens (9+1), carpels-2.

**Family :** Caesalpiniaceae

**Species :** *Intsia bijuga* (Colebr.) Kuntz.

**Common Name :** Maasitha

**Occurrence :** Rare & restricted to only Dangmal & Bhitarkanika Forest Blocks in Kanika Range.

**Germination :** Non-viviparous.

**Flowering :** February in the 1st phase, August in the 2nd phase.

**Fruiting :** March to July.

**Distinguishing** Compound leaf, whitish brown

**Features :** bark, foliage deciduous, leaflets ovate, hairs on midrib beneath, flowers numerous in dense terminal, finely hairy spikes, sepals-4 & unequal, petal solitary, at first white but turning red.



**Family :** Convolvulaceae

**Species :** *Ipomoea tuba* (Sch.) G. Don

**Occurrence :** Hinterlands of coastal areas beyond tidal reach, more in Sanatubi, Badatubi forest blocks in Mahanadi delta.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** Post monsoon & winter, October to February.

**Distinguishing** Large twiner, corolla white,

**Features :** large with a long & narrow tube, seeds tomentose with longer hairs on the edges.



**Family :** Poaceae

**Species :** *Myriostachya wightiana* (Nees ex Steud.)  
Hook. f.

**Common Name :** Nalia grass

**Occurrence :** Abundant along mudflats in Kanika & Rajnagar Range along with *P. coarctata*.

**Flowering :** June to January in Sundarbans. In Bhitarkanika, June to October.

**Fruiting :** June to October in Bhitarkanika.

**Distinguishing Features :** Culms tufted, erect, stout, sheathed, leaf blade broad, serrated, inflorescence panicles, whorled flowering.



**Family :** Asclepiadaceae

**Species :** *Pentatropis capensis* (L. f.) Bullock

**Common Name :** Raigidi

**Occurrence :** Common in Dangmal forest block in Kanika Range.

**Germination :** Non-viviparous.

**Flowering :** April to October in Bhitarkanika

**Fruiting :** May to October.

**Distinguishing** Twining herb with milky

**Features :** latex, leaves small of size 2.5 cm x 1.8 cm, corolla lobes lanceolate, fruit follicle, 3-4 cm long, cylindrical, tapering end.

**Family :** Poaceae

**Species :** *Phragmites karka* (Retz.) Trin.

**Common Name :** Nala

**Occurrence :** A few pockets in Khola in Kanika Range

**Flowering :** December to March in Sundarbans. In Bhitarkanika, September to January.

**Fruiting :** October-January.

**Distinguishing Features :** Culms erect, stout, leaf blades

flat, lanceolate, inflorescence panicles.



**Family :** Poaceae

**Species :** *Porteresia coarctata* (Roxb.) Tateoka

**Common Name :** Dhani Dhana

**Occurrence :** Very common in the newly silted up mud flats along the Bhitarkanika creeks and Mahanadi delta.

**Germination :** Non-viviparous (hypogeal).

**Flowering :** Middle of June to December in Sundarbans. In Bhitarkanika, August to September.

**Fruiting :** August to September rarely in October.

**Distinguishing Features :** Leaves acicular, margin

spinulose serrate, grass.

**Family** : Hippocrateaceae

**Species** : *Salacia prinoides* DC.

**Common Name** : Batra

**Occurrence** : Very common in almost all the forest blocks in Kanika Range.

**Flowering** : January to February.

**Fruiting** : January to May.

**Distinguishing** : Scandent shrub, flowers

**Features** : yellowish, berry scarlet, globose.



**Family** : Chenopodiaceae

**Species** : *Salicornia brachiata* Roxb.

**Common Name** : Batula

**Occurrence** : Abundant along Khola creek & river flatlands in the coastal mangal like Raipatia & Jaudia in Rajnagar Range.

**Germination** : Non-viviparous.

**Flowering & Fruiting** : July to November.

**Fruiting** :

**Distinguishing** : Stem fleshy, nodes ridged easily

**Features** : separated, leaves simple, fleshy, petals yellow, showy.

**Family :** Asclepiadaceae

**Species :** *Sarcolobus carinatus* Wall.

**Common Name :** Lata Rai

**Occurrence :** Common in most of the forest blocks but abundant in Dangmal forest block.

**Germination :** Non-viviparous.

**Flowering :** During monsoon i.e. July to October in Sundarbans, in Bhitarkanika, May to June.

**Fruiting :** July to November in Bhitarkanika.

**Distinguishing Features :** Climbing herb, exudes milky latex on injury, petiole upto 2.7 cm, bracteate, fruit ellipsoid, keeled, pale yellow, fleshy, fruit coat terminated into a short beak, inflorescence unbranched corymb.



**Family :** Asclepiadaceae

**Species :** *Sarcolobus globosus* Wall.

**Common Name :** Katukula

**Occurrence :** Restricted to Dangmal & Bhitarkanika forest blocks in Kanika Range.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** October to January.

**Distinguishing Features :**

Prostrate or climbing shrub, leaves elliptic, flower whitish green, fruits follicle, globose & brown, leafless during March.

**Family :** Cyperaceae

**Species :** *Scirpus litoralis* Schr.

**Common Name :** Sipal

**Occurrence :** Common sedge in marshy or shallow brackish water zones of Bhitarkanika.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** October to January

**Distinguishing Features :** Tall stout, perennial sedge. Stem erect, terete below and trigonous upwards. Leaves reduced to bladeless. Spikelets large, usually distinct from one another on short pedicels; involucral bract erect, continuous with the stem, triquetrous.



**Family :** Aizoaceae

**Species :** *Sesuvium portulacastrum* (L.) L.

**Common Name :** Goda Bani

**Occurrence :** Common on muddy river banks along river Maipura and Baunsagarh.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** Post monsoon to winter.

**Flowering & Fruiting :** October to January.

**Distinguishing Features :** Creeping herb, red shining

glabrous stems, sepals-5, persistent, margin white pink, corolla absent, stamens numerous, carpels-3.

**Family :** Chenopodiaceae

**Species :** *Suaeda maritima* (L.) Dumort

**Common Name :** Giria

**Occurrence :** Very common in hyper saline areas like meadows in Kalibhanjadia, prawn ponds in Mahanadi delta.

**Germination :** Non-viviparous.

**Flowering &** October to December.

**Fruiting :**

**Distinguishing** Erect herb, spreading horizontal

**Features :** roots, leaves broad, green, styles-2, seeds usually horizontal, leaf 1 cm long x 0.4 cm wide, grows gregariously, acts as a soil binder.



**Family :** Chenopodiaceae

**Species :** *Suaeda monoica* Forssk. ex Gmel.

**Common Name :** Giria / Ninia

**English :** Sea date

**Occurrence :** Occasional in Mahanadi delta and Thakurdia FB, gregarious in tidal mud.

**Germination :** Non-viviparous.

**Flowering &** June to October.

**Fruiting :**

**Distinguishing** Erect, many branched herb.

**Features :** Leaves linear, obtuse or sub-acute. Flowers polygamous, in slender, lax-spikes. Seed ovoid, smooth, shining, black.

**Family :** Chenopodiaceae

**Species :** *Suaeda nudiflora* (Wild.) Moq.

**Common Name :** Giria

**Occurrence :** Very common in hyper saline areas like meadows in Kalibhanjadia, prawn ponds in Mahanadi delta.

**Germination :** Non-viviparous.

**Flowering &** November to January.

**Fruiting :**

**Distinguishing Features :** Prostrate much branched herb having erect branches, leaves semi terete, green but reddish after maturation, styles-3 seeds erect, leaf 3.0 cm long x 0.3 cm wide.



**Family :** Aizoaceae

**Species :** *Trianthema portulacastrum* L.

**Common Name :** Puruni

**Occurrence :** Common weed in sandy places in Mahanadi delta and Bhitarkanika.

**Germination :** Non-viviparous.

**Flowering &** July to December

**Fruiting :**

**Distinguishing Features :** Succulent herb with prostrate

forked branches. Leaves opposite, unequal, broadly obovate; base of petiole sheathing with two stipule like appendages. Flowers solitary, sunk in the forks, pinkish.

## BACK MANGROVES

**Family :** Sapindaceae

**Species :** *Allophylus serratus* (Roxb.) Kurz

**Common Name :** Khandakoli

**Occurrence :** Common along the bank of Baunsagad river near Krushnapuriyapur and also in Bhitarkanika

**Germination :** Non-viviparous.

**Flowering &** August to October.

**Fruiting :**

**Distinguishing Features :** Much branched shrub. Leaves 3-foliolate; leaflets elliptic, serrate; central leaflet larger than the lateral. Flowers white, clustered. Fruit 1-2 lobed, glabrous, orange-red on ripe.



**Family :** Salvadoraceae.

**Species :** *Azima tetraacantha* Lam.

**English Name :** Mistle toe

**Occurrence :** Armed straggling shrub common in Jaudia, Chinchiri, Krushnapuriyapur and Bhitarkanika.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** March to May.

**Distinguishing Features :** Straggling shrub; spines straight, paired in the leaf axils; branchlets quadrangular. Leaves elliptic with spinulose tip, greyish-green. Flowers yellowish. Berries white.





**Family :** Caesalpinaceae

**Species :** *Caesalpinia bonduc* (L.) Roxb.

**Common Name :** Gilo

**Occurrence :** Common in Bhitarkanika block along Gokhani creek and in Orasahi block along Baunsagarh creek.

**Germination :** Large seeded, non-viviparous.

**Flowering & Fruiting :** July to February.

**Distinguishing Features :** Spines on fruit (pods prickly), leaflets 16-24 per pinna, inflorescence always axillary, flowers yellow, seeds grey.



**Family :** Caesalpinaceae

**Species :** *Caesalpinia crista* L.

**Common Name :** Nentei

**Occurrence :** Very common climbing shrub in mangrove forests of Kanika Range & Rajnagar Range, less common in Mahanadi delta (Petchhela block).

**Germination :** Large seeded, non-viviparous.

**Flowering :** November to June in Sundarbans. In Bhitarkanika March to September.

**Fruiting :** April to December, rarely in January.

**Distinguishing Features :** Climbing shrub, pods not prickly, yellow colored flowers, leaflets always opposite, 2-4 pairs per pinna, inflorescence often terminal, flowers bisexual, fruit unarmed and seeds black.

**Family :** Amaryllidaceae

**Species :** *Crinum defixum* Ker Gawl.

**Common Name :** Pani Kenduli

**Occurrence :** Very common in less saline water area, more in Dangmal & Ragadapatia forest blocks in Kanika Range.

**Germination :** Non-viviparous.

**Flowering :** June to September in Sundarbans, in Bhitarkanika, March-July.

**Fruiting :** June-July in Bhitarkanika.

**Distinguishing Features :** Erect herb upto 1.5 m, rhizome bulb, 5-10 white flowers on each peduncle, a common thin white layer cover the buds at young stage, tepals-5, stamens-6, carpels-2, leaf 100 cm long X 12 cm wide, anther 1.8 cm long.



**Family :** Cyperaceae

**Species :** *Cyperus conglomeratus* Rottb.

**Common Name :** Hanshi grass

**Occurrence :** Common sedge in marshy places at Dangmal.

**Flowering & Fruiting :** June to October.

**Family :** Cyperaceae

**Species :** *Cyperus corymbosus* Rottb.

**Common Name :** Keuti grass

**Occurrence :** Common in Bhitarkanika & Dangmal forest blocks in Kanika Range.

**Flowering :** September-October.

**Fruiting :** October-December



**Family :** Loranthaceae

**Species :** *Dendrophthoe falcata* (L. f.) Etting.

**Local Name :** Malanga

**Occurrence :** Parasite on *Heritiera fomes* tree along Bhitarkanika river in Dangmal forest block, on a *Sonneratia apetala* tree along Ganjeikhia creek & also growing on *Excoecaria agallocha* tree in MPCA, Kansaridiha.

**Germination :** Non-viviparous.

**Distinguishing Features :** Parasitic branched shrub, midrib

red in young leaves, flowers orange in racemes, subtended by a single sub orbicular bract, petals 5.



**Family :** Bignoniaceae

**Species :** *Dolichandrone spathacea* (L. f.) K. Schum.

**Common Name :** Gosinga

**Occurrence :** Rare & restricted to Dangmal & Ragadapatia forest blocks in Kanika Range.

**Flowering :** November to March in Sundarbans. In Bhitarkanika May to June.

**Fruiting :** June to October in Bhitarkanika.

**Distinguishing Features :** Leaves pinnately compound,

leaflets 5.0 - 7.5 cm, seeds rectangular with corky wings, long tubed flower, young leaves often reddish.

**Family :** Cyperaceae

**Species :** *Fimbristylis ferruginea* (L.) Vahl

**Common Name :** Luni grass

**Occurrence :** Common in marshy places in brackish water zones of Bhitarkanika forest block in Kanika Range.

**Flowering & Fruiting :** July to November.



**Family :** Asclepiadaceae

**Species :** *Finlaysonia obovata* Wall.

**Common Name :** Khasai Lata

**Occurrence :** Uncommon in Bhitarkanika & Dangmal forest blocks.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** November to April

**Distinguishing Features :**

Parasitic with succulent lanceolate to ovate leaves, large evergreen climber having leaves opposite, exudes milk, flowers white or purple, corolla densely hairy inside, seeds obovoid.

**Family** : Flagellariaceae

**Species** : *Flagellaria indica* L.

**Common Name** : Bahumruga

**Occurrence** : Common but restricted to Dangmal & North Mahisamada forest blocks in Kanika Range.

**Germination** : Non-viviparous.

**Flowering** : February to August in Bhitarkanika.

**Fruiting** : April to October.

**Distinguishing Features** : Tall herb, often climbing, drupe globose with a produced base turning pinkish red on maturity.



**Family** : Boraginaceae

**Species** : *Heliotropium curassavicum* L.

**English Name** : Salt heliotrope

**Occurrence** : Restricted in hyper saline areas, prefers to grow in open places especially on aquaculture gherry bonds in Mahakalapada Range and also in Bhitarkanika.

**Germination** : Non-viviparous.

**Flowering &** : March to January

**Fruiting** :

**Distinguishing** : Ascending herb with long tap

**Features** : root. Leaves lanceolate, shallowly retuse, fleshy and silvery. Flowers white in terminal, unilateral spikes. Fruit globose.

**Family :** Malvaceae

**Species :** *Hibiscus tiliaceus* L.

**Common Name :** Bania

**Occurrence :** Abundant in Kanika Range, common in Rajnagar Range and uncommon in Mahanadi delta.

**Germination :** Small seeded without viviparous germination.

**Flowering :** In Bhitarkanika, November to January.

**Fruiting :** December to March in Bhitarkanika.

**Distinguishing Features :** Evergreen shrub, epicalyx present, petal light yellow, yellow-white longitudinal veins upward, crimson eye spot at base on inner-side of flowers, stigma pink yellow, initially yellow turning to red later on.



**Family :** Asclepiadaceae

**Species :** *Hoya parasitica* (Roxb.) Wall

**Common Name :** Hoya

**Occurrence :** Restricted to Bhitarkanika forest block in Kanika Range.

**Germination :** Non-viviparous.

**Distinguishing Features :** Large epiphytic climber, leaves

broadly elliptic-oblong, fleshy, glabrous, yellowish green, grows on old trees.

**Family :** Anacardiaceae

**Species :** *Lannea coromandelica* (Houtt.) Merr.

**Common Name :** Mahi

**English Name :** Indian Ash Tree

**Occurrence :** Common in Mahanadi delta and Bhitarkanika.

**Germination :** Non-viviparous.

**Flowering &** March to June.

**Fruiting :**

**Distinguishing Features :** Moderate sized tree, leafless prior to flowering. Leaves 10-25 cm long, clustered at the ends of thick branchlets; leaflets 5-9 or more, oblique at base, puberulous beneath. Flowers small, yellowish green, dioecious, fascicled on the rachis of numerous racemes crowded towards the ends of leafless branchlets. Drupes red, compressed.



**Family :** Rutaceae

**Species :** *Merope angulata* (Willd.) Swingle

**Common Name :** Bana lembu

**Occurrence :** Rare & restricted to Dangmal & Bhitarkanika Forest Blocks in Kanika Range and fairly common in Jamboo, Kansaridiha & Hetamundia blocks in Mahanadi delta.

**Germination :** Non-viviparous.

**Flowering :** April to May.

**Fruiting :** June to September.

**Distinguishing Features :** Flowers white, fruits triangular

**Features :** in section, 2 to 3 cm large, long flattened seeds, shrubby tree with paired spines.

**Family :** Fabaceae

**Species :** *Mucuna gigantea* (Willd.) DC.

**Common Name :** Luna Baidanka

**English Name :** Sea Bean

**Occurrence :** Restricted to Khola and Bhitarkanika forest blocks.

**Germination :** Large seeded without vivipary.

**Flowering & Fruiting :** September to March.

**Distinguishing Features :** Woody perennial twiner. Leaflets ovate-elliptic, acuminate, glabrous, lateral leaflets in equilateral. Flowers in umbelliform corymbs. Corolla greenish-yellow. Pods winged on both sutures, covered with yellowish-brown irritant bristles. Seeds 2-6 per pod, hilum extending round more than half the edge.



**Family :** Pandanaceae

**Species :** *Pandanus fascicularis* Lam.

**Common Name :** Ketaki kia

**Occurrence :** Restricted to Bhitarkanika forest block in Kanika Range.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** March to November.

**Distinguishing Features :**

Male inflorescence sweet-scented, fruiting carpels without an apical prickle.



**Family :** Pandanaceae

**Species :** *Pandanus foetidus* Roxb.

**Common Name :** Luni kia

**Occurrence :** Common in Khola creek, few in Dangmal forest block in Kanika Range.

**Germination :** Non-viviparous.

**Flowering :** November to January.

**Fruiting :** April to June.

**Distinguishing Features** : Much branched, male

**Features** : inflorescence foetid, fruiting carpels with an apical prickle.



**Family :** Fabaceae

**Species :** *Pongamia pinnata* (L.) Pierre

**Common Name :** Karanja

**Occurrence :** Frequently grow in fresh water zones along the creeks in Kanika & Rajnagar Range.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** April to August. Pods hang up in trees upto December.

**Distinguishing Features** : Evergreen, leaves broadly ovate

**Features** : with acute tip, fruit flattened but thick with blunt tip.



**Family :** Salvadoraceae

**Species :** *Salvadora persica* L.

**Common Name :** Miriga

**Occurrence :** Abundant all over the Park, more in Dangmal forest block.

**Germination :** Non-viviparous.

**Flowering :** February to April.

**Fruiting :** March to June.

**Distinguishing** Small evergreen tree, leaves

**Features** : elliptic-oblong, flowers greenish white, 1.8 mm long, calyx lobes rounded.



**Family :** Euphorbiaceae

**Species :** *Sapium indicum* Willd.

**Common Name :** Ghigidi

**Occurrence** : Common along khola creek near Khola checkgate, also in Dangmal forest block.

**Germination** : Non-viviparous.

**Distinguishing** Leaves alternate,

**Features** : lanceolate-oblong, exudes white latex, seeds ovoid, dark brown.

**Family :** Solanaceae

**Species :** *Solanum trilobatum* L.

**Common Name :** Nabhiankuri

**English Name :** Purple fruited Pea Egg Plant

**Occurrence :** Hinterlands of coastal areas beyond tidal reach, more in Hetamundia, Kantilo, Krushnapriyapur forest blocks.

**Germination :** Non-viviparous.

**Flowering &** Throughout the year.

**Fruiting :**

**Distinguishing Features :** Prickly climbing much branched shrub with sharp recurved prickles. Leaves hastately 3-lobed with stellate hairs; petiole prickly. Flowers purple blue, in few flowered terminal cymes. Berry globose, turned red on maturity.



**Family :** Tamaricaceae

**Species :** *Tamarix dioica* Roxb.

**Common Name :** Jagula

**Occurrence :** Grows on riverbank flat land in the saline soil above tidal zones as in Satabhaya & Dangmal.

**Germination :** Non-viviparous.

**Flowering &** July to October.

**Fruiting :**

**Distinguishing** Leaves sheathing, apex

**Features :** acuminate, monoecious in short close cylindric spikes, white or pink, bracts triangular, capsules oblong, tapering.

**Family :** Tamaricaceae

**Species :** *Tamarix troupilii* H.

**Common Name :** Jagula

**Occurrence :** Commonly distributed in mangrove reclaimed areas at Dangmal & Satabhaya.

**Germination :** Non-viviparous.

**Flowering &** November to March.

**Fruiting :**

**Distinguishing** Leaves not sheathing, flowers

**Features :** bisexual, inflorescence in long slender spikes, sometimes in loose panicles, bracts spreading, presence of leaf scars, older trunks black brown, flower pink-violet.



**Family :** Combretaceae

**Species :** *Terminalia catappa* L.

**Common Name :** Pesta Badam

**Occurrence :** Common in fringe area around the Park.

**Germination :** Non-viviparous.

**Flowering &** December to April.

**Fruiting :**

**Distinguishing** Female flowers at base and

**Features :** male flowers distally, fruits of almond shaped develop in clusters at the base of the spike.

**Family :** Malvaceae

**Species :** *Thespesia populnea* (L.) Sol. ex Corr.

**Common Name :** Habali

**Occurrence :** Common in Kalibhanjdia block and also along the periphery of the National Park.

**Germination :** Small seeded without viviparous germination.

**Flowering :** November to March in Sundarbans, in Bhitarkanika, November to January.

**Fruiting :** In Bhitarkanika, December to February.

**Distinguishing Features :** Commonly grow above tidal zones, leaves deeply cordate, pedicels erect, 1-5 cm long with a bracteole joint very near the base, seeds with long soft hair.



**Family :** Asclepiadaceae

**Species :** *Tylophora indica* (Burm. f.) Merr.

**Common Name :** Anantamula

**Occurrence :** Restricted to sandy areas in Barunei-Gahirmatha forest block near Dobandhi.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** November to March.

**Distinguishing Features :** Stems twining, more or less pubescent, flowers 10-15mm across, follicles 2, lanceolate, smooth, produced into an angular beak.

**Family :** Asclepiadaceae

**Species :** *Tylophora tenuissima* (Roxb.)  
Wt. & Arn. ex Wt.

**Common Name :** Anantamula

**Occurrence :** Rare & restricted to Bhitarkanika forest block & Kharnasi block in Mahanadi delta.

**Germination :** Non-viviparous.

**Flowering &** November to March.

**Fruiting :**

**Distinguishing** Slender twining herb,

**Features :** stems twining & glabrous, leaves ovate-elliptic, flowers purplish brown, 3-4 mm across, follicles linear- lanceolate



## BEACH FLORA

**Family :** Fabaceae

**Species :** *Canavalia maritima* (Aubl.) Thouars

**Occurrence :** Sandy beaches of Ekakuia.

**Germination :** Non-viviparous.

**Distinguishing Features :** Prostrate herbs, stems with white silky hairs, leaflets orbicular & silky when young, flowers pink, pods straight, 4-6 seeded.



**Family :** Cyperaceae

**Species :** *Cyperus arenarius* Retz.

**Common Name :** Luni Mutha

**Occurrence :** Frequent on sand dunes on the sea coast in Barunei-Gahirmatha forest block.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** July to November.

**Distinguishing Features :** Small herb with wiry creeping rootstock. Leaves terete and fleshy, often recurved; sheaths inflated, strongly striate at base. Spikelets crowded in a single terminal globose head, pale finally brown. Stamens 3; anther tip red. Nut black, unequally trigonous.

**Family :** Rubiaceae

**Species :** *Hydrophylax maritima* L. f.

**Occurrence :** Sandy beaches beyond tidal reach at Babubali, Dobandhi.

**Germination :** Non-viviparous.

**Distinguishing** Succulent herb with long creeping

**Features** : stems, leaves fleshy, ovate-elliptic, flowers lilac, fruit oblong-ovoid.



**Family :** Convolvulaceae

**Species :** *Ipomoea pes-caprae* (L.) R. Br.

**Common Name :** Kansarilata

**Occurrence** : Prostrate creeping herb, common in Ekakula, Babubali islands in Bhitarkanika & also in Mahanadi delta along the beach facing sea beyond tidal reach.

**Germination** : Non-viviparous.

**Flowering & Fruiting** : Post monsoon & winter, October to February.

**Distinguishing** Leaf apex bifurcate, flower 5.5 cm

**Features** : long x 3.0 cm across, spine at the base of filament, fruit capsule with persistent large calyx, reddish at margin, sepals-5, 3 inner large, 2 outer small, petals- 5, violet at base.





**Family :** Asteraceae

**Species :** *Launaea sarmentosa* (Willd.) Schultz-Bip.  
ex Kuntze

**English Name :** Beach Launaea

**Occurrence :** Common in sandy soil along the coast near Beacon Point of Mahanadi delta and also in Dobandhi and Babubali.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** March to November

**Distinguishing Features :** Perennial, prostrate, stoloniferous herb, rooting at each rosette. Leaves pinnatifid-sinuate, margins denticulate, base attenuate. Peduncles 1-3 cm long. Florets yellow.



**Family :** Poaceae

**Species :** *Spinifex littoreus* (Burm.f.) Merr.

**Common Name :** Rabana

**English Name :** Littoral spine grass

**Occurrence :** Frequent in coastal sands near Hetamundia, Barunei-Gahirmatha forest blocks.

**Germination :** Non-viviparous.

**Flowering & Fruiting :** September to February.

**Distinguishing Features :** Stout, bushy grass with long, rigid, 10-15 cm long, squarrose, recurved, margins serrulate. Male heads sessile at the angles of zigzag rachis. Spikelets 1 cm long, glabrous. Female heads upto 32 cm diameter. Female spikelets 1-1.2 cm long, partly sunken in the base of needle like rachis which is supported by distichous bracts.

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<i>Bruguiera cylindrica</i>	13	<i>Pentatropis capensis</i>	33
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<i>Bruguiera parviflora</i>	14	<i>Phragmites karka</i>	34
<i>Bruguiera sexangula</i>	15	<i>Pongamia pinnata</i>	49
<i>Caesalpinia bonduc</i>	41	<i>Porteresia coarctata</i>	34
<i>Caesalpinia crista</i>	41	<i>Rhizophora apiculata</i>	20
<i>Canavalia maritima</i>	55	<i>Rhizophora mucronata</i>	21
<i>Cerbera odollam</i>	28	<i>Rhizophora stylosa</i>	21
<i>Ceriops decandra</i>	15	<i>Salacia prinoides</i>	35
<i>Ceriops tagal</i>	16	<i>Salicornia brachiata</i>	35
<i>Clerodendrum inerme</i>	28	<i>Salvadora persica</i>	50
<i>Crinum defixum</i>	42	<i>Sapium indicum</i>	50
<i>Cynometra iripa</i>	29	<i>Sarcolobus carinatus</i>	36
<i>Cynometra ramiflora</i>	29	<i>Sarcolobus globosus</i>	36
<i>Cyperus arenarius</i>	55	<i>Scirpus litoralis</i>	37
<i>Cyperus conglomeratus</i>	42	<i>Sesuvium portulacastrum</i>	37
<i>Cyperus corymbosus</i>	42	<i>Solanum trilobatum</i>	51
<i>Dalbergia candenatensis</i>	30	<i>Sonneratia alba</i>	22
<i>Dalbergia spinosa</i>	30	<i>Sonneratia apetala</i>	22
<i>Dendrophthoe falcata</i>	43	<i>Sonneratia caseolaris</i>	23
<i>Derris scandens</i>	31	<i>Sonneratia griffithii</i>	23
<i>Derris trifoliata</i>	31	<i>Spinifex littoreus</i>	57
<i>Dolichandrone spathacea</i>	43	<i>Suaeda maritima</i>	38
<i>Excoecaria agallocha</i>	16	<i>Suaeda monoica</i>	38
<i>Fimbristylis ferruginea</i>	44	<i>Suaeda nudiflora</i>	39
<i>Finlaysonia obovata</i>	44	<i>Tamarix dioica</i>	51
<i>Flagellaria indica</i>	45	<i>Tamarix troupii</i>	52
<i>Heliotropium curassavicum</i>	45	<i>Terminalia catappa</i>	52
<i>Heritiera fomes</i>	17	<i>Thespesia populnea</i>	53
<i>Heritiera kanikensis</i>	17	<i>Trianthema portulacastrum</i>	39
<i>Heritiera littoralis</i>	18	<i>Tylophora indica</i>	53
<i>Hibiscus tiliaceus</i>	46	<i>Tylophora tenuissima</i>	54
<i>Hoya parasitica</i>	46	<i>Xylocarpus granatum</i>	24
<i>Hydrophylax maritima</i>	56	<i>Xylocarpus mekongensis</i>	24
<i>Intsia bijuga</i>	32	<i>Xylocarpus moluccensis</i>	25





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