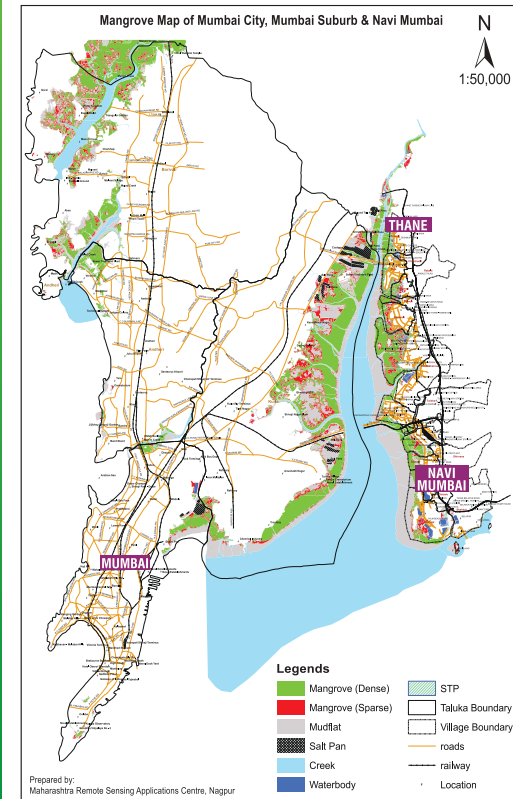


MAP OF MANGROVES IN GREATER MUMBAI



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 This field guide has been conceptualized and issued in public interest by United Way Mumbai with support from J.P. Morgan Chase.
 Developed and designed by Ladybird Environmental Consulting LLP.
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MANGROVE BIRDS

1. Common Sandpiper (*Actitis hypoleucos*)

Winter migrant from Europe & Asia, first to come and last to leave. Shows a distinctive 'teetering' behaviour, in which the head and the tail are constantly bobbed up and down. Feeds on insects, snails, crabs, shrimps, fish, and worms. Threatened due to loss of habitat.

LEAST CONCERN 21 cm.



2. Grey Heron (*Ardeacinerea*)

Resident bird found along the marshes on sea coast. Adult develops bright pinkish-yellow bill during breeding season. Feeds on fish, amphibians, small mammals and insects.



LEAST CONCERN 90-100 cm.

3. White-Throated Kingfisher (*Halcyon smyrnensis*)

Seen around water bodies among mangroves as well forests. Feeds on insects, snails, crabs, shrimps, earthworms, fish, amphibians, and reptiles. Hunts from a perch and batters the prey before swallowing it. Threatened due to loss of habitat.

LEAST CONCERN 28 cm.



4. Brahminy Kite (*Haliastur indus*)

Raptor mainly seen along the coast. Could be identified in flight from chestnut brown body, white head and round tail. Opportunistic scavenger, feeds on offal, fish, frogs, small snakes and bats.



LEAST CONCERN 48 cm.

5. Black-Winged Stilt (*Himantopus himantopus*)

Seen among waterbodies of disturbed habitat. Feeds on aquatic insects, snails, crabs, shrimps, amphibians, small fish, and occasionally seeds. Threatened due to loss of habitat.

LEAST CONCERN 25 cm.



6. Black-Headed Gull (*Larus ridibundus*)

Winter visitor from Central Asia, seen in large numbers hovering around shores. Bold and opportunistic feeder. Develops brown head during summer, white in winter. Feeds on fish, insects, worms, scraps etc. Threatened due to oil spills, bird flu, egg collection and shore pollution.

LEAST CONCERN 43 cm.



7. Little Cormorant (*Microcarbo niger*)

Duck like bird often seen on the shore with their wing spread open for drying. Feeds exclusively on fish which it chases and captures under water. Excellent diver. Flocks occasionally hunts in concert.

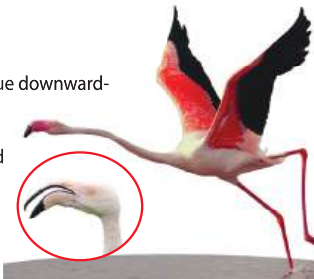


LEAST CONCERN 51 cm.

8. Greater Flamingo (*Phoenicopterus roseus*)

Winter migrant from Gujarat. Unique downward-bending filtering beak. Gets the pink colour from their food. Feeds on small crabs, shrimps, worms and minute animals. Threatened due to loss of habitat.

LEAST CONCERN 140 cm.



7. White-Eared Bulbul (*Pycnonotus leucotis*)

Gets its common name due to the white patch on its face. Prefers drier habitats. Seen in flocks or pairs in mangroves, where it feeds on *Salvadora persica* berries.



LEAST CONCERN 20 cm.

10. Black-Headed Ibis (*Threskiornis melanocephalus*)

Unusual large bird that could be identified from its black bald head and long curvy beak. Produces no calls. Feeds on frogs, tadpoles, snails, insects and worms. Threatened due to hunting or disturbance at breeding sites and loss of habitat to agriculture.

LEAST CONCERN 75 cm.



MANGROVE REPTILES

1. Common Garden Lizard (*Calotes versicolor*)

Tree dwelling lizard with prominent crest on body. Feeds mainly on insects and small animals. Male become highly territorial and gets a bright red patch on its throat in the breeding season.

LEAST CONCERN 37 cm.



2. Common Rat Snake (*Ptyas mucosus*)

Agile nonvenomous snake. Feeds on lizards, young birds and rodents. Good climber, swimmer and diver. Noted for its combat dance between males, during which they entwine around each other and stand erect with half of the bodies off the ground.



LEAST CONCERN 2 m.

3. Common Monitor Lizard (*Varanus bengalensis*)

Large lizard with long forked tongue. Feeds on crabs, insects, young birds, and eggs. Threatened due to hunting for food, for its fat which is used for medicinal purposes, and for its skin which is sold commercially. Also protected under the Schedule 1 of the Wildlife Protection Act.

LEAST CONCERN 175 cm.



4. Little File Snake (*Acrochordus granulatus*)

Unique nonvenomous snake with loose skin and rough texture that helps in holding the prey tight; hence the common name. Inhabits creeks and estuaries and shallow sea. Feeds on gobby fish, mudskippers, crustaceans and snails. Female gives birth to live young.



LEAST CONCERN 60-120 cm.

5. Dog-Faced Water snake (*Cerberus rynchops*)

Nonvenomous snake often seen anchored by its prehensile tail waiting for the fish. Known to flick its tail to frighten fish and drive it towards its head to catch. Climbs on lower branches of mangrove. Female gives birth to live young. Threatened due to past skin trade.

LEAST CONCERN 120 cm.



MANGROVE AND MAN

Threats to Mangroves

More than 35% of the world's mangroves are already gone and India has lost around 50% of its mangrove cover. These are the affecting factors:

- Clearing of mangrove forests for farming, fishing and infrastructure projects.
- Overharvesting of mangrove forest produce.
- Change in water salinity and increased soil erosion.
- Pollution due to untreated industrial effluents and oil spills.
- Increased sea levels due to climate change.



Conservation of Mangroves

A legislative framework for the conservation and management of mangroves is already in place. Enforcement of the legislative mandates is a prime need. Here is the list:

- Indian Forest Act, 1927 & Wildlife (Protection) Act, 1972
- Forest Conservation Act, 1980
- Environment (Protection) Act, 1986
- Mangrove Cell of Forest Dept.

As part of mangrove conservation, the Govt. and civil bodies have undertaken following tasks:

- Mapping of mangrove habitats
- Reforestation of mangrove habitats
- Declaration of Mangrove Protected Areas
- Establishment of Mangrove Interpretation Centres.



How you could help?

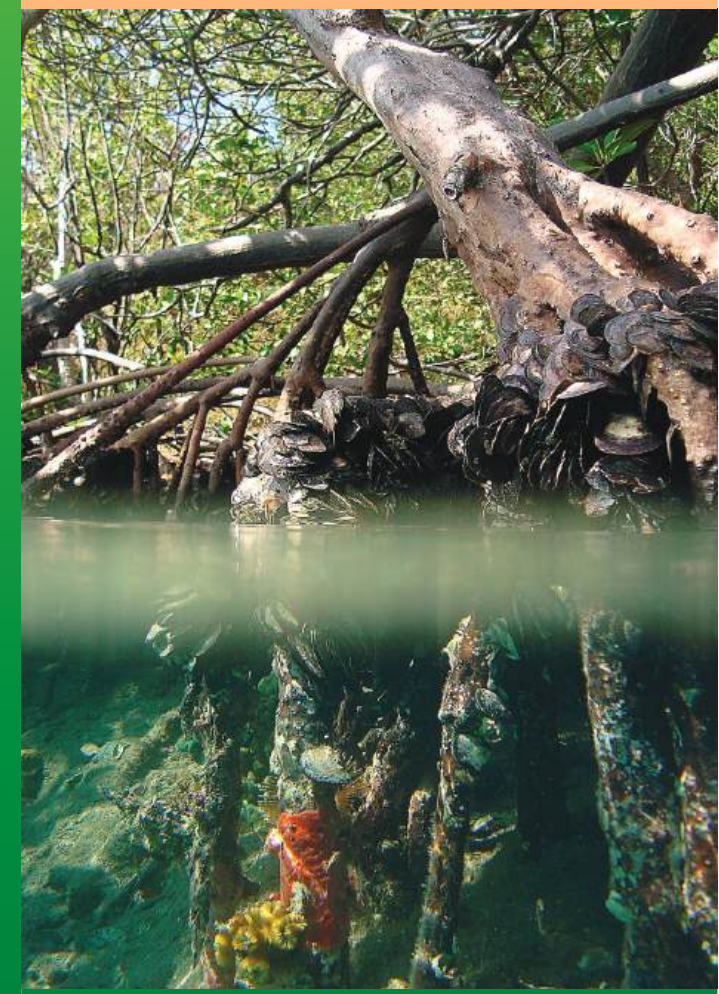
- Report cutting of mangroves to your nearest police station.
- Don't buy your house on reclaimed area.
- Participate in Mangrove Plantation Drives.
- Participate in mangrove walks.
- Visit Mangrove Centers at Vikroli and Airoli.

MANGROVE HELPLINE: Hello Forest (Toll Free): 1926

Mission Mangroves aims to educate citizens on the importance of mangroves plantation and maintain more than 1,00,000 mangroves and restore more than 20 hectares of degraded wetlands through public private partnership.

A FIELD GUIDE TO MANGROVE ECOSYSTEM OF GREATER MUMBAI

This unique field guide on mangrove ecosystem covers 40 species of flora and fauna found among the mangroves of Greater Mumbai.



Under the aegis of Initiative of In collaboration

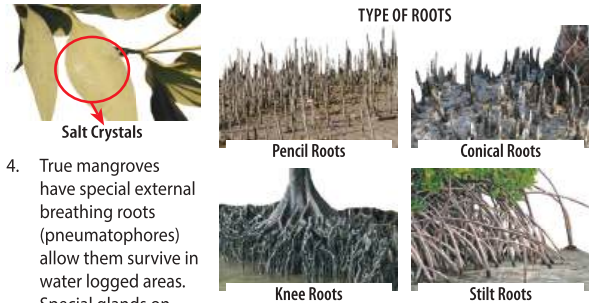


TOP TEN FACTS ABOUT MANGROVES

Sundarban is the largest Mangrove forest in the world and home to the endangered Royal Bengal Tiger. It is also declared as a World Heritage Site by UNESCO.



- Greater Mumbai has 4865 hectares stretch of mangroves and 11 species of mangroves from wetlands around Mumbai.
- Mangroves are group of salt tolerant plants that grows in the intertidal regions of coastlines.
- Mangrove is derived from the Portuguese word 'mangue' meaning assemblage of plants which later got corrupted to mangrow and then mangrove.



TYPE OF ROOTS

- True mangroves have special external breathing roots (pneumatophores) allow them survive in water logged areas. Special glands on their leaves help them to remove excess salt.
- Mangrove associates are those plants which grow among mangroves but do not have special roots and leaves.
- Mangroves could be categorized into Front; Intermediate and Back species depending on their closeness to sea or land.
- Viviparity is known in some mangroves where the seeds develop into new seedlings while still attached to the mother plant.
- Protects coast line from soil erosion thus maintaining the land-sea barrier, act as wave and wind breaker reducing impact of floods.
- Provides food, shelter and breeding ground for several marine animals. Act as air purifiers; water purifier and carbon sink.
- Provide food, fuel, income for fishing communities and ecotourism opportunities.

We have listed 10 mangrove species. All species marked with red box are threatened due to habitat loss.



KNOW YOUR MANGROVES

TREES

1. River Mangrove (*Aegiceras corniculatum*)

Intermediate mangrove common along the sheltered intertidal banks of creeks and channels. Used as vegetable, medicine, fish poison and dye. Prominent stilt roots. Pollinated by bees, source of honey.



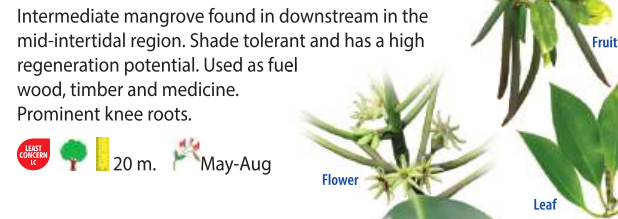
2. Grey Mangrove (*Avicennia marina*)

Intermediate mangrove that dominates intertidal zone. Pioneer in colonizing newly formed mudflats. Tolerates shade and high salinity. Used as fodder, fuelwood, timber and medicine. Host plant of Mangrove Moth. Pencil like roots. Fruit edible.



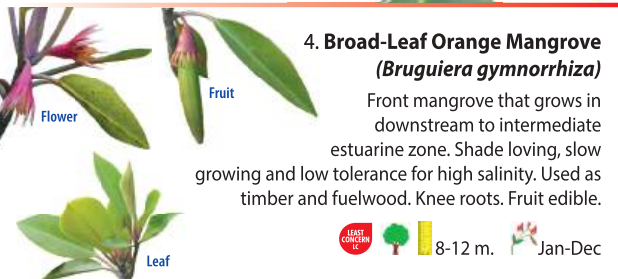
3. White Burma Mangrove (*Bruguiera cylindrica*)

Intermediate mangrove found in downstream in the mid-intertidal region. Shade tolerant and has a high regeneration potential. Used as fuel wood, timber and medicine. Prominent knee roots.



4. Broad-Leaf Orange Mangrove (*Bruguiera gymnorrhiza*)

Front mangrove that grows in downstream to intermediate estuarine zone. Shade loving, slow growing and low tolerance for high salinity. Used as timber and fuelwood. Knee roots. Fruit edible.



5. Milk Mangrove (*Excoecaria agallocha*)

Back mangrove growing along land end, often exploits open areas and is tolerant of disturbed areas. Used for furniture, ornaments and as fish poison. Extensive cable roots. Milky sap of leaves could cause temporary blindness, if it enters in eyes. Tiny male and female flowers grow on separate trees, pollinated by bees.



6. Tall-Stilt Mangrove (*Rhizophora apiculata*)

Intermediate mangrove growing in the mid-intertidal region. Hardy and fast-growing species. Used as medicine, fuel wood, timber, fodder and dye. Distinct stilt roots.



7. Red Mangrove (*Rhizophora mucronata*)

Intermediate mangroves grows in the upstream estuarine zone, but more towards sea side. Hardy, easily propagated and fast-growing species. Used as timber, fuelwood, fodder and also used for charcoal production. Prominent stilt roots. Seeds start to develop while still attached to the tree.



8. Sonneratia Mangrove (*Sonneratia apetala*)

Front mangrove that grows in the upstream estuarine zone. First mangrove species to colonize newly formed mudflats. Fast-growing and hardy plant used in reforestation programmes. Used as timber, fodder and food. Conical roots. Pollinated by bees.



SHRUBS

9. Sea Holly (*Acanthus ilicifolius*)

Aquatic plant locally common on the river banks or tidal canal sides or low swampy areas of mangrove forests. Indicator of degraded habitat. Used for medicinal purpose. Stem base with stilt roots. Pollinated by bees.



MEET MANGROVE ASSOCIATES

10. Tooth Brush Tree (*Salvadora persica*)

Seen growing on the edges of mangrove forests towards the land end. Used as natural toothbrush. Seed oil used in soaps. Host plant of Small Salmon Arab butterfly. Ripe berries attract birds, sweet to taste and slightly narcotic.



MANGROVE MARINE LIFE

1. Striped Barnacle (*Balanus sp.*)

Shelled animals related to prawns and crabs. Inhabits rocky shores of coastal and estuarine environment where they are found fixed on hard surfaces. Dominant species that damage ship hulls. Feeds on small marine animals during high tide and remain closed during low tide.



2. Blue-spotted Mudskipper (*Boleophthalmus boddarti*)

Lives in brackish water of estuaries and freshwater tidal zone; often found in mangroves. Occurs in burrows and is often found on mudflats. Air breathing fish that has ability to walk and climb. Threatened due to estuarine pollution.



3. Indian White Prawn (*Fenneropenaeus indicus*)

Inhabits mud or sandy bottom from 2-90 m deep. Non-burrowing and active in both day and night. Young shrimps migrate to estuaries, where they grow and return to the sea for breeding. Major commercial prawn species.



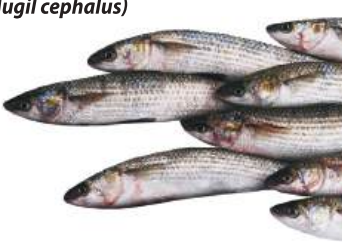
4. Ring-Legged Fiddler Crab (*Gelasimus annulipes*)

Small crab with males having one enlarged brightly coloured claw. Seen during low tides on mudflats. Males perform dance waving their claw to attract mate and establish their territories.



5. Flathead Grey Mullet (*Mugil cephalus*)

Diurnal coastal species that often enters estuaries and rivers. It usually schools over sand or mud bottoms, feeding on zooplankton. It can tolerate different levels of salinity. Sold as seafood.



6. Mantis Shrimp (*Oratosquilla sp.*)

Most important predators in many shallow tropical marine habitats. Flattish body with legs adapted for feeding and hunting. Gets its common name due to its mantis-like arms and eyes. Powerful claws are used to attack and kill prey by spearing, stunning or cutting. Active during dusk/dawn.



7. Blue Swimmer Crab (*Portunus pelagicus*)

Inhabits sandy and sand-muddy depths in shallow waters between 10 to 50 m depth in marshy areas. Voracious predator. Feeds on shells, fish, other small crabs, shrimps, and algae. Excellent swimmer as last pair of legs are flat and paddle-like. Sold as seafood.



8. Giant Mud Crab (*Scylla serrata*)

Inhabits muddy bottoms, mangrove marshes, and river mouths in estuarine environments. Digs deep burrows. Migrates offshore (up to 50 km) to spawn. Feeds on snails and prawns. Adults remain buried at day, emerging at sunset and night to feed. Sold as sea food.



9. Blood Cockle (*Tegillarca granosa*)

Thick-shelled, strongly ribbed clam with white inner side. Prefers intertidal zone where it burrows down into the sand or mud. It gets its name from the red haemoglobin that is present in its body. Bottom filter feeder and feeds on organic detritus.



10. Telescope Snail (*Telescopium telescopium*)

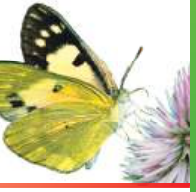
Large snail with tall conical shell. Seen among the mangroves on muddy banks. Herbivore mainly feeding on algae and can stay out of water for a long time. Used as food in certain areas of Southeast Asia.



MANGROVE INSECTS

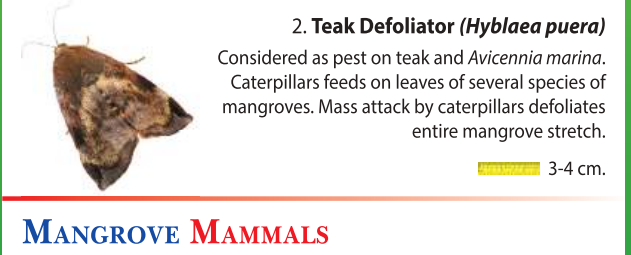
1. Small Salmon Arab (*Colotis amata*)

Common butterfly seen in mangroves. Lays eggs on *Salvadora persica*. Caterpillar is green with white stripe on the back and seen feeding in groups on the undersides of the leaves.



2. Teak Defoliator (*Hyblaea pueria*)

Considered as pest on teak and *Avicennia marina*. Caterpillars feeds on leaves of several species of mangroves. Mass attack by caterpillars defoliates entire mangrove stretch.



MANGROVE MAMMALS

1. Indian Jackal (*Canis aureus indicus*)

Typical dog-like with a bushy tail. Greyish brown with a mix of black and white. Seen among mangroves, active from dusk till dawn. Usually seen in pairs. Mainly scavenger, feeds on crabs, dead fish, rodents, reptiles, insects and even berries.



2. Indian Grey Mongoose (*Herpestes edwardsii*)

Commonly seen carnivore in mangrove areas and in human habitation close to the shore. Feeds on rodents, birds eggs and hatchlings, snakes, lizards, crabs, fish and insects. It has immunity against snake venom.



3. Indian Wild Boar (*Susscrofa cristatus*)

Males have tusk and a mane on their back. Highly adaptable and social animal. Live in female-dominated groups. Seen among mangroves feeding on berries, snails, fish, rodents, bird eggs, lizards, snakes and carrion.

