

Introduction to the Coastal and Marine Biodiversity of Maharashtra

Isaac Kehimkar

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Federal Ministry for the
Environment, Nature Conservation,
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of the Federal Republic of Germany

Flock of Flamingos at Thane
Creek Flamingo Sanctuary

SUPRIYA JHUNJHUNWALA





FOREWORD

Appropriately named *Maha* 'Great' and *Rashtra* 'Nation', Maharashtra is not only India's economic powerhouse but also a biodiversity treasure trove. Our diverse and beautiful forests, coasts, grasslands, and wetlands are life support systems for millions of Maharashtrians and the bedrock of Maharashtra's economic growth and ecological security.

Maharashtra is famed for its Konkan coast with unspoilt beaches, unrivalled hospitality, and unsurpassed wildlife. Our coastal communities have always lived and continue to live in harmony with Nature, drawing both sustenance and livelihood from it.

Our government and the Mangrove Cell, Maharashtra, in collaboration with the Conservation and Sustainable Management of Existing and Potential Coastal and Marine Protected Areas (CMPA) Project by the Indo-German Biodiversity Programme (GIZ) has made many valuable contributions to conserving this natural heritage, with support from local communities.

The CMPA Project has also expanded our current network of protected areas through the addition of one new sanctuary and two biodiversity heritage sites.

I convey my congratulations to the author and the GIZ team in Maharashtra, who have put together this invaluable and informative guide to Maharashtra's coastal and marine heritage.

Vikas Kharge

Secretary (Forests)

Revenue and Forest Department, Maharashtra State



FOREWORD

Maharashtra's stunning natural beauty and diversity is a symbol for the union of nature, culture and history. The Konkan coast of Maharashtra with its pristine beaches and verdant mangrove forests, has provided a fertile ground for community based efforts for conservation. Three sites of the CMPA project are located on this coastal belt, home to rich biodiversity, including the planet's largest mammal, the blue whale.

We value our partnership with the Maharashtra Government, Forest Department and Mangrove cell to conserve this outstanding biological heritage of Maharashtra's coasts through the Conservation and Sustainable Management of Existing and Potential Coastal and Marine Protected Areas (CMPA) Project. The Project is supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB).

We thank Mr. Kharge, Secretary (Forests) Revenue and Forest Department, Maharashtra State for his invaluable support and advice, and congratulate Mr. Vasudevan APCCF, Mangrove Cell Maharashtra, and the nodal officer for the CMPA project for his success in not just conserving but increasing Maharashtra's mangrove cover.

This book is an informative introduction to the coastal and marine biodiversity of Maharashtra, and I congratulate the author Mr. Isaac Kehimkar for capturing Maharashtra's astounding natural heritage so aesthetically. I would also like to commend the efforts of the GIZ Advisers for Maharashtra, Ms. Supriya Jhunjunwala and Advisor for Goa, Dr. Aaron Lobo for making this publication possible.

Dr. Konrad Uebelhör

Director

Indo-German Biodiversity Programme

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Olive Ridley sea turtle hatchling at Velas



COASTAL MAHARASHTRA

Introduction

Blessed with varied physical features and climate, Maharashtra, the third largest state of India, has rich and diverse plant and animal life. To the west of the state is the Arabian Sea with a 720 km coastline, and running north to south, parallel to the coast, is the mountain range of the Western Ghats, separating the Deccan plateau from a narrow coastal plain along the Arabian Sea. The coastal region of Maharashtra state is popularly known as Konkan. The entire Konkan region is hilly, narrow, dissected with transverse ridges of the Western Ghats ranges on its east. At many places along the coast there are extending rocky projections, notches, sea caves, small bays, submerged shallow sand bars, and offshore islands. The upper limits of the coastline are lined by the coastal plateaus.

Depending on the geography and climate, both plant and animal life vary accordingly. The diversity of animal life in the area is also directly related to the abundance and diversity of plant life. Rainfall is the major factor that affects vegetation, besides other factors. Because of the Western Ghats, the coastal area gets the maximum rainfall from the southwest monsoon, hence the vegetation here is most luxuriant and diverse. All these factors make this area a biodiversity hotspot with an array of invertebrates, fishes, amphibians, reptiles, birds, and mammals.

Konkan (coastal Maharashtra) is a narrow coastal belt, about 720 km from north to south and about 50 km wide. This strip is sandwiched between the Arabian Sea to the west and the Western Ghats ranges to the east. The area receives 2,000 to 3,000 mm of rainfall annually. The six districts in this coastal region are Palghar, Thane, Greater Mumbai and Mumbai suburban, Raigad, Ratnagiri, and Sindhudurg. Of the 720 km long coast, Greater Mumbai district covers approximately 114 km, while Thane along

with Palghar district has 127 km, Raigad district has 122 km, Ratnagiri district has 237 km, and Sindhudurg district has 120 km.



TYPES OF COASTS IN MAHARASHTRA

A coastline or seashore is the area where the land meets the sea. The term coastal zone means a region where there is an interaction of the sea and land forms. Seashores of Maharashtra could be broadly classified as given below:

Sandy beach

Sandy shores or beaches are areas where loose deposits of sand, gravel, and shells cover the shoreline. Beaches act as buffers or shock absorbers that protect the coast from direct wave action. This region is very dynamic, as sand, water, and air are always being moved about here by the sea waves and wind. Sandy shores are formed by deposition of particles carried by water currents from other areas. Shores are formed from transported material, partly from the erosion of shores, but mostly of material from the land which the rivers bring to the sea. Mainly, beach material is of two types, one is quartz or silica sand that is brought from the land and the other is the carbonate sand from the sea. Carbonate sand consists of broken and weathered pieces of shells, corals, and skeletons of sea animals. Also, heavy minerals such as basalt and feldspar are part of the sand. The size of sand



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grains varies from fine to very coarse. Maharashtra coast has mainly coarse gravel sandy beaches. Some beaches have high clay content that makes the beaches dark and tightly packed. Beaches also provide important coastal recreational areas for many people.

Rocky shores

All along the Maharashtra coast there are several pocket beaches flanked by rocky cliffs. Rocky shores seen along the coast are the outcrops of the foothills of the Western Ghats. Formed in between the sandy shores, they have characteristic “c” shaped bays. There



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are about 32 rocky shores along coastal Maharashtra, and they are mainly of laterite or basalt rock formations. Rocky shores are biologically rich, and are the perfect place to study intertidal ecology and other biological processes. Mainly oysters and barnacles are dominant here, besides some edible oysters. Rock pools with abundant algal growth support several life forms such as crabs, gobies, starfish, sea slugs, and shells.

Mangroves and mudflats

Mangroves are salt-tolerant shrubs or small trees that grow in coastal saline or brackish water. They grow along sheltered shores, estuaries, tidal creeks, backwaters, salt marshes and coastal mudflats. These plants have adapted to grow in saline water and on tightly packed clayey soil in the intertidal zone of marine coastal environments and estuarine margins. Mangroves are well-known for their role as nurseries for many species of fish and crustaceans, and thus they help to maintain the local abundance of fish and shellfish.

Twelve backwater regions are prominent along the coast of Maharashtra. All of these areas have mudflats and forested patches of mangrove plants and their associate vegetation.



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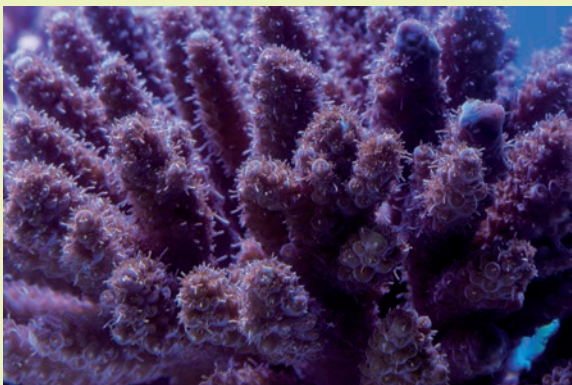


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Mudflats are formed mainly by siltation and are a highly productive ecosystem. The mudflats of Sewri in Mumbai host a large congregation of migratory waders and flamingos. Often mangroves take over vacant mudflats. These mudflats are still used to make salt commercially.

Coral reefs

Coral reefs are diverse marine ecosystems formed by calcium carbonate structures secreted by corals. Coral reefs are built by colonies of these tiny animals found in the sea. Most coral reefs are built from stony corals, which in turn



SAMEER KEHIMKAR



consist of polyps that cluster in groups. Corals secrete hard carbonate exoskeletons to protect the coral polyps. Coral reefs provide shelter to fish, molluscs, worms, crustaceans, echinoderms, sponges, tunicates, cnidarians, and other diverse marine life. Coral reefs occur in shallow depths, but deep water corals are also present on a smaller scale.

Coastal areas of Ratnagiri are known for the presence of patchy reefs along the shoreline. Malvan has the best secondary reef formations. Corals have been reported from Mumbai too.

Creeks

Creeks are inland brackish water wetlands seen along the coast. Along Maharashtra coast there are about 15 rivers, five major creeks, and 30 backwater regions. There are no major freshwater rivers or estuaries along the coast, but there are a few small rivers like Kundalika, Savitri, Vashishti, Shastri, and a few creeks like Vaitarna, Ulhas-Thane complex, Karanja-Dharmatar complex, Dabhol, Jaigad, Sakhartar, Bhatye, Purnagad, Vijaydurg, Devgad, Achra, and Karli. All these creeks and estuaries together form the drainage in east-west direction, flowing into the Arabian Sea. The mouths of these rivers and creeks are wide-open and funnel-shaped.



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INDO-GERMAN COOPERATION ON BIODIVERSITY

The Governments of India and Germany have fostered a partnership to enhance conservation of India's biodiversity in line with the objectives of the Convention on Biological Diversity (CBD). The partnership includes implementing projects in which protecting the environment takes center-stage in unison with the principle of sustainable development and enhancement of human well-being.

The CMPA Project

The CMPA project is a flagship project of the Indo-German technical cooperation supporting the CBD's Aichi targets. The project is funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). It is implemented by the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of BMUB.

The overall objective of the project is, "The conservation and sustainable use of biodiversity in the pilot protected areas are improved, taking into consideration the economic circumstances of the local population."

The project aims at conservation and management of potential marine protected areas in Maharashtra. The three main components of the CMPA project are participatory process, human capacity development, and communication and awareness. The Project intervenes at two levels in India: At the national level and at the level of selected federal states. It focuses on:

I: Participatory management

Participatory management processes are implemented in the pilot protected areas.

II: Capacity development

A capacity strengthening system for supporting participatory management of coastal and marine protected areas is developed for selected states and at national level.

III: Information, education and communication

Relevant stakeholders have information on and are aware of the importance of conserving biodiversity in marine and coastal areas.

CMPA sites in Maharashtra

A series of national and state level stakeholder consultations involving government representatives, researchers and NGOs resulted in the identification of three CMPA sites in Maharashtra. These are Thane Creek, Velas to Dabhol Coastal Stretch and Ansure Creek.

- Thane Creek: Thane Creek opens into Mumbai's harbour and extends over a distance of 26 km. Thane Creek supports a rich diversity of flora and fauna. It has been declared an Important Bird Area and a Wildlife Sanctuary.
- Velas to Dabhol coastal stretch: This 60 km coastal stretch, is located in the Ratnagiri district of Maharashtra. Habitats in the region include sandy beaches, rocky shores; mangroves, estuaries, coastal plateaus and moist deciduous forests on hill sides. Beaches along this coast have become popular due to sea turtle nesting sites and the efforts of local communities to conserve turtle nests.
- Ansure Creek: Ansure creek is located in the Ratnagiri district of Maharashtra. It is approximately 6.5 km long and 250-300 m wide. The creek harbors large mud flats and mangrove forests.

Site descriptions

1. Thane Creek

Thane Creek opens at the southwest approach to Mumbai's harbour and extends over a distance of 26 km. Thane Creek supports a rich diversity of flora and



fauna. It has been declared an Important Bird Area, and recently the entire stretch of 26 km of coastal mudflats in the northern area of Thane Creek between Airoli and Vashi bridges, situated in the midst of the bustling cities of Mumbai and Thane, was declared as a Wildlife Sanctuary in August, 2015 by the Government of Maharashtra.

The area is known for its rich mangrove ecosystem. Every year more than 30,000 flamingos visit this area during winter. More than 200 species of migratory birds, including threatened species like the Greater Spotted Eagle, visit this area. For this reason, it has been given the status of an Important Bird Area by BirdLife International.



With the special Mangrove Cell of the Forest Department, the Sanctuary management and development plans have been established and operationalized. An Interpretation Centre too has been planned. The Thane Creek Flamingo Sanctuary is Maharashtra's second marine sanctuary, the first being the Malvan Marine Sanctuary.



YUVRAJ GURJAR

2. Velas to Dabhol Coast

Velas to Dabhol coastal stretch is an approximately 60 km coastal stretch located in the Ratnagiri district of Maharashtra. Habitats in the region include sandy beaches, rocky shores, mangroves, estuaries, coastal plateaus, and moist deciduous forests on hill sides.

Beaches along this coast have become popular due to sea turtle nesting sites and the efforts of local communities to conserve turtle nests. A community-based initiative in turtle conservation has proved to be a successful model of biodiversity conservation through community participation. Today Velas is a popular tourist destination, where homestays and traditional food are the speciality. This endeavour has provided sustainable livelihood options for the local population.

The main reason for tourists to visit this 60 km long beach is to see the endangered marine turtles which arrive here to nest. Today, it is an important turtle congregating

area on the coast of Maharashtra. The Dabhol coast is also in the Important Coastal and Marine Biodiversity Areas (ICMBAs) list. The CMPA project primarily focuses on the villages of Velas, Kelshi, and Anjarle within this coastal stretch.

The main tourist season starts with the Velas Turtle Festival which coincides with the hatching of the turtle eggs. Tourists often participate in releasing the hatchlings into the sea during this festival.

An interpretation centre is being planned here and efforts are being made to establish this coast as a Biodiversity Heritage Site.

SUPRIYA JHUNJHUNWALA



3. Ansure Creek

Ansure Creek is located in the Ratnagiri district of Maharashtra. It is approximately 6.5 km long and 250–300 m wide. The creek harbours large mudflats and luxuriant mangrove forests, especially along the north bank.

Here the CMPA Project has facilitated the formation of Biodiversity Management Committees and capacity building of the local population to make “people’s biodiversity registers”. An outdoor interpretation centre is being planned to raise awareness among the local population as well as for visitors.

The area is listed as ICMBAs, and efforts are being made to establish it as a Biodiversity Heritage Site.

Coastal Biodiversity — an important source of employment, livelihood and food security



With a very diverse and rich coastline of Maharashtra state, marine fisheries provide an attractive and promising sector for employment, livelihood, and food security. Fish products from India are well received by almost half of the world's countries, creating export-driven employment opportunities in India and greater food security for the world. During the past decades, Indian fisheries and aquaculture have witnessed improvements. The potential annual catch from the area has been estimated at 4.5 million tons. The marine fish harvested in India consist of about 65 commercially important species.

Besides food, the coastal communities have been harvesting mangroves sustainably for their fuelwood requirement. However, with alternative fuel available, dependence on mangroves as fuelwood is considerably reduced now.

BIODIVERSITY OF COASTAL MAHARASHTRA

FLORAL DIVERSITY

MANGROVES

Mangroves play an important role in maintaining coastal water quality by their filtering action and cycling of nutrients, pollutants, and particulate matter from land-based sources. They filter these materials from water before they reach seaward. The existence and health of coral reefs are dependent on the buffering capacity of these shoreward ecosystems. Mangroves supply nutrients to adjacent coral reef and sea grass communities, sustaining these habitats' primary production and general health.

Mangrove root systems slow down water flow, facilitating the deposition of sediment. Toxins and nutrients



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get bound to sediment particles or clay particles. Mangrove wetlands are being adopted and used for treatment of aquaculture and sewage effluents.

Mangroves protect shorelines, especially during storms by acting as shock absorbers of the strong waves. Mangroves also protect coastlines from eroding away all round year. As new cities are developed especially along the coastline, the importance of mangrove forests to protect the shoreline is evident. Maintaining a healthy mangrove forest is less expensive than building and maintaining artificial seawalls and similar erosion control structures.

A large variety of fishes, molluscs, prawns, and crabs are totally dependent on the mangrove ecosystem. Deep sea fishes are known to use the habitat for breeding and rearing their juveniles in the food-rich and safe shelters of mangroves.

Mangroves provide a variety of important ecosystem roles: a refuge and food for a variety of flora and fauna, a natural water filter, and an important stabilizer of coastal and river banks. Their roots prevent mud and sand from being washed away with the tide and river currents. Mangrove trees also slowly regenerate the soil by penetrating and aerating it with other creatures like crabs as the mud builds up and soil conditions improve, so other plants can take root. Mangrove trees also reduce the damage from violent storms.

Mangroves are home to several species like crocodiles, birds, deer, monkeys, and honeybees. Many animals find shelter either in the roots or branches of mangroves. Mangroves serve as nesting areas for coastal birds. Many migratory species depend on mangroves during their seasonal migrations for food and shelter.

It is reported that during the last 25 years about 40% mangrove area in the Maharashtra coast has been reduced due to increased human activities. Satellite Imagery data shows that in Maharashtra coast the mangrove area is only 148.4 km² on the mouth of rivers like the Vashishti and

Vaitarna. Minor mangrove areas are located in Ratnagiri, Raigad, Thane, Mumbai, Navi Mumbai, Sindhudurg, Waghota, Rajapur, Dharamtar, and Vasai.

Some common mangrove species and mangrove associates

Starting from the sea-side, different mangrove species occupy different habitats towards the land.

GREY MANGROVE *Avicennia marina*

Local name: Tiwar

Description: Shrub or tree with multiple branches, grows 3 to 14 m tall. Smooth light grey bark has thin, stiff, brittle flakes, and this gives it the common name. Bright, glossy,



green leaves are thick and 5–8 cm long. On the underside, the leaves are silvery white or grey, with very small matted hairs. Flowers white or golden yellow, in clusters of 3–5, small, almost 1 cm across. Fruit contains a large fleshy seed, often germinating on the tree and falling as a seedling.

Habits & Habitat: A gregarious species seen in large stretches along the estuarine region and creeks. This is the first among mangrove species to establish itself in new habitats.

INDIAN MANGROVE *Avicennia officinalis*

Local name: Bhartiya Tiwar

Description: Evergreen tree, much taller than Grey Mangrove, grows up to 25 m in height with a 1 m wide trunk. Bark brownish grey, becomes rough and blackish as the tree matures. Leaves 4–12 cm long, rounded at tip, acute or rounded at base, thick, leathery, with edges slightly rolled under. Upper leaf surface shiny green and hairless, underside with fine grey-green hairs and resin dots. Flowers stalkless, yellow or yellow-brown, in clusters of 2–12. Fruits broad with a short beak, covered with short yellowish brown hairs. Seed large, flattened, without seed coat, germinates in water. Numerous upright air-filled roots rise above soil from long shallow, horizontal roots. Like other *Avicennia* species, it has pencil-like pneumatophores.

Habits & Habitat: Seen in large or small groups along creeks and estuarine regions. Prefers to grow on soft, recently consolidated mud banks.



WHITE-FLOWERED MANGROVE *Lumnitzera racemosa*

Local name: Kirpa

Description: Small to medium-sized evergreen tree, its many spreading branches have brown to greyish black bark. Leaves simple, obovate, margin slightly notched, and arranged in spirals confined towards the ends of twigs.



DINESH VALKE

V.C. BALAKRISHNAN

Small white flowers seen on terminal spikes in the axils (the upper angle between the leaf and the stem). Flowers fragrant. Woody, vase-shaped, compressed fruits are glossy yellowish green, with one seed. Lacks buttresses, but has breathing roots (pneumatophores), and sometimes stilt roots.

Habits & Habitat: Common and fairly widespread, it normally has a rounded, low crown, with branches that root into the mud below. But in overcrowded areas, it may adopt a narrower form, with a more conical crown and a single trunk, and can grow up to 18 m tall.

WHITE BURMA MANGROVE *Bruguiera cylindrica*

Local name: Lahan zumbar

Description: This mangrove grows up to 20 m tall. The grey bark is smooth. Leaves light green, thin, elliptic, in



opposite arrangement. Stipules pale yellow or greenish. Small flowers present in clusters. Pale greenish or white sepal cup has eight stout, long sepals. Thin, white petals have two to three bristles at the tips. Petals turn brown. Calyx tips bend away from the propagule, forming a 'crown'. The aerial roots come out from the soil in bent, knee-shaped loops, and have many raised pores to allow exchange of air into the interconnecting roots, while excluding water.

Habits & Habitat: The petals of the flower hold loose pollen and are under tension, and when probed at the base, they open to scatter a cloud of pollen over the head of the visiting insect pollinator. This mangrove species prefers new deposits of silt, and often grows behind other mangroves which are more salt tolerant, like *Avicennia*.

BROAD-LEAF ORANGE MANGROVE

Bruguiera gymnorhiza

Local name: Zumbar

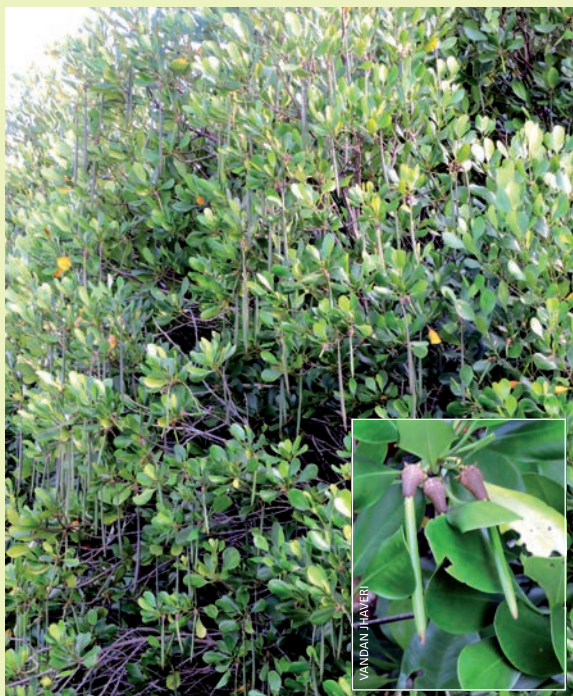
Description: Small tree, grows up to 10 m high. Bark rough and reddish brown. Like other *Bruguiera* species,



the bark is covered with small lenticels, and the tree has knee roots rather than long stilt roots. Flowers are creamy white, but soon turn brown. Calyx pinkish or bright red. Petals have bristles at the tip. When mature, the spindle-shaped fruits drop and become embedded in the mud in an upright position, where they rapidly develop roots.

Habits & Habitat: Found on the seaward side of mangrove swamps, often in the company of *Rhizophora*.

TAGAL MANGROVE *Ceriops tagal*



Local name: Kirkiri, Sonchippi

Description: Small tree, grows 5 to 15 m tall, with many buttresses at the base, and dark red bark. Leaves obovate to elliptical, 5–10 cm long, 2–6 cm wide rounded at tip, acute at base, entire, thick, leathery, smooth, and without visible veins. Flowers about 6 mm in length and borne on short stalks, small with five smooth petals, which are white but turn brown quickly, and five thick, claw-like sepals. Sepals elongated, with pointed tips. Fruit small, club-shaped, surrounded at the base by claw-like sepals.

Habits & Habitat: This mangrove species is seen from estuarine zones up to high intertidal regions. Though a hardy and very prolific species, it grows slowly.

NARROW-LEAVED KANDELIA *Kandelia candel*



Local name: Kandal

Description: Small, stilt-rooted or buttressed tree, grows 4–8 m tall, with a swollen base. Flaky, porous bark could be greyish to reddish brown. Leaves opposite, shiny green, elliptic or drop-shaped oblong. Flowers whitish, with numerous powder puff-like stamens. Seedling propagule narrowly cylindrical or club-shaped, up to 40 cm long at maturity, capped by the persistent sepals whose tips bend backwards to the stalk.

Habits & Habitat: Can be seen growing on soft mud along the banks of tidal rivers. Prefers downstream estuarine zone in the lower intertidal region.

RED MANGROVE *Rhizophora mucronata*



Local name: Lal Kandal

Description: Small to medium-sized evergreen tree,

grows to a height of about 10 to 15 m. It has a large number of aerial stilt roots buttressing the trunk. Leaves elliptical, usually about 12 cm long and 6 cm wide. Leaf tip elongated, with corky warts on the pale undersides. Red or light green stipules (each leaf has a cap-like stipule that hides and protects the tender leaf). Leaves much bigger and proportionally broader than other *Rhizophora* species. Flowers in clusters, with four white, hairy petals. Long seeds (propagules) viviparous, and start to develop while still attached to the tree. Mature seedlings are dispersed by water and have a light green or whitish “collar”. The propagule becomes detached from the branch when sufficiently well-developed, to root in the mud.

Habits & Habitat: Mainly seen along sheltered estuaries and creeks.

TALL-STILT MANGROVE *Rhizophora apiculata*



Local name: Motha Kandal

Description: Can grow 20–30 m tall. Bark dark grey and chequered. Arching stilt roots can be up to 5 m long. With lots of aerial roots around the tree, it appears like a skirt of roots. Leaves stiff, glossy green, with tiny, evenly marked black spots on underside. Stipule (one of the small, paired parts resembling leaves at the base of a leafstalk) usually, but not always, red. Flowers small, in pairs on very

short stalks. Petals yellow or white, but soon fall off after blooming. Fruit brown, about 2 cm, looks like an upside-down pear, and is crowned by short sepals. Cylindrical propagule up to 38 cm long.

Habits & Habitat: This mangrove prefers the intermediate estuarine zone in the mid-intertidal region. A hardy, fast-growing species, it grows up to 30 m tall. It is an efficient colonizer of coastal areas.

MANGROVE APPLE *Sonneratia alba*



SHUBHADA NIKHARGE

PRASHANT AWALE

Local name: Karpu

Description: Grows up to 15 m tall. This mangrove species has grey or brown bark with slight vertical fissures, and no buttresses or prop roots. Aerial roots cone-shaped. Leaves rounded, leathery, with opposite arrangement. White powder puff-like flowers bloom at night. Fruits large (4 cm), leathery, green berries with a star-shaped base. Sepal tips bend back towards the stalk.

Habits & Habitat: Grows on exposed soft mud banks, low on the tidal mudflats along banks of tidal rivers and creeks.

SONNERATIA MANGROVE *Sonneratia apetala*



SHUBHADA NIKHARGE

SHUBHADA NIKHARGE

SUPRIYA JHUNJHUNVALA

Local name: Chipee

Description: Medium-sized tree that can grow up to 20 m tall. Leaves simple, opposite, and leathery. Bark light brown, irregularly fissured. As the scientific name suggests, the flowers have no petals, but have four prominent green sepals. The powderpuff-like stamens give the flowers a cream colour. Flower with long style, and stigma flattened like an umbrella; the upper side is reddish. Seeds are sickle-shaped.

Habits & Habitat: Often, this is the first mangrove species to colonize newly formed mudflats.

SEA HOLLY *Acanthus ilicifolius*

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SHUBHADA NIKHARGE

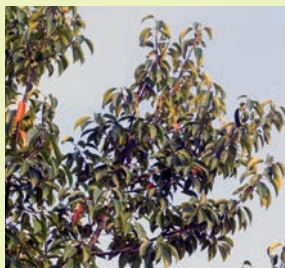
Local name: Kateri, Marandi

Description: Low growing gregarious shrub, up to 1.5 m tall. Leaves thick, shiny, waxy, with prickly edges. Light violet flowers seen in a cluster at the branch tip. Fruits shiny green, pods in a cluster. May develop small prop roots.

Habits & Habitat: Grows on mud banks near the high tide mark, preferring areas where the water is brackish with more freshwater input. These plants often cover large areas to form thickets, particularly in disturbed mangrove area. Unlike some mangrove plants, Sea Holly does not exclude salt at the root level. In fact, its sap is salty and excess salt is secreted through the leaves, to be removed by rain or wind. Sometimes, the salt can be seen as a white crystalline layer on the upper surface of the leaves.

MILKY MANGROVE *Excoecaria agallocha*

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DINESH VALKE

Local name: Geva, Hura

Description: Tall deciduous tree growing about 15 m, often branched at the base. Roots are seen on the surface,

and often knotted. Bark grey, smooth, but becomes warty and fissured in mature trees. Bark and roots covered with small, corky pores or narrow lines for air exchange. Leaves thick, oval, pointed, arranged alternately in a spiral. Young leaves are pink. Leaves turn yellow, orange, or even reddish before they are shed. Flowers are very small, less than 1 mm. The trees bear either male or female flowers, never both. Male flowers are fragrant, present in elongated clusters. Female flowers appear in shorter spikes. Bees are common visitors and the main pollinators. Three-lobed fruits are small (less than 1 cm), green turning black as they ripen.

Habits & Habitat: Grows along the estuaries and tidal creeks, often on higher landward ground. Poisonous white latex present in trunk, stems, and leaves, can cause blistering and temporary blindness.

CANNONBALL MANGROVE *Xylocarpus granatum*



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Local name: Bhelanda

Description: This mangrove tree grows 3–12 m tall. Pairs of leaflets are elliptic or obovate, with rounded tip. Flowers small and white. Fruit very large, and round. Bark thin and flaky.

Habits & Habitat: The tree is seen along estuaries and tidal creeks.

RIVER MANGROVE *Aegiceras corniculatum*



Local name: Kajala, Sugandha

Description: Bushy shrub or small tree, grows 1 to 2 m tall. Leaves arranged alternately, leathery and minutely dotted. Small, white, fragrant flowers are seen in clusters. Fruit green or pink, curved and cylindrical.

Habits & Habitat: Gregarious, grows on sandy to compact mud banks along estuaries and tidal creeks, often at the seaward edge of the mangroves.

MANGROVE FERN *Acrostichum aureum*



Local name: Kandalvan Neche

Description: Grows in clumps and can be as tall as 2 m. Rounded leaf tips. Young leaves are reddish, older fertile

fronds get covered with red-brown spores on the underside of the leaflet tip.

Habits & Habitat: One of the few fern species that can tolerate salinity. However, unlike typical mangrove plants, it cannot tolerate flooding, so it grows on higher land behind mangroves. Besides brackish water, it grows around freshwater swamps and marshes. It is seen in tidal swamps, muddy coasts, river banks, and tidal estuaries, often very common and even dominant.

TOOTHBRUSH TREE *Salvadora persica*



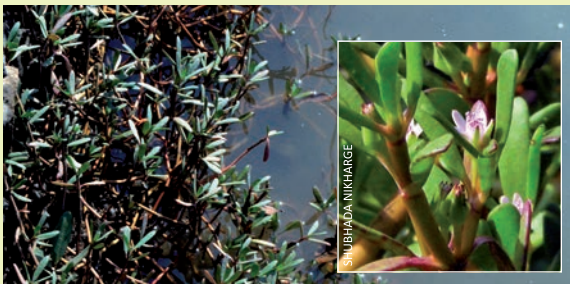
Local name: Mesvak

Description: Not a true mangrove, but a mangrove associate, this is a large, well-branched evergreen shrub or small tree with sandy greyish bark, and numerous drooping, shining, almost white branches. Leaves smooth, somewhat fleshy. Flowers greenish yellow. Small berries become dark red when ripe. The tree grows to a maximum height of 3 m.

Habits & Habitat: At places it can become an aggressive colonizer. Besides being seen along the coast, it is well distributed in the drier regions of India. Attracts birds when the berries are ripe in winter. Small Salmon Arab Butterfly lays eggs on this plant.

SEA PURSLANE *Sesuvium portulacastrum*

ISAAC KEHIMIKAR



Local name: Dhapa, Ghol

Description: A perennial herb found on the sea coasts. Thick, fleshy glossy green leaves are on succulent, reddish-green stems that branch regularly forming dense stands close to the ground. Flowers are pink or purple. Each flower opens for only a few hours each day.

Habits & Habitat: These plants are known to help build dunes by catching sand in between stems and leaves. The plant is closely related to the more familiar Purslane commonly found in gardens and along the roads. Plant is edible.

GOAT'S FOOT GLORY *Ipomoea pes-caprae*

ISAAC KEHIMIKAR



Local name: Maryada Vel

Description: Alternate leaves are leathery, 3 – 10 cm

long and notched at the tip such that they resemble the shape of a goat's foot.

Habits & Habitat: A spreading ground creeper commonly seen much above the tide line along the sea shore. It belongs to the family of Morning Glory climbers. More common on sandy shores.


At present, Maharashtra coast has 18 true mangrove species and 15 species of mangrove associates.

SEAWEEDS

Seaweed is the common name given to several simple plants called algae which live in the ocean. Seaweeds are important habitat for several species of fish, molluscs, shrimps, crabs, sea stars and brittle stars.



PRADIP PATADE



Some invertebrates and fish are specialists in feeding on seaweeds. Several other fish also visit seaweeds in search of smaller prey that may be hiding among their nooks and crannies. Just like forests on land, seaweeds play an important role in producing oxygen. Seaweeds are also an important source of food for humans and ingredients from seaweed are used in manufacturing cosmetics, fertilisers and chemicals.

FAUNAL DIVERSITY

SPONGES



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Sponges are seen in a variety of habitats from rocky shores and coral reefs to depths up to 8,800 m. They are simple multicellular animals with no true tissue and organ (such as eyes, heart, and skin). They lack body symmetry as seen in other higher animals. Sponges are often mistaken for plants, as they are usually not free moving. Most sponges are filter-feeders, feeding mainly on plankton or tiny decaying matter. However, some species like the Harp Sponge and the Ping-Pong Tree Sponge are carnivorous that feed on small animals.

Main characteristics:

- There is no symmetry to the body.
- They have many small pores and one or more bigger openings.
- They are not free living, but with little movement.

Most sponge species have a skeleton made up of tiny structures called spicules, which may appear like rods, stars, needles, balls, and hooks. These spicules may harbour certain toxins, and therefore sponges should not

be handled with bare hands. These very toxins protect the sponges from predators. However, turtles, slugs, and flatworms do feed on these poisonous sponges.

Sponges reproduce both sexually and asexually. While many species of sponges have separate sexes, some can change sex to produce either eggs or sperm. Eggs eventually develop into planktonic larvae and the female releases them from its body openings. In asexual reproduction, a sponge splits into two sponges or grows a new one out of the main body; alternatively, small pieces break away from the sponge, and settle down on suitable habitat to develop into a new sponge. Besides being used as bath sponges, several important compounds with anti-cancer, antiviral, antibacterial, and anti-inflammatory properties have been found in sponges. That makes them an important source of raw materials in the biomedical industry.

CNIDARIANS

Cnidarians are seen in a wide variety of forms like sea anemones, tube anemones, hard corals, zoanthids, soft corals, blue corals, sea pens, hydroids, and jellyfish. They are seen in several diverse forms, and all are armed with stinging cells called nematocysts.

Main characteristics:

- Body structure spreading out from a central point symmetrically (radial symmetry).
- They possess tentacles.
- Have harpoon-like cells (cnidocytes).
- May be solitary or colonial.

Solitary animals may be not free moving (flower-like polyp) or capable of moving (medusa, commonly called jellyfish).

Colonial animals build a skeleton which does not spread out from a central point symmetrically, but individual animals in the colony still exhibit spreading out from a central point symmetrically.

SAMEER KEHIMKAR



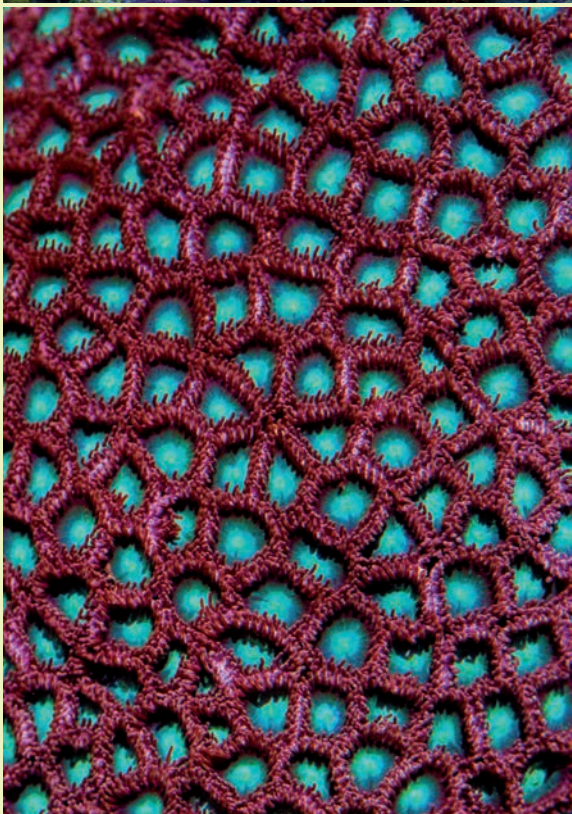
SAMEER KEHIMKAR



Corals



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Zoanthids

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Sea Anemones

ECHINODERMS

In Greek, echinoderm means “spiny skin.” Surprisingly, while most echinoderms do have “spiny” skin, there are several species which do not have a spiny skin. All echinoderms have body structure which points outwards from the centre of the body like the spokes on a bicycle wheel. Popularly known creatures from this group are starfish, sea urchins, feather stars, brittle stars, sea cucumbers, sea urchins, and sand dollars. Altogether, this group contains about 6,000 species.

Main characteristics:

- Marine animals with pentaradial symmetry, i.e. the body spreads out from a central point symmetrically, and can be divided into five equal parts, at least in some stage of life.
- Possess a water vascular system, which is a network of water-filled vessels within the body, usually terminating at numerous tiny tube feet on the underside.



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Sea urchin

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Starfish



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Brittle star



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Feather star

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Sea cucumbers

ANNELIDS

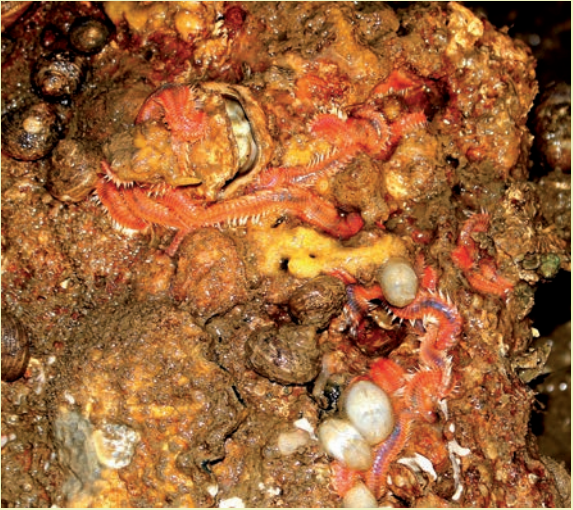
This is a large group of ringed worms or segmented worms, with over 17,000 species including earthworms and their relatives, ragworms, leeches, and a large number of mostly marine worms known as polychaetes. The word Annelida is derived from the Latin word “annulus” means “little ring”. These worms have no legs and no hard skeleton. Their bodies are divided into many little segments, like rings joined together. The largest group among them are the polychaetes which are all found in marine habitats.

Various species of polychaetes are bristle worms, feather duster worms, ragworms, lugworms, clam worms, fire worms and sea mice. Polychaeta in Latin means “many bristles”, and some do have bristles on the body, though earthworms and leeches have fewer bristles.

Main characteristics:

- Bilaterally symmetrical worms which may or may not be segmented.
- Segmented species have a body comprising identical segments (excluding the head and tail), containing the same set of paired organs, and in some cases, external structures used for locomotion.
- Unsegmented annelids are believed to have lost the segments through evolution. They include spoon worms which have a flattened proboscis resembling a spoon at the front end, and peanut worms with body comprising an unsegmented trunk and a retractable structure called an “introvert”.

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Bristle worm

SAMEER KEHIMKAR



Feather duster worm

MOLLUSCS

Molluscs (Phylum Mollusca) are a group of invertebrates that include squids, octopuses, cuttlefish, nudibranchs, snails, slugs, limpets, sea hares, mussels, clams, oysters, scallops, as well as many lesser-known animals. Scientists estimate that there are more than 100,000 species of molluscs alive today. This makes them the second largest phylum of animals, having fewer species than only the arthropods.

Molluscs have soft bodies that consist of three basic parts: a foot, a visceral mass, and a mantle. Many species also have a protective shell made of chitin, proteins, and calcium carbonate. Since molluscs are so varied in form, it is difficult to use a single representative species to generalize about the group's common anatomical structures. Instead, textbooks often describe a hypothetical "mollusc" that exhibits the features common to many species.

This hypothetical mollusc has a mantle, shell, foot, and visceral mass. The mantle is a layer of tissue that covers the visceral mass and in many molluscs it contains glands which secrete a hard shell.

Main characteristics:

- Soft-bodied, unsegmented and bilaterally symmetrical animals.
- Most have a muscular foot.
- Many have a special feeding structure called "radula", which is a tongue-like structure bearing rows of teeth.
- Usually with a mantle and mantle cavity used for breathing and excretion.
- Some members of this group are chitons, tusk shells, bivalves, cephalopods, marine snails, marine slugs, and non-marine gastropods.

LIMPET *Cellana radiata*

V. SHUBHALAXMI



Description: This small shell is 25 mm long. It is conical with or without opening.

Habits & Habitat: Limpets are seen on exposed rocks near the high mark. They feed on algae.

COWRI *Ovatipsa coloba*

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Local name: Cowdi

Description: Shell surface glossy, but covered with a mantle. This prevents any unwanted growth on the shell.

Habits & Habitat: During the day they remain hidden, but at night they are seen in shallow rock pools.

MUREX SNAIL *Thaisella lacera*



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Description: This marine snail has a strong shell of 5 – 6 whorls with strong triangular knobs.

Habits & Habitat: Common on rocky seashore in rock pools.

BABYLON SNAIL *Babylonia spirata*



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Description: Babylon Shells have a thick glossy outside shell, often plump looking with brown spots or swirls covering the whorl (outside body). They primarily inhabit the tropical Pacific in the Indo-Pacific region stretching from eastern Indian Ocean east to the northern shores of Australia and New Zealand. They prefer shallow sandy or muddy sea water.

Habits & Habitat: Prefer shallow sandy bank, where they remain half buried and emerge at high tide.

BLACK-AND-WHITE CONE *Conus ebraeus*



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Description: Easily recognisable small, squat shell, up to 5 cm. Colour white with a pattern of blackish squares. Cone snails are venomous. Venom is toxic to humans. The height of the shell varies from 25 mm to 62 mm.

Habits & Habitat: Rocky shores, often under boulders.

HOODED ROCK OYSTER *Saccostrea cucullata*



ALANKAR YADAV

Local name: Kalov

Description: Shell quite strong, oyster-like, irregular, almost circular to oval. Outer surface purple-brown; internally white with a purple-black zone in the periphery.

Habits & Habitat: Seen commonly on rocky shores in the intertidal zone, can be found at a depth around 15 m. It

fixes itself by cementing to rocks or the roots of mangroves. It also grows on underwater structures of the harbour wall, where it is not welcome.

A typical filter feeder, it pumps water through its gills and collects phytoplankton. However, in polluted waters, it ends up accumulating toxic heavy metals in its tissues. It is known as a very effective bio-indicator for monitoring pollution. In India, it is commercially collected.

BLOOD COCKLE *Tegillarca granosa*



PRADIP PATADE

Local name: Khubbe

Description: A thick-shelled, strongly ribbed clam with white inner side, often tinged with light yellow. It gets its name from the red haemoglobin inside the soft tissues, which are also red.

Habits & Habitat: Preferring the intertidal zone at 1 or 2 m water depth, it burrows down into the sand or mud, but it can also be seen at a depth of 20 m. The preferred habitat is the intertidal area with salty bottom, with relatively low salinity, and a period when water recedes from the area every day. It is a bottom filter feeder and its main food is organic detritus, phytoplankton, and algae. Adult size is 5 to 6 cm long and 4 to 5 cm wide.

GREEN MUSSEL *Perna viridis*



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Local name: Kakaiee

Description: Full-grown adults are dark green to brown, young mussels are bright green. An adult can grow 160 mm (6 inches) long.

Habits & Habitat: These immobile bivalve mussels prefer estuarine areas where they breed once a year to release eggs and sperm in the water. Free-swimming larvae keep on moving for 2–3 weeks, after which they settle down and attach themselves to rocks or mangrove roots with a cluster of thread-like growth. They are filter feeders and feed on phytoplankton and zooplankton in the surrounding water.

ASIATIC HARD CLAM *Meretrix* sp.

Local name: Tisari

Description: It grows about 7 cm long.

Habits & Habitat: Occurs in intertidal areas in sand and mud. Prefers shallow habitat where the low tide depth is less than 1.0 m, however they are found up to 20 m deep



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also. Young larvae are free-swimming, but soon settle down, resembling a miniature clam. This edible marine is collected commercially for its meat and shell.

TELESCOPE SNAIL *Telescopium telescopium*



V. SHUBHALAXMI

Local name: Shing Gogalgai

Description: This marine sea snail has a perfect cone-shaped shell. It grows around 8–15 cm long.

Habits & Habitat: Commonly seen among the mangroves on muddy banks. Often, several hundred can be seen at a time in one area. The snail inside the shell is velvety black, with a highly extensible proboscis. It can stay out of water for a long time. This herbivore mainly feeds on algae.

Sea slugs (Nudibranchs)

Though very small in size (less than 3 to 5 cm), sea slugs are known for their bright colours and ornamental appearance. Despite being soft-bodied, they can deter predators with a variety of acids, toxins, and stinging cells. Most sea slugs are carnivorous and move during the night.

ORANGE DRAGON SLUG *Bornella* sp.



PRADIP PATADE

Local name: Narangi Gogalgai

Description: A small, orange and white sea slug around 20 mm in length. Oral tentacles are paired and finger-like. All tentacles are orange tipped with a white point at the top.

Habits & Habitat: Nocturnal in habit. Seen in shallow waters on muddy shores.

Squids, Cuttlefish, Octopuses

Cephalopods include octopuses, squid, cuttlefish, and nautilus. They are truly fascinating creatures of the sea, and their ability to change colour, skin texture, and body shape is amazing. And if all these adaptations fail to protect, they can squirt a cloud of ink and take advantage of this smoke-screen to escape from predators.

Interestingly, they have three hearts that pump blue blood. They are fast swimmers too, as they can take off by expelling water through their body with force – that makes them jet propelled. They are probably the most intelligent among invertebrates.

INDIAN SQUID *Loligo duvauceli*



Local name: Makul

Description: This squid has reddish brown patches and spots on a pale white body. The slender, smooth, scale-less body tapers from mid region to a blunt rear end. At the rear end is one fleshy fin. Its narrow head has ten arms, including two long slender tentacles. Each arm has two rows of suckers, and the rings of the arm suckers have 6 to 8 teeth. The clubs of the tentacles have four rows of suckers, with each ring having 17 to 20 teeth. The extreme end of one arm of the male is specialized to store and transfer sperm to the female. There is a flat, pen-like hard internal skeleton, composed mainly of chitin, located inside its back along the entire body. Total length of the squid is 155 mm.

Habits & Habitat: Occurs in reef associated habitats. It squirts a cloud of dark ink to confuse predators and allow itself some time to escape. Squids feed on small fish, crabs, and shrimps. Some squids hunt by chasing down their prey, while others wait and ambush the prey to catch it with the tentacles. The prey is pulled towards the beak-like mouth, to tear into small pieces and swallow. Most species of squids have venom glands that lead to the beak. Venom paralyses the prey. Squid serves as food, so there is great demand for it in the local and export markets.

COMMON OCTOPUS *Octopus vulgaris*



DIGANT DESAI

Description: The Octopus appears to have a large bulbous head (which is actually the full body) with two large eyes and four pairs of arms. At the centre point of the arms, it has a beak with a mouth. It has no internal or external skeleton.

Habits & Habitat: Octopuses are known to live in diverse regions of the sea from coral reefs and open waters to the ocean floor. They feed mainly on crabs, polychaete worms, prawns, fish, clams, and other shellfish. They are known to inject their prey with paralysing saliva before tearing it into small pieces with their beak.

They have several ways to defend themselves, like squirting an ink cloud, changing colour to camouflage and hide, or just jet quickly through the water to escape. Earlier it was believed that only the blue-ringed octopus was harmful to humans, but now all octopuses and cuttlefish, and some squids are known to be venomous. Octopus is a delicacy and is in good demand in the local market.

ARTHROPODS

This group certainly has the most successful animals on earth, as they are seen on land, sea, and air, and comprise more than one million species in all. Arthropods are found everywhere, from the deep sea to mountain peaks, varying in size from the King Crab with its 12-foot arm-span to microscopic insects and crustaceans. Surprisingly, even with so much diversity, the basic body structure of arthropods has remained almost uniform. Arthropods have a stiff cuticle made largely of chitin and proteins, forming an exoskeleton that may or may not be further stiffened with calcium carbonate. They have segmented bodies and show various patterns of segment fusion to form integrated units (head, abdomen, and thorax). This group of animals get its name from its distinctive jointed appendages, which may be modified in a number of ways to form antennae, mouthparts, and reproductive organs.

Main characteristics:

- Bilaterally symmetrical animals with segmented bodies and jointed (or segmented) limbs.
- The body is enclosed in an external skeleton (or exoskeleton) composed largely of chitin.
- Some well-known members of this group are millipedes, centipedes, arachnids (spiders and scorpions), insects, crabs, shrimps and barnacles.

Crabs & Shrimps

SERRATED MUD CRAB *Scylla serrata*

ISAAC KEHIMKAR



Local name: Kali Chimbori

Description: Large greenish brown crab with large greenish claws with a pinkish tinge. A full grown specimen has a shell (carapace) up to 23 cm wide, and can weigh from 0.90 to 2.0 kg.

Habits & Habitat: Seen in mangroves and sheltered coastal habitats. Prefers the soft muddy bottom where it digs its burrow. A good swimmer as well as burrower, it is adapted to salinities ranging from almost freshwater to seawater habitats. Like most crabs, it is mainly a scavenger. It is able to stay out of water for long periods. It is always in great demand in local markets for its meat.

THREE-SPOT SWIMMING CRAB *Portunus sanguinolentus*

Local name: Teen Thipkyachi Chimbori

Description: This olive green crab has three prominent maroon to red spots on its back. A full grown crab has a shell (carapace) up to 20 cm wide.

Habits & Habitat: Found from the shore through the intertidal zone, up to 30 m deep. It mainly prefers sandy to sandy-muddy habitats and is also seen in brackish water. It feeds on immobile and slow-moving small invertebrates,



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and scavenges too. Breeds throughout the year. Swimming Crab gets its name from the last pair of legs that are flat and paddle-like, making it a good swimmer. It can move sideways rapidly with the pincers spread out.

BLUE SWIMMER CRAB *Portunus pelagicus*



PRADIP PATADE

Local name: Neeli Chimbori

Description: Male bright blue with white spots, and with longer claws. Female dull greenish brown, with more rounded carapace. A full grown crab has a 20.0 cm wide shell (carapace).

Habits & Habitat: Found in shallow waters as well as depths up to 40 m, in sandy to sandy-muddy areas near reefs, mangroves, and sea grass and algal beds. When alarmed, it burrows in the sand. During the day, it stays buried under sand or mud, and comes out to feed by night. It is a voracious predator of smaller marine creatures, feeding on bivalves, fish, other small crabs, shrimps, and algae. Due to the last pair of legs that are flat and paddle-like, it is an excellent swimmer. It breeds throughout the year.

CROSS CRAB *Charybdis feriatius*



PRADIP PATADE

Local name: Lal Chimbori

Description: The striking red and white colour pattern is unmistakable. There are bold wide dark lines with a distinctive white cross in the centre of the body, because of which it gets its common name. The last pair of legs are paddle-shaped and can rotate like boat propellers. Female usually weighs from 150 to 350 g, and male can weigh up to 1 kg.

Habits & Habitat: Occurs most often in deeper water with sandy-muddy bottom. It mainly feeds on fish, snails, sea anemones, corals, and algae.

RING-LEGGED FIDDLER CRAB *Uca annulipes*



ISAAC KEHIMKAR

Local name: Kurli

Description: This small crab has a body just 2 cm wide, but the male has one enlarged white pincer claw, which is almost twice as long as the body width. The dark body has blue or white stripes on the back. Eyes are on long yellow stalks, and its legs are short, orange, brown, or reddish. Female has both pincer claws small and of equal size.

Habits & Habitat: Seen at low tide on mudflats, especially near mangroves. The males come out of their small burrows to actively wave their large pincer claw in the air, to assert their territories to rival male and to attract females.

HORNED GHOST CRAB *Ocypode ceratophthalma*



ISAAC KEHIMKAR

Local name: Reti Khadpi

Description: This crab has eyestalks extending over the

eyes into long extensions. Usually the adult crabs have long stalks, while younger crabs may have short stalks or the stalks may be absent. With a box-shaped body and long legs, these crabs are swift runners on sandy beaches. This characteristic of “horned” eyes is not unique to one species.

Habits & Habitat: Prefers sandy shores where it digs a burrow and comes out to feed mainly during late evening and at night. It is seen during the daytime too. On being alarmed, the crab quickly disappears into its hole. It is mainly a beach scavenger, and feeds on carrion, worms, fishes, clams, and crabs.

MOTTLED SALLY LIGHTFOOT *Grapsus albolineatus*



ISAAC KEHIMKAR

Local name: Khadpi

Description: This flat-bodied crab has a rough-looking ridged back. Long legs help it to scurry over the rocky shore. The colour often matches the rocky habitat in which it lives, that makes it almost invisible.

Habits & Habitat: Common on rocky shores, often seen along the waterline. At low tide, this crab is seen feeding on algae growing on the rocks. On being alarmed, it disappears among large rocks.

RED-SPOTTED BOX CRAB *Calappa calappa*



PRADIP PATADE

Local name: Lal Thipkyacha Gol Khekda

Description: Claws are broad and flattened, shell is rounded box-like. One claw has a specialized enlarged tooth. Curved, flat claws fit together in front of the crab's face.

Habits & Habitat: Seen in shallow coral reefs and on sandy shores. When alarmed, this crabs can completely bury under the sand or soft mud in the sea. Broad claws are fringed with tiny hairs, which are known to filter sand and other particles from water that it takes into the body and across the gills to extract oxygen. This is useful when the crab is buried in the sediment. This crab can hide its legs and claws close to the shell, appearing box-like, and remain motionless. One claw has a specialized enlarged tooth that is used to “peel” open gastropod shells, similar to using a can opener.

HERMIT CRAB

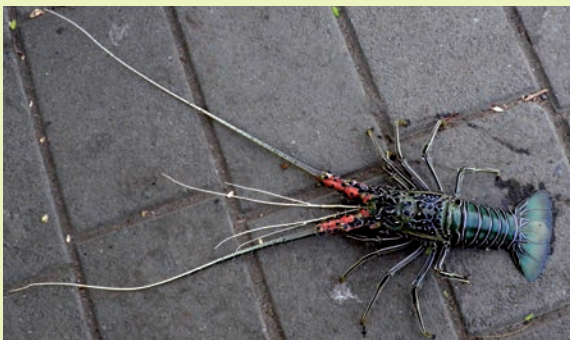
Local name: Yati khekada

Description: Unlike a typical crab, this crab does not have a hard shell, and being soft-bodied, it uses old, discarded shells of snails for protection. These crabs belong to a larger group (superfamily) Paguroidea.



Habits & Habitat: Probably because of its habit of living in a second-hand shell, this crab gets its name 'hermit' crab. It always carries the shell around, and when its body size grows, it transfers itself into a larger shell. A majority of hermit crab species live on the ocean floor, and some occur along the seashores. Females of the shore dwelling hermit crabs have to return to the sea to breed. Hermit crabs are omnivores and scavengers.

PAINTED ROCK LOBSTER *Panulirus versicolor*



Local name: Rangit Shevand

Description: These lobsters do not have prominent claws like the true lobsters. Usually they grow up to 30 cm long. Males are larger than females.

Habits & Habitat: Occur in rocky habitats and coral reefs up to a depth of 15 m. They are nocturnal, often hiding among rocky crevices during the day. They are not gregarious. They feed on the marine invertebrates and carrion. Their main predators are large fishes and sharks. Locally harvested for the aquarium trade, they are in great demand for their striking coloration.

MUD SPINY LOBSTER *Panulirus polyphagus*



ISAAC KEHIMIKAR

Local name: Shevand

Description: Unlike other lobsters, this lobster does not have enlarged claws, but it does have long spines covering much of its body.

Habits & Habitat: This species occurs in a variety of habitats from slightly turbid coastal waters, sandy and muddy bottom, rock beds and coral reefs, usually around a depth of 8 m but is seen at 50 m depth also. Its antennae can grow up to 60 cm long, and it uses them to detect its prey. This lobster is known to rub its antennae against its head to produce a grinding noise, possibly to warn other lobsters or keep predators away. Young ones always travel in a single line, and if threatened by a predator, they form a circle with their spines pointing towards the predator.

INDIAN WHITE PRAWN *Fenneropenaeus indicus*

PRITI CHOHALE



Local name: Safed Kolambi

Description: Semi-translucent, usually yellowish white or greyish green, covered with minute dark brown dots. Female grows up to 23 cm and male up to 17 cm in length.

Habits & Habitat: After the early developmental stages in the sea, young shrimps migrate to estuaries, where they grow and return to the sea on becoming mature to breed. They prefer mud or sandy bottom from 2 to 90 m deep. They are non-burrowing and active in both day and night.

TIGER PRAWN *Penaeus monodon*

ISAAC KEHIMKAR



Local name: Wagh Jhinga

Description: Colour can vary according to habitat, food availability, and water turbidity, from green, brown, red,

grey, blue, to alternating transverse blue-black and yellow stripes. A full-grown prawn can be up to 33 cm long, and the female is larger than the male.

Habits & Habitat: Prefers muddy and sandy bottom around 110 m deep, in estuaries, creeks, and deeper waters. Young ones are common in brackish water, full-grown prawns move to deeper waters to breed. This prawn is now extensively reared in aqua-farms to meet the market demand.

MANTIS SHRIMP *Oratosquilla* sp.



PRADIP PATADE

Local name: Eechari

Description: These are crustaceans belonging to the order Stomatopoda. The name Stomatopoda is given because its first five pairs of legs are bent towards the mouth and used in feeding (stoma = mouth, podos = foot. Like the Praying Mantis insect, Mantis Shrimp has a pair of specialized forelimbs to capture prey.

Habits & Habitat: Mantis Shrimps are solitary, marine, and remain hidden among rock and coral formations or in holes in the sea bed. Active during late evening or early morning, when they lie in ambush for prey, or chase prey to hunt it down. They have a good sense of smell, which they use to find food and mates, and to locate their habitat. In some species, both parents take care of the eggs, while in others, the female takes care of the eggs while the male provides her food.

GOOSE BARNACLE *Lepas anatifera*



PRADIP PATADE

Local name: Safed Kalov

Description: About 5 cm wide, these marine crustaceans are hermaphrodites, meaning that the animal has both male and female sexual organs. Their eggs hatch into free-swimming larvae as zooplankton in the ocean currents. Fully grown barnacles have feathery feeding apparatus to filter food particles from the water. If alarmed, the feathery filters are withdrawn inside the hard shell. Opening of the shell may be red, orange, or bright yellow.

Habits & Habitat: Growing larvae attach themselves to an object with their strong stalk, and once attached they do not move again. If they get stranded on a beach they usually die. Barnacles grow on rocks, floating wooden pieces, and on the hull of ships.

Fisheries – an important source of livelihood

All along the coast of Maharashtra a large population of several different fishing communities depend on the fisheries as their main source of livelihood. Always the menfolk have been going out for fishing and women manage the sale of the fish catch. Today fisheries as business has grown manifold, however it still continues to support the poorest among the fishing community.



ISAAC KEHIMKAR



ISAAC KEHIMKAR

CHORDATES

Most chordates are vertebrates (animals with backbones), though chordates include some small marine invertebrate animals too. However, here we will describe only the typical chordates, starting with fishes.

Fishes

Cartilaginous fishes include sharks, rays, skates, and chimaeras. Most other fishes are ray-finned (or bony) fishes, both in marine and freshwater habitats.

BLACKTIP REEF SHARK *Carcharhinus melanopterus*



DIGANT DESAI

Local name: Mori

Description: Slender body with a very short and bluntly rounded snout. Yellow-brown on upper side and white below. All fins have black or dark brown tips; first dorsal fin is moderately large with a pointed apex. Grows up to a length of 1.6 m.

Habits & Habitat: Usually occurs singly or in small groups along the coast. Young sharks prefer shallow, sandy flats while older sharks are common around reef ledges

and also near reef drop-offs. Known to enter brackish and freshwater environments. Feed mainly on small fishes, squids, prawns, and crabs, and even on sea snakes and seabirds. Female gives birth to two to five live young.

WHITE-TIP REEF SHARK *Triaenodon obesus*

DIGANT DESAI



Local Name: Mushi

Description: A small shark that grows up to 1.6 m in length. Easy to recognize by its white-tipped dorsal and caudal fins. One of the most common sharks found on Indo-Pacific coral reefs, the White-tip Reef Shark occurs as far west as South Africa and as far east as Central America. It is typically found on or near the bottom in clear water, at a depth of 8–40 m. It is a common species, seen along deeper reef slopes.

Habits & Habitat: A nocturnal hunter, it spends the day resting in caves. By night, this shark comes out to hunt fishes, crabs, prawns, and octopus. Females gives birth to one to six live young pups every other year.

MARbled STINGRAY *Himantura uarnak*

Local Name: Waghya Paakat

Description: Known for the ornate colour pattern on its back, this ray is a large, bottom-dwelling species that can grow up to 2 m in width. It has a diamond-shaped pectoral fin disc, an extremely long tail without fin fold, and one to three stout spines near the tail base.



Habits & Habitat: Seen in coastal waters over sandy flats, lagoons, and coral reefs, up to a depth of 50 m or more. Throughout the day, the whip ray spends much time resting on the sandy floor or may even remain buried in sand. By nightfall, it hunts for crabs, shrimps, mantis shrimps, bivalves, shells, worms, jellyfish, and fishes. Females give birth to up to five pups.

The Marbled stingray is fished for meat, skin, cartilage, and other purposes. With low reproductive rate and habitat degradation, it could be facing severe population loss.

WHIP-TAIL STINGRAY *Himantura uarnacoides*



Local name: Pakat

Description: Stingrays are cartilaginous fishes related to sharks. They have flat bodies, and both eyes are on top of their bodies, while their mouths are on the undersides. Stingrays have one or more barbed stingers on the tail, and on the

underside two grooves with venom glands. The stinger is covered with a thin sheath of skin, in which the venom is present. It grows about 119 cm in disc width (300 cm total length). Rays like the Manta Ray do not have stingers.

Habits & Habitat: Stingrays are common along the coast on soft mud or sand, to a depth up to 30 m. Flat body of stingrays enables them to remain “invisible” as they bury themselves in the sand. Because their eyes are on top of their bodies and their mouths on the undersides, stingrays cannot see their prey; instead, they use smell and electroreceptors like those present in sharks. They mainly feed on molluscs, crustaceans, and small fish. More commonly seen around coral reefs during high tide. Young are born live.

SLENDER GIANT MORAY EEL *Strophidon sathete*



PRADIP PATADE

Local name: Keelish

Description: Greyish brown coloration, lower surface lighter. Young eels have crossbands. Could be easily mistaken for a snake, but being a fish, eels have gills. Can grow up to 100 cm long.

Habits & Habitat: Seen singly on reef flats and sea grass beds of shallow lagoons up to a depth of 80 m on outer reef slopes. Could also be seen in estuaries. This eel is nocturnal and hunts for fish and crustaceans at night.

INDIAN OIL SARDINE *Sardinella longiceps*

PRITI CHOHALE



Local name: Tarli

Description: Blue-green on the back with silvery flanks, a dark spot on the hind margin of gill cover. When fully grown, it is 23 cm long and can weigh up to 200 gm.

Habits & Habitat: Seen in open waters at a depth of 20–200 m, along the continental shelf. Female scatters eggs after external fertilization in open waters. It is an important commercial fish, in good demand in local markets as a low priced food fish.

RIBBONFISH or HAIRTAIL *Lepturacanthus savala*



PRITI CHOHALE

Local name: Wagti

Description: This steely, metallic blue, flat, ribbon-like fish has a long, tapering tail. It has an unusually

long snout, and a large mouth with 2 or 3 long teeth, the rearmost teeth being so long that they come out through a small slit on the lower jaw when the mouth is tightly closed, while another pair of fangs(long teeth) are present at the tip of lower jaw. It has a single, long dorsal fin. It grows up to 100 cm long and can weigh 11 kg (24.3 lb).

Habits & Habitat: Ribbonfish inhabits deep waters at depths from 100 m and comes to the surface at night to catch small fish and crustaceans, especially prawns. Breeds from late summer to monsoon.

GOLDEN ANCHOVY *Coilia dussumieri*



PRITI CHOCHALE

Local name: Mandeli

Description: Small fish with golden flanks and belly with golden or pearly spots in rows. Body tapering to a pointed tail. Pectoral fin with 6 long thread-like filaments. Grows to a length of 15 to 21 cm.

Habits and Habitat: Seen in coastal and estuarine zones, prefers full salinity in water, but can tolerate almost fresh water. Feeds on copepods, prawn and fish larvae, crustaceans, polychaete larvae, and isopods. Possibly enters estuaries to breed. Female scatters eggs after external fertilization. Popularly utilized as a low priced food fish.

BOMBAY DUCK *Harpodon nehereus*

PRITI CHOHALE



Local name: Bombil

Description: A soft, semi-transparent and gelatinous appearance is typical of this fish. The characteristic large head, wide mouth, prominent lower jaw with rows of unequal, recurved, long, pin-sharp teeth are unmistakable. This fish grows up to 40 cm.

Habits & Habitat: This soft-bodied fish lives in deep water offshore on sandy mud bottom for most of the year. Only during the rains, large shoals of this fish congregate at river mouths to feed. Females scatter eggs to be fertilized externally in open water.

COMMON SEAHORSE *Hippocampus kuda*

Description: The seahorse is actually a fish that can grow around 17–30 cm long. It has a long body with tail that can curl around to hold onto a substrate. The snout is short and thick. The dorsal fin on its back propels it to move. Coloration is usually very cryptic that makes it almost invisible as it does not move much among the seaweed.

Habits & Habitat: Feeds on small shrimps, very small fish, and planktonic organisms. Strangely, here it is the male who actually broods the eggs in the belly brood pouch, after he receives the eggs from the female. While brooding eggs, each fertilized egg gets connected with the male's body where the eggs get the nourishment till they



PRADIP PATADE

hatch out. The babies come out of the pouch when fully grown.

INDIAN SALMON *Eleutheronema tetradactylum*



PRADIP PATADE

Local name: Ravas

Description: This fish is silvery green on top and cream below. Main identifying characteristics are the white filamentous pectoral fins; each fin has four filaments. Tail is deeply forked. It is known to grow up to 200 cm, and maximum weight so far recorded is 145 kg.

Habits & Habitat: Mainly occurs on shallow muddy bottom in coastal waters. Known to enter rivers during winter. Young fish are found in estuaries, where they form loose schools. Bigger fish are usually seen in pairs or singly. They feed on prawns, fish, marine worms, prawns and crabs. At times males get transformed to change sex as females, where the hermaphroditic individuals develop from 1-2-year-old fish, and females first appear as 2-3-year-old individuals. Soon after the breeding season, males start changing into females. This change from hermaphrodites to females is complete by the next breeding season. A highly priced fish. Marketed fresh, frozen, and dried or salted.

SPOTTED CROAKER *Protonibea diacanthus*

PRITI CHOCHALE



Local name: Ghol

Description: Grey or brown back, head light glossy purple, silvery below, fins yellowish with dark edges. Young fishes have several irregular black spots on the back; tail fins, head, and back are vertically banded. Tail not forked. Grows up to 150 cm long and can weigh up to 16 kg.

Habits & Habitat: Occurs in coastal waters over muddy bottom. Often enters tidal rivers and estuaries. Feeds mainly on crustaceans and small fishes. Sold fresh and dried salted in markets. An important low-priced food fish.

COMMON CROAKER *Johnius dussumieri*

Local name: Dhoma

Description: Brownish coloration, sometimes glossed



BIAS CHAKRABORTY

with gold on lower third of body. Tail wedge-shaped in young, getting rounded with age. Grows 11 – 16.5 cm.

Habits & Habitat: Inhabits coastal waters and estuaries. Seen generally in shallow water to a depth of 20 m. This carnivorous fish feeds mainly on prawn, fishes, molluscs, and other invertebrates. Females scatter their externally fertilized eggs while laying. No parental care. Often caught as a by catch by fishermen. This is a low-priced food fish available in local markets.

BLUE-SPOTTED MUDSKIPPER *Boleophthalmus boddarti*



AARON LOBO

Local name: Nivtee

Description: A dark greyish violet, slender fish with small black and bluish white spots on the fins. Prominent protruding large eyes and puffed up jaws are typical of this amphibious air breathing fish. The puffed up jaws are their gill chambers,

where they keep a bubble of air. Gill chambers close tightly when the mudskipper is out of water, allowing the gills to be kept moist, and make them supply oxygen while the mudskippers are on the land. Grows upto 18.7 cm long.

Habits & Habitat: Commonly seen on mudflats and among mangroves in brackish and marine waters at low tide, as they slither, skip and jump on wet mud. They have the ability to breathe through their skin and the lining of their mouth and throat. This is only possible when the mudskipper is wet, limiting mudskippers to remain near water. Mudskippers have eyes at the top of the head for an all-round view, while their mouth faces downwards to feed on the mud surface. Their pectoral fins are used to crawl over mud. Mudskippers are carnivorous opportunist feeders. They dig deep burrows to escape predators and raise their young.

INDIAN MACKEREL *Rastrelliger kanagurta*



PRITI CHOCHALE

Local name: Bangada

Description: Bluish green, tending towards grey above and yellow on belly and at sides, with greyish stripes and irregular blotches along upper body. Fins and deeply forked tail yellowish. Younger fish have small, round greyish dots along upper half of back. Indian Mackerel can grow up to 35 cm long, but most specimens are about 25 cm in length.

Habits & Habitat: Common along shallow coastal bays, harbours, and deep lagoons. Often occurs in turbid waters rich in plankton, as it mainly feeds on phytoplankton and small zooplankton, besides larval shrimps and fish. Females

scatter eggs in the open water. The eggs are fertilized externally, and there is no parental care. Mackerel is a commercially important fish with good demand.

SPOTTED SEER FISH *Scomberomorus guttatus*



BIAS CHAKRABORTY

Local name: Surmai

Description: Blue on back, silvery on sides; usually with irregular rows of dark round spots (smaller than eye) along sides of the body; spinous dorsal fin uniformly dark. Deeply forked tail. Size ranges from 45 to 82 cm. It grows up to 45 Kg.

Habits & Habitat: A migratory fish found in coastal waters at depths around 200 m. It is known to enter turbid estuarine waters. Female lays eggs scattered on the sea bed after being fertilized externally. This is a fairly expensive fish and a delicacy.

MACKEREL TUNA *Euthynnus affinis*



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Local name: Kuppa

Description: Dark blue and iridescent green back with wavy stripes up to the dorsal fin. Lower sides and

below are silvery white. Several black spots between the pelvic and pectoral fins. Specimens usually measure 50 to 100 cm, and can weigh up to 14 kg.

Habits & Habitat: This migratory species occurs in open waters along the shoreline up to 50 m depth. Young fish may be seen in bays and harbours. It is often seen in a mixed school of tuna and mackerel. An opportunistic predator, it feeds on small fishes, squids, crustaceans, and zooplankton. Female lays eggs scattered on the sea bed after external fertilization. There is no parental care. This tuna is widespread and abundant. It is caught in commercial fisheries, primarily as a bycatch.

SILVER POMFRET *Pampus argenteus*



PRITI CHOHALE

Local name: Pamplet

Description: Easily recognised by the flat body, forked tail fin, and long pectoral fins, it is usually silvery white, with a few small scales. Known to grow up to 4–6 kg, but due to overfishing most individuals weigh less than 1 kg. Size is recorded at 20–60 cm.

Habits & Habitat: Occurs usually in schools over muddy bottoms. Adults feed on comb jelly, jellyfish, and other zooplankton groups. One of the most expensive fishes sold fresh in markets, it is prized for its taste. Also called White Pomfret, it is found in coastal waters of the Middle East, South Asia, and Southeast Asia.

CHINESE POMFRET *Pampus chinensis*



PRITI CHOHALE

Local name: Saraga, Kafri

Description: Similar to Silver Pomfret, but tail slightly forked, snout blunt and rounded, forehead almost straight. Greyish to brownish dorsally, silvery white on sides, and covered in dark pigment spots. Fins silvery to greyish, and darkest near the body margin. Size ranges between 15–40 cm.

Habits & Habitat: Seen singly or in small schools over muddy bottom and may enter estuaries. Feeds on comb jelly, jellyfish, and other zooplankton, additionally it feeds on small crabs and shrimps. One of the most expensive fishes sold fresh in markets, prized for its taste.

BLACK POMFRET *Parastromateus niger*

Local name: Halwa

Description: Uniformly silvery grey to bluish brown, with dark edged fins. The young have dark vertical bars. Deep-bodied and strongly compressed, with tail deeply forked. This species grows up to 75 cm in length and is highly in demand in the local markets.

Habits & Habitat: During the day it remains near the sea bed, and at night rises close to the surface. Seen in large



schools, and when near the surface it swims on its side. Found in reefs at depths from 15 to 40 m, most often over muddy bottom. Feeds on zooplankton. Females scatter their eggs in reef beds once a year.

PUFFER FISH *Tetraodon* sp.



Local name: Paatha, Petha, Chend

Description: This queer little fish has a tapering body with big head. The common species found locally has greenish spots on white, while others have stripes too. There are several species of puffer fish ranging from the 1-inch-long pygmy puffer to the afoot-long puffer fish.

These fish do not have scales, but may have a rough to spiky skin. They have four teeth fused together like a beak.

Habits & Habitat: These fish are seen in brackish as well as fresh water. They feed mainly on invertebrates and algae. Larger puffers can break open and eat shells and mussels with their hard beaks. Puffer fish have a toxic substance in their body called tetrodotoxin. This substance makes puffer fish distasteful and can even kill a predator. Tetrodotoxin is up to 1,200 times more poisonous than cyanide, and there is no known antidote.

When alarmed, puffer fish are known to quickly suck in a lot of water or air that makes them several times larger to discourage predators and some species have spines on their skin that makes them look like a ball with sharp pins.

REPTILES

Sea Snakes

Sea snakes are among the most venomous of the world's snakes, and are completely adapted to life in the sea. Most sea snakes remain confined within the sea and usually never come on shore on their own. Sea snakes have been recorded as deep as 100 m in the sea. Most possess a flattened, paddle-like tail for swimming, as well as valved nostrils, which can be closed when the snake is underwater. Almost all sea snakes can remain underwater for up to two hours before surfacing to breathe. Sea snakes lack the expanded belly scales that most other snakes use for moving on land. All sea snakes give birth to live young.

Though extremely venomous, sea snakes are often handled by fishermen while removing them from the nets. Bites by sea snakes are very rare in India. Venom of some species is known to be ten times more potent than cobra venom. Antivenom on sea snakes is not easily available in India.

LITTLE FILE SNAKE *Acrochordus granulatus*
Non-Venomous

AARON LOBO



Description: Length: 60–120 cm. Grey or brown above with many narrow pale bands. Skin is loose and has a rough texture; hence the common name Wart or File Snake. Compared to the male, the female is larger, shorter, and stocky.

Habits and Habitats: Seen among the mangroves in creeks and estuaries, and also in the shallow sea on mud bottom up to a depth of 10 m, this snake is completely aquatic. Feeds on slow-moving fish like gobies and mudskippers, and may also feed on crustaceans and snails. Females ambush prey, while males forage actively. As the snake constricts the prey within its body folds, the rough skin helps to hold onto the prey underwater. Female gives birth to live young.

SHAW'S SEA SNAKE *Lapemis curtus* Venomous

Description: Length: 60 cm. A robust snake but short in length, with bands of moderate width around its body. Upper side is olive greenish brown or grey, while its belly is yellowish white. The number of bands can vary from 35 to 55. These narrow greenish black bands taper down near the belly. The bands could be seen on the belly also in



AARON LOBO

some individuals, while some may be just greyish brown without any bands.

Habits and Habitat: Prefers shallow coastal waters of estuaries, bays and gulfs also close to coral reefs. Could be seen in water from 4 to 40 m depth, and as deep as 55 m into the sea. Feeds on a variety of fishes, gastropods, crabs and shrimps. Female gives birth to live young. In a season, two to six young (25–35 cm long) are born during summer and mid monsoon months.

BEAKED SEA SNAKE *Enhydrina schistosa* Venomous



AARON LOBO

Description: Length: 90–140 cm. Prominent downturned beak-like projection on the snout, at the front of the upper jaw gives it the common name “Beaked”. Highly adapted

to life at sea, it has a flattened oar-like tail for swimming, and valved nostrils, which close underwater. Young bluish or bluish grey snakes have distinct black rings, but these bands fade in adults.

Habits and Habitats: Commonest among the sea snakes, this snake can be seen all along the coast as well in brackish creeks and even in freshwater tidal region. Feeds exclusively on fish. Female gives birth to 4 to 18 live young.

YELLOW-BELLIED SEA SNAKE

Pelamis platurus Venomous



SOLANKI PARESH

Description: Length: 70–100 cm. Colour pattern is unmistakable. Flat, elongated head with long snout. Body compressed with sharp ridge along the back. Colour variable, with black above and yellow or brown on the side and below. Prominent flat tail has dark stripes, wavy or broken into spots.

Habits and Habitat: Feeds on fishes. Female gives birth to live young. Seen on the surface floating passively and sometimes on the shore.

DOG-FACED WATER SNAKE *Cerberus rhynchops*

Mildly-Venomous

Description: Length: 60–120 cm. A stout, rough-skinned snake. Tail short, tapering to a point.



AARON LOBO

Habits and Habitats: An estuarine species. Seen along sea coasts, creeks and estuaries. Prefers mangrove habitat. It is known to flick its tail to frighten fish towards its head to catch. Female gives birth to live young.

Land snakes

RUSSELL'S VIPER *Daboia russelii* Venomous



SAVEER KEHIMKAR

Local name: Ghonus

Description: Length: 120 cm. Could be easily mistaken for a young python, with large stout body, and triangular flat head and dark brown markings. However, unlike python, the viper has a series of regular, large, ovate brown spots. When cornered, the viper hisses like a pressure cooker.

Habits and Habitats: Though this viper prefers open country, it is often found among mangroves and vegetation near the sea shore. Seen mainly after sunset. Feeds mainly on lizards, birds and rodents. Female gives birth to live young.

COMMON RAT SNAKE *Ptyas mucosus* Non-Venomous



Local name: Dhaman

Description: Length: 1.65–2.0 m. A long, agile greenish yellow snake. Large eyes with round dark pupils. Belly greyish white. Male longer than female.

Habits and Habitats: Often seen among mangroves as it is a good climber and will readily swim and dive too. Feeds on lizards, young birds, and rodents.

Sea turtles

Among the five species of sea turtles found in India, four are known to occur along the Maharashtra coast. Out of these, Olive Ridley Turtle is most common and seen along the entire coast of Maharashtra. There are also good records of Green Turtle and Hawksbill from various coastal villages in Maharashtra. Green Turtles occur more often near Malvan. Though very rare, there have been stray records of Leatherback Turtle on the coast of Maharashtra.

Though not usually preferred, sea turtles are eaten in some coastal villages, especially in Ratnagiri district. Most of the turtles entangled in fishing nets are killed here for meat. However, in Sindhudurg and Raigad districts, turtles caught in the nets are released after a prayer.

Sporadic nesting of Olive Ridley occurs in Raigad district, but Ratnagiri district has some good undisturbed beaches where good nesting takes place.

Threats

Egg poaching: This is the main threat to the population of sea turtles on the coast of Maharashtra. The eggs are collected and eaten all along the entire coast. And besides humans, stray dogs and jackals dig out the eggs.

Incidental catch: Turtles often get caught in fishing nets, but in most of the localities they are released immediately. However, in some areas of Sindhudurg district and most of the localities in Ratnagiri district, turtles are caught for meat. On an average, 4 to 5 turtles are caught per trawler per year. Overall, there has been an increase in fishing activities and human disturbances on the beaches, because of which turtles are avoiding those shores to nest.

OLIVE RIDLEY *Lepidochelys olivacea*



ISAAC KEHIMKAR

Local name: Kasav

Description: This turtle can weigh between 34–45 kg and reach roughly 0.6 m in length. It is named for its pale olive green carapace, or shell.

Habits and Habitats: This species is the most abundant among sea turtle species. These turtles are omnivores, eating a variety of prey including crabs, shrimp, lobster, urchins, jellyfish, algae, and fish. During the nesting season, thousands of females may nest over the course of a few days to a few weeks. Adults reach sexual maturity around the age of 15 years.

HAWKSBILL *Eretmochelys imbricata*



DIGANT DESAI

Local name: Kasav

Description: One of the smaller turtles, adults weigh between 45–90 kg and reach roughly 0.5 to 1 m in length. This is one of the most beautiful sea turtles, known for its colourful shells. It gets its name from its narrow head and sharp, bird-like beak.

Habits and Habitats: They spend their time in coral reefs, rocky areas, lagoons, mangroves, oceanic islands, and shallow coastal areas. Their diet is very specialized, feeding almost exclusively on sponges.

GREEN TURTLE *Chelonia mydas*

Local name: Kasav

Description: The Green Turtle is the second largest after the Leatherback. It can weigh up to 225 kg and reach 1.2 m in length. This turtle gets its common name from the green colour of the fat under its shell, and not because of



DIGANT DESAI

its skin or shell colour, as commonly believed. The shell is olive to black, teardrop-shaped, and the turtle has large, paddle-like flippers.

Habits and Habitats: Adult is a herbivore. Feeds mainly on sea grasses, seaweeds, algae, and other forms of marine plant life. Its beak is sharp and finely serrated, perfectly adapted for grazing on sea grass beds and scraping algae.

Lizards


COMMON MONITOR LIZARD *Varanus bengalensis*



YAGNESH BHAT

Local name: Ghorpad

Description: This large lizard grows about 175 cm long from the snout to the tip of the tail. Young monitor lizards



are brightly marked with dark crossbars and spotted with grey or yellow. Adults are light brown or grey with no spots. They have a long forked tongue.

Habits & Habitat: Young monitors may be more tree-dwellers, but adults mainly hunt on the ground. Adult monitors have few predators apart from humans who hunt them for meat and skin. Younger lizards are hunted by birds of prey and snakes. These lizards are not venomous. They feed mainly on insects, lizards, snakes, birds, eggs, and even fish. Often seen among the mangroves near the shore searching for crabs, young birds, and eggs.

Birds

Here are some birds that are commonly seen along the coastal habitats like sandy beaches, rocky shores, mudflats and mangroves. Both resident as well as migratory birds prefer these habitats. Migratory birds travel thousands of kilometres from their breeding grounds to spend their winter here before returning back. Some birds shown here are commonly seen around villages and urban areas near the coast. At places some species are seen in large numbers, indicating the richness of the coastal habitats in supporting such large populations. Many have long legs suitable for wading and that is why some are called 'waders'. A majority of these shore birds eat small invertebrates picked out of mud or exposed sand, besides fish. Different lengths of bills enable different species to feed in the same habitat, particularly on the coast, without direct competition for food. Moreover bill tips of these birds are sensitive enough to detect the hidden prey within mud and sand. Some larger species of birds feed on larger prey including insects, and small reptiles, fish and crabs.

Toxic contamination of the food base and oil pollution can adversely affect these birds who utilise these polluted habitats. Around 390 species of birds are known to occur along the coast of Maharashtra.



LITTLE CORMORANT *Microcarbo niger*

Local name

Chota Paankavla

Family

Phalacrocoracidae
(Cormorants)

Status

Common
Resident



V. GOPI NAIDU

ID: Dark duck-like bird, with stiff tail and sharp hooked bill. A small white patch on throat. Sexes alike.

Habits & Habitat: More commonly seen in estuaries and creeks with mangroves. They dive underwater to catch fish. Often seen on the shore with their wings held open to dry. They breed gregariously in trees, often along with other waterbirds in the colony. Little Cormorants breed between November and February in southern India.

Food: Fish.

ORIENTAL DARTER *Anhinga melanogaster*

Local name

Teerandaaz

Family

Anhingidae (Darters)

Status

Common
Resident



ISAAC KEHIMKAR

ID: Dark cormorant-like bird with silvery grey streaks on the back. Slender, snake-like neck and pointed sharp bill are typical of this bird.

Habits & Habitat: Resident of the wetlands including estuaries and creeks with mangroves, where it is often found on a rock or branch with its wings held open to dry. They nest in colonies in mixed-species heronries where they build a stick platform on tree which is usually surrounded by water. Several pairs may nest close to each other. Sexes alike.

Food: Fish.

LITTLE EGRET *Egretta garzetta*

SIDDHESH BRAMHANKAR



Local name
Lahan Bagla

Family
Ardeidae (Herons)

Status
Common
Resident

ID: Very similar to Cattle Egret, but with a black bill, and feet black and partly yellow. In breeding season, they get long drooping feathers on the head and fine ornamental feathers on the back and breast. Sexes alike.

Habits & Habitat: In the coastal area, seen on rocky or sandy shores, reefs, estuaries, mudflats, mangroves, and tidal creeks. May nest singly or in mixed-species colonies on trees, bushes or reed beds.

Food: Mainly small fish, aquatic and terrestrial insects, crustaceans, amphibians, molluscs, worms, reptiles, and small birds.

WESTERN REEF-EGRET *Egretta gularis*

NIKHIL BHOPALE



Local name
Samudri Bagla

Family
Ardeidae (Herons)

Status
Common
Resident

ID: Resembles Little Egret to some extent, but has two colour phases: pure white and the bluish slaty with a white patch on the throat. During breeding season, the bird gets two drooping long feathers. Sexes alike.

Habits & Habitat: Seen singly on rocky seashore and in mangroves. Breeding season is from March to July. Nests in colonies mixed with other egrets and herons on mangroves as well as taller trees.

Food: Feeds mainly on crabs, shrimps, shells and fish.

GREY HERON *Ardea cinerea*

Local name

Rakhi Bagla

Family

Ardeidae (Hérons)

Status

Common

Resident



YAGNESH BHAT

ID: Tall greyish white bird. Long slender S-shaped neck and pointed bill.

Habits & Habitat: Seen along creeks, salt marshes, mangroves, estuaries, tidal mudflats, muddy and sandy shores. Breeds either solitarily or in colonies.

Food: Mainly fish as well as amphibians, crabs, molluscs, crustaceans, aquatic insects, snakes, small rodents, and even small birds.

PURPLE HERON *Ardea purpurea*

Local name

Jambala Bagla

Family

Ardeidae (Hérons)

Status

Not Common

Resident

Local migrant



ANAND AMEMBAL

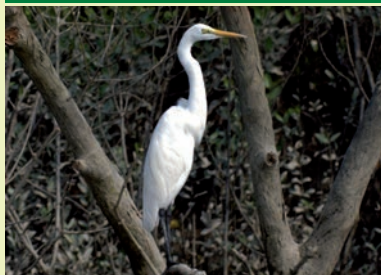
ID: Bluish grey upperside. Head and neck reddish brown, black and light brown below. It appears bright purple in direct sunlight.

Habits & Habitat: Mangroves and coastal mudflats. Breeds from November to March in south India.

Food: Fish, frogs, insects, crabs, shrimps, and snails. May even feed on small birds and mammals, snakes and lizards.

GREAT EGRET *Ardea alba*

ISAAC KEHIMIKAR



Local name
Motha Bagla

Family
Ardeidae (Hérons)

Status
Common
Resident

ID: Tall white bird, legs black, bill black and yellow or only yellow. During breeding season, they get a beautiful cluster of long feathers on the back. Sexes alike.

Habits & Habitat: Occurs along the coast, saltpans, mudflats, mangroves, and estuaries when in coastal locations. Nesting is on trees and bushes over water. Nests singly or in mixed-species groups.

Food: Fish, amphibians, snakes, aquatic insects, and crustaceans. May also feed on insects, lizards, small birds, and small mammals.

WESTERN CATTLE EGRET *Bubulcus ibis*

ISAAC KEHIMIKAR



Local name
Gai Bagla

Family
Ardeidae (Hérons)

Status
Common
Resident

ID: Plumage pure white, and bill yellow. During breeding the plumage on the head, neck, and back is orange and pale yellow.

Habits & Habitat: Commonly seen accompanying grazing mammals or domesticated cattle. Breeding season starts with the onset of monsoon in May. They nest in groups on trees and bushes.

Food: Mainly locusts, grasshoppers, beetles, caterpillars, centipedes, worms, crustaceans, frogs, tadpoles, snails, fish, lizards, small birds, and rodents.

INDIAN POND-HERON *Ardeola grayii*

Local name

Dhokari

Family

Ardeidae (Herons)

Status

Common

Resident



YAGNESH BHAT

ID: This brown bird is difficult to spot when at rest, but in flight white wings, tail and rump are prominent. During breeding season, the male and female get long hair-like feathers on the back and a long white crest on the head. Sexes alike.

Habits & Habitat: Very common, seen along estuaries, mangroves and tidal mudflats. Nests on trees with other egrets.

Food: Fish, crabs, shrimps, and insects.

STRIATED HERON *Butorides striata*

Local name

Hirvi Dhokari

Family

Ardeidae (Herons)

Status

Not Common

Resident



ISAAC KEHIMIKAR

ID: Almost like Indian Pond Heron, but more blackish grey, dark green and bronze green upper side, grey below, head and crest glossy greenish black. Sexes alike.

Habits & Habitat: Mostly seen singly in mangroves and coastal mudflats. Active during early mornings and evenings. Nests singly, not in colonies.

Food: Fish, insects, crabs, shrimps, and snails.

BLACK-CROWNED NIGHT HERON *Nycticorax nycticorax*

YAGNESH BHAT



Local name

Raat Bagla

Family

Ardeidae (Hérons)

Status

Common
Resident

ID: A grey, black, and white stocky bird. Head, nape, and a long crest on head black, additionally has long white drooping feathers on the head. Young birds resemble Indian Pond Heron, but are stocky. Active after sunset. Sexes alike.

Habits & Habitat: Seen along shallow rivers, streams, lagoons, marshes, mangroves, and estuaries. Nests in trees, bushes, reed beds, on cliff ledges overhanging river, with other species in colonies.

Food: Varied diet of fish, frogs, tadpoles, turtles, snakes, lizards, insects, spiders, crustaceans, molluscs, leeches, small rodents, bats, and eggs and chicks of other bird species.

PAINTED STORK *Mycteria leucocephala*

YAGNESH BHAT



Local name

Rangeet Karkocha

Family

Ciconiidae (Storks)

Status

Common
Resident

ID: Large, tall bird with long heavy yellow bill, slightly curved at the tip and bare featherless yellow face. Sexes alike.

Habits & Habitat: Seen singly or in small groups foraging in wetlands. Prefers freshwater marshes, intertidal mudflats, and saltpans. Often roosts in groups in mangroves.

Food: Mainly fish, but frogs also. Usually forages in shallow water, with the bill partially open, and swings its head back and forth in search of fish.

BLACK-HEADED IBIS *Threskiornis melanocephalus*

Local name

Paandhari Sharati

Family

Threskiornithidae
(Ibises, Spoonbills)

Status

Common
Resident



YAGNESH BHAT

ID: A white bird as large as a village hen, with naked black head and neck, and a stout, long, downcurved bill. Sexes alike.

Habits & Habitat: Seen in small groups of a few birds or as many as 25 to 30 birds on mudflats, aquatic grass, creeks, mangroves, and coastal lagoons. Nests in trees and bushes overhanging a waterbody, with other species in colonies.

Food: Fish, frogs, as well as insects.

EURASIAN SPOONBILL *Platalea leucorodia*

Local name

Chamcha

Family

Threskiornithidae
(Ibises, Spoonbills)

Status

Not Common
Local migrant



YAGNESH BHAT

ID: Snow-white with a distinctive long, flat, black and yellow spatulate bill. Cinnamon yellow patch at base of foreneck and breast. Naked throat yellow-orange.

Habits & Habitat: Prefers shallow wetlands with mud, clay or fine sand, but avoids rocky areas, thick vegetation or swift currents. Seen in marine habitats such as estuaries, tidal creeks, and coastal lagoons. Locally migratory, does not nest along the Maharashtra coast. It nests in other regions of India in mixed-species colonies.

Food: Adult and larval insects, molluscs, crustaceans, worms, frogs, and small fish.

GREATER FLAMINGO *Phoenicopterus roseus*

YAGNESH BHAT



Local name
Motha Rohit

Family
Phoenicopteridae
(Flamingos)

Status
Not Common
Local migrant

ID: Long-legged, long-necked, rosy white tall bird. Heavy pink bill turned down at an angle. Sexes alike.

Habits & Habitat: Seen as migratory birds on the Maharashtra coast during winter, as their nesting is only in the Great Rann of Kutch in Gujarat, where their return for nesting by April-May. Flamingos occur in flocks. Seen in estuaries and coastal mudflats.

Food: They feed by filtering particles through tiny platelets in the bill. Their diet consists of crustaceans like brine shrimp, molluscs, annelid worms, larval aquatic insects, small fish, algae, and organic ooze.

LESSER FLAMINGO *Phoeniconaias minor*

ISAAC KEHIMKAR



Local name
Chota Rohit

Family
Phoenicopteridae
(Flamingos)

Status
Not Common
Local migrant

ID: Long-legged, long-necked bird. Plumage darker rose pink than in Greater Flamingo. Bill dark coloured with crimson feathers around its base. Sexes alike.

Habits & Habitat: They migrate to the Maharashtra coast during winter, and by May-June return to their nesting site in the Great Rann of Kutch in Gujarat. Seen in large flocks along the mangroves, mudflats, and salt pans.

Food: They feed by filtering particles through tiny platelets in the bill. Their main diet consists of crustaceans like brine shrimp, phytoplankton, and blue and green algae.

LESSER WHISTLING DUCK *Dendrocygna javanica*

Local name

Adaee

Family

Anatidae
(Ducks, Geese, Swans)

Status

Resident
Common



ISAAC KEHIMKAR

ID: Small pale brown and pale reddish brown duck.

Habits & Habitat: Seen in small flocks dabbling and diving in water, in estuaries and mangroves. Breed during monsoon. Nesting in a tree hole or grass-lined nook in a tree fork. Eggs 7 to 12, white, incubated by both parents. Eggs hatch in about 22 to 24 days. Parents may often carry young ducklings on the back.

Food: Mainly aquatic plants, grains, fish, frogs, and invertebrates such as molluscs and worms.

BLACK KITE *Milvus migrans*

Local name

Ghaar

Family

Accipitridae
(Hawks, Eagles)

Status

Common
Resident



YAGNESH BHATT

ID: A familiar, medium-sized bird of prey with forked tail.

Habits & Habitat: Often seen circling around fish and meat markets. This bird is commensal with humans. Nests in trees.

Food: Carrion as well as live birds, mammals, fish, lizards, amphibians, and invertebrates.

BRAHMINY KITE *Haliastur indus*

ISAAC KEHIMKAR



Local name
Sagari Ghaar

Family
Accipitridae
(Hawks, Eagles)

Status
Common
Resident

ID: Light brown plumage except for the white head and breast, and black wing tips. Young birds are brownish. Tail is rounded.

Habits & Habitat: Mainly seen on the coast and in inland wetlands. Nests are constructed on various trees, often in mangroves. Both parents share nest building and feeding the young.

Food: Dead fish and other prey.

WHITE-BELLIED SEA EAGLE *Haliaeetus leucogaster*

SIDDHESH BRAMANKAR



Local name
Sagari Garud

Family
Accipitridae
(Hawks, Eagles)

Status
Not Common
Resident

ID: Large bird with white head, breast and tail. Upperparts grey. Tail short, wedge-shaped. Female slightly larger than male. Wingspan of female up to 2.2 m Young birds have brown plumage.

Habits & Habitat: They usually choose tall trees along the coast to nest, and often renovate their old nests and use them year after year.

Food: Mainly fish, turtles, and sea snakes. They also feed on carrion like dead birds and fish found on the shore.

WESTERN MARSH HARRIER *Circus aeruginosus*

Local name

Daldal Bhovtya

Family

Accipitridae
(Hawks, Eagles)

Status

Not Common
Winter visitor



YAGNESH BHAT

ID: Male dark brown with silvery grey tail and wings, wingtips black. Head reddish brown, neck and underparts dark reddish brown and chestnut. Female chocolate brown with a pale yellowish whitish cap on head and pale yellow leading edge of wings. It is similar in size to the Black Kite.

Habits & Habitat: This migratory bird is seen here during winter. Does not breed in India.

Food: Small mammals, frogs, fish, insects, and birds.

OSPREY *Pandion haliaetus*

Local name

Kaikar, Mor-ghaar

Family

Pandionidae
(Osprey)

Status

Not Common
Winter visitor



MOUMITA CHAKRABORTY

ID: As large as the Black Kite, it is brown with a brown and white head, and white underparts. The broad brown band across its upper breast is prominent. Sexes alike.

Habits & Habitat: Seen along the coast singly. Usually migrates alone, but may gather in small groups for roosting. Does not breed in India.

Food: Fish.

PEREGRINE FALCON *Falco peregrinus*

YAGNESH BHAT



Local name
Bahiri Sasana

Family
Falconidae
(Falcons)

Status
Not Common
Winter visitor

ID: Slaty black head, and black cheek stripes which stand out prominently on its white chin and throat. Grey barring on the back, reddish brown and white below, with black bars on lower breast.

Habits & Habitat: Winter visitor to India, and does not breed here.

Food: Hunts waders, ducks, and other waterfowl in the coastal area.

WHITE-BREASTED WATERHEN *Amaurornis phoenicurus*

YAGNESH BHATT



Local name
Kuva Kombadi

Family
Rallidae (Rails, Crakes,
(Moorhens)

Status
Common
Resident

ID: White head and breast. Short tail slaty grey, under tail bright rusty red. Sexes alike.

Habits & Habitat: Though it prefers freshwater habitats, it is seen in brackish wetlands and mangroves. Nests among low vegetation during rains.

Food: Worms, snails, insects, and shoots of marsh plants.

GREY-HEADED SWAMPHEN *Porphyrio poliocephalus*

Local name

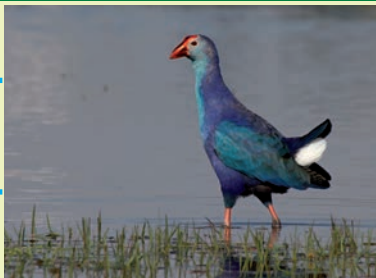
Jambali Paankombadi

Family

Rallidae (Rails, Crakes,
(Moorhens)

Status

Not Common
Resident



YAGNESH BHAT

ID: Purplish blue overall with long red legs and toes. Frontal shield on forehead red, continuing from the red bill. White patch under tail. Sexes alike.

Habits & Habitat: Partial to freshwater wetlands, but seen in mangroves and adjoining marshes. Nests among low vegetation during rains.

Food: Worms, snails, insects, and shoots of marsh plants.

COMMON MOORHEN *Gallinula chloropus*

Local name

Kaali Paankombadi

Family

Rallidae (Rails, Crakes,
(Moorhens)

Status

Common
Resident



YAGNESH BHAT

ID: Slaty grey and brown bird with white edges to the wings. Prominent white undertail-coverts. Frontal shield on the forehead and base of greenish bill bright red. Large feet.

Habits & Habitat: More frequently seen in freshwater habitats, but also seen in mangroves and adjoining marshes. Nests among low vegetation during rains.

Food: Worms, snails, insects, and shoots of marsh plants.

RED-WATTLED LAPWING *Vanellus indicus*

ISAAC KEHIMKAR



Local name

Titwee

Family

Charadriidae
(Plovers)

Status

Common
Resident

ID: The red fleshy wattle in front of each eye is unmistakable. Long legs are yellow. Sexes alike. The loud alarm call “Did he do it” is well-known.

Habits & Habitat: Prefers open grassy habitat near wetlands. Does not build a nest; eggs are laid on open bare ground, sometimes fringed with pebbles. Both parents take care of the young.

Food: Insects, snails, and other invertebrates.

LITTLE RINGED PLOVER *Charadrius dubius*

NIKHIL BHOPALE



Local name

Chota Kantheri
Chikhalya

Family

Charadriidae
(Plovers)

Status

Common
Resident

ID: Small, quail-sized bird with small white patch on forehead; black in front, ear-coverts and round the eyes. A black band round the neck and white collar above it. Sexes alike.

Habits & Habitat: Singly on intertidal mudflats, tidal creeks, and brackish estuaries or lagoons. Prefers to breed on bare or sparsely vegetated sandy and pebbly shores of freshwater pools, or slow-flowing rivers. Eggs laid on bare sandbanks, blend perfectly with the surroundings.

Food: Insects and their larvae, spiders, freshwater shrimps and other small crustaceans, mussels, worms, and snails.

KENTISH PLOVER *Charadrius alexandrinus*

Local name

Kentish Chikhalya

Family

Charadriidae
(Plovers)

Status

Not Common
Winter visitor



YAGNESH BHAT

ID: Small, quail-sized bird, smaller and paler than Little Ringed Plover. Dark collar band never complete, appears as dark patches on the sides. Upperparts greyish brown, underparts white.

Habits & Habitat: Seen in mixed flocks with other waders on the sea coast. Breeds in south India from April to August. Nest is just a depression in the sand above high tide mark. Both parents take care of the young.

Food: Mainly small crabs, shrimps, and insects.

LESSER SAND PLOVER *Charadrius mongolus*

Local name

Chota Chikhalya

Family

Charadriidae
(Plovers)

Status

Not Common
Winter visitor



YAGNESH BHAT

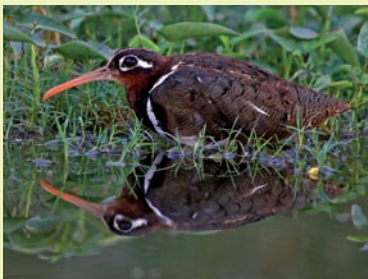
ID: Quail-sized plover with bare greenish grey legs and short pigeon-like black bill. Upperside sandy grey brown, white below. Brownish dark patch behind eyes on white head. Collar, hind-neck and upper breast and sides white.

Habits & Habitat: Seen singly or in flocks of up to 100 or more on sandy beaches, estuaries, sand-flats near the coast, mangrove mudflats, and exposed coral reefs. Breeds in the Himalaya, up to 5,500 m in Ladakh, Lahaul, and Sikkim.

Food: Small crabs, sand hoppers, and marine worms.

GREATER PAINTED SNIPE *Rostratula benghalensis*

YAGNESH BHAT



Local name
Rangeet Panlava

Family
Rostratulidae
(Painted-snipes)

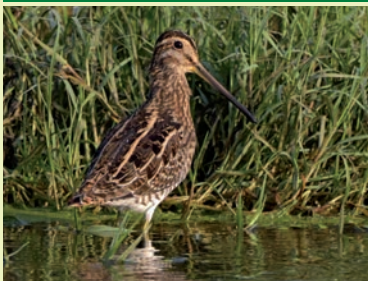
Status
Common
Resident

ID: Medium-sized, with a long, straight, slender bill slightly downcurved at tip. Female larger and more brightly coloured than male. Female has distinct white patches around the eyes, contrasting with dark red-brown head and neck. Male has prominent golden eye patch in contrast with grey-brown head, ash-grey neck, and white streaked throat. A golden “V” streaks the male’s back, and white below.

Habits & Habitat: Prefers mudflats overgrown with marsh grass and mangroves. Breeds mainly from late September to early May.

COMMON SNIPE *Gallinago gallinago*

YAGNESH BHAT



Local name
Panlava

Family
Scolopacidae
(Snipes, Sandpipers,
Phalaropes)

Status
Not Common
Winter visitor

ID: Cryptic coloration makes it almost invisible while it sits crouching on the mud, even in the open. Upperparts are mottled brown, with pale stripes on the back, dark streaks on the breast, and paler underparts. This quail-sized wader has short legs, short tail, and a greatly elongated bill for probing in the soft mud. Sexes alike.

Habits & Habitat: Prefers to feed at dawn and dusk, often in small groups, in shallow coastal areas and estuaries.

Food: Worms and insect larvae.

BLACK-TAILED GODWIT *Limosa limosa*

Local name

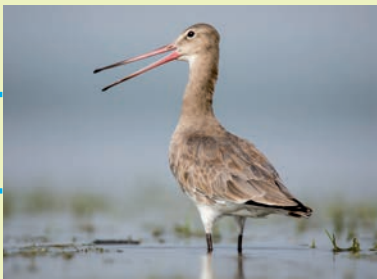
Kalya Shepticha
Pantilva

Family

Scolopacidae
(Snipes, Sandpipers)

Status

Not Common
Winter visitor



YAGNESH BHAT

ID: Long-legged and long-billed bird. Bill slender, straight, and slightly upcurved. Dull grey-brown plumage with distinctive black and white wingbar. By March, it starts getting its breeding plumage, with orange head, neck, and breast.

Habits & Habitat: Though more likely to be seen in brackish and freshwater waterbodies near the coast, it does occur along the shores of tidal creeks and estuaries. Often seen in large mixed flocks with other waders.

Food: Worms, snails, crabs, and insects.

BAR-TAILED GODWIT *Limosa lapponica*

Local name

Patteree Shepticha
Pantilva

Family

Scolopacidae
(Snipes, Sandpipers)

Status

Not Common
Winter visitor



NIKHIL BHOPALE

ID: Larger than Black-tailed Godwit, with similar slightly upcurved bill and barred tail, but in flight no white wingbar is seen. Upperside dark patterned sandy brown. Underside pale grey-brown, partly edged whitish, chest turns grey with fine dark streaking, underparts white. Sexes alike.

Habits & Habitat: Seen in winter in intertidal areas along muddy coastlines, estuaries, mangrove-fringed creeks, and sheltered bays, with tidal mudflats or sandbars.

Food: Mainly annelid worms like nereids, and bivalves, small crabs, and fish.

WHIMBREL *Numenius phaeopus*

ISAAC KEHIMIKAR



Local name

Lahan Koral

Family

Scolopacidae
(Sandpipers, Snipes)

Status

Not Common
Winter visitor

ID: Hen-sized bird that resembles Eurasian Curlew, but is smaller and has a dark crown with central whitish stripe on the head and long white eyebrow stripes.

Habits & Habitat: Usually seen in a flock of 5 to 15 on mudflats along the mangroves. Does not breed in India.

Food: Mainly snails and small crabs.

EURASIAN CURLEW *Numenius arquata*

ISAAC KEHIMIKAR



Local name

Eurasian Koral

Family

Scolopacidae
(Sandpipers, Snipes)

Status

Not Common
Winter visitor

ID: Long-legged bird with a very long, curved bill. Greyish brown and white on back, with greyish blue legs. Though sexes are alike, female has a longer bill.

Habits & Habitat: Seen singly or in a small flock on mudflats near mangroves.

Food: Probes the soft mud with its long, curved bill for snails and crabs. Also known to eat berries of marsh plants, grass shoots, and seaweed.

COMMON REDSHANK *Tringa totanus*

Local name

Tilva

Family

Scolopacidae
(Snipes, Sandpipers)

Status

Common
Winter visitor



YAGNESH BHAT

ID: Plain greyish brown above and whitish below, with fine brown streaks on chest. Legs red and red, bill black-tipped. Shows white on the lower back and rump, and white semi-circular band along the trailing edge of wing in flight. Sexes alike.

Habits & Habitat: Seen singly or in small flocks on rocky, muddy, and sandy beaches, salt marshes, tidal mudflats, and tidal estuaries. Breeds in India, in Ladakh and areas of Kashmir.

Food: Worms, small fish, shrimps, and insect larvae.

COMMON SANDPIPER *Actitis hypoleucos*

Local name

Tootari

Family

Scolopacidae
(Snipes, Sandpipers)

Status

Common.
Winter visitor



YAGNESH BHAT

ID: Small wader with short greenish grey legs and straight long beak. Its head, upper breast, and upperparts are greenish brown with delicate dark streaking, contrasting with the white underparts. Sexes alike.

Habits & Habitat: Seen singly on the shore from August, typically bobbing its head up and down. Even the tail portion of its body moves up and down while standing or walking. Prefers rocky seashore, tidal creeks. In India, it nests in Kashmir and Uttarakhand.

Food: Insects, molluscs, small crabs, shrimps, small fish, and worms.

TEREK SANDPIPER *Xenus cinereus*

YAGNESH BHAT



Local name

Ultachoch Tootari

Family

Scolopacidae
(Sandpipers, Snipes)

Status

Not Common
Winter visitor

ID: Easy to identify by its long, slender, upcurved bill and short orange-yellow legs.

Habits & Habitat: During winter it prefers open estuaries and mudflats, coral reefs, sandy and pebbly beaches, sandbars, coastal swamps, saltpans, coastal lagoons, and creeks. It often forms communal roosts in the branches of mangroves.

Food: A variety of insects, small shells, crabs, shrimps, and worms.

CURLEW SANDPIPER *Calidris ferruginea*

YAGNESH BHAT



Local name

Baakchoch Tootari

Family

Scolopacidae
(Snipes, Sandpipers)

Status

Not Common
Winter visitor

ID: Downcurved slender bill. Plain greyish brown above with fine dark mottling, white below, white eyebrow stripe, and sides of the chest washed brown. Female paler and has a longer bill.

Habits & Habitat: Seen in winter in large flocks on mudflats, creeks, saltpans, estuaries, and marshes along the coast. Does not breed in India.

Food: In winter habitat, seen feeding mainly on polychaete worms, snails, crustaceans like brine shrimps and copepods, and occasionally insects and seeds.

SANDERLING *Calidris alba*

Local name

Kavdya Tilva

Family

Scolopacidae
(Snipes, Sandpipers)

Status

Common
Winter visitor



NIKHIL BHOPALE

ID: Small wader, the size of a sandpiper. Pale plumage, almost white except for dark shoulder patch. Straight slender bill. Sexes alike.

Habits & Habitat: Often seen in large mixed flocks with other waders at the edge of surfing waves on open sandy beaches, estuaries, rocky and muddy shores, mudflats, and coral reefs. Very active in the surf on the shore. Does not breed in India.

Food: Feeds on small snails, small crabs, shrimps, polychaete worms, small fish, and insects.

LITTLE STINT *Calidris minuta*

Local name

Chota Tilva

Family

Scolopacidae
(Snipes, Sandpipers)

Status

Common
Winter visitor



NIKHIL BHOPALE

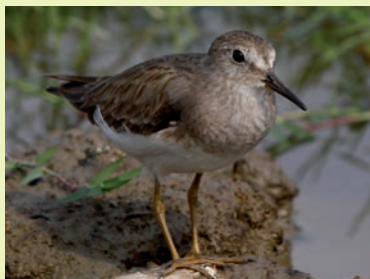
ID: Small quail-sized wader. Mottled greyish brown or dusky upperside, white below. Rump and middle tail feathers dark brown, outer tail feathers smoky brown. Dark bill and legs. Sexes alike.

Habits & Habitat: Always seen in large flocks, along the shore, mainly in coastal areas like estuarine mudflats, enclosed lagoons, tidal creeks, and saltpans. Does not breed in India.

Food: Insect larvae, annelids, molluscs, crustaceans and plant material.

TEMMINCK'S STINT *Calidris temminckii*

YAGNESH BHAT



Local name

Temminckcha Tilva

Family

Scolopacidae
(Sandpipers, Snipes)

Status

Not Common

ID: Slightly larger than House Sparrow, this small wader is similar to Little Stint, but differs in having pure white outer tail feathers and olive-green legs. No white stripe on back. Could be mistaken for a Common Sandpiper, but is smaller in size.

Habits & Habitat: Seen in mixed flocks with other waders on sandy beaches, tidal sand flats, mudflats, and river banks.

Food: Mainly marine invertebrates and insects.

DUNLIN *Calidris alpina*

NIKHIL BHOPALE



Local name

Karda Tilva

Family

Scolopacidae
(Sandpipers, Snipes)

Status

Not Common
Winter visitor

ID: Similar to Curlew Sandpiper, but slightly larger with longer legs, and bill more slender. Greyish brown upperside with fine dark mottling; white underside with chest washed brown.

Habits & Habitat: Seen in flocks on estuarine mudflats, coastal lagoons, saltworks, and sandy coasts during winter.

Food: While wintering it is omnivorous, feeding mostly on polychaete worms and small snails, insects, crabs, shrimps, bivalves, small fish, and even seeds.

RUDDY TURNSTONE *Arenaria interpres*

Local name

Rangit Tootari

Family

Scolopacidae
(Sandpipers, Snipes)

Status

Common
Winter visitor



NIKHIL BHOPALE

ID: This quail-sized bird has dark brown and white upper side, with rump and tail-coverts white, dark brown crossbar on the tail-coverts. Tail dark brown with white tips. Legs bright orange.

Habits & Habitat: During winter it is seen on rocky and sandy beaches, sheltered inlets, estuaries, mangroves swamps, exposed reefs, and mudflats with beds of molluscs.

Food: Insects, crabs, shrimps, snails, mussels or cockles, annelid worms, echinoderms, small fish, carrion, and birds' eggs.

RUFF *Philomachus pugnax*

Local name

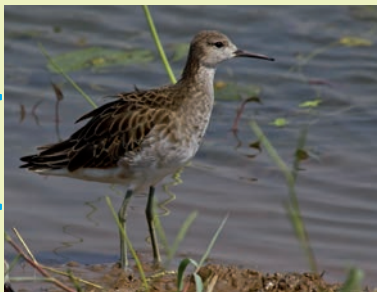
Bhandkhor Panlava

Family

Scolopacidae
(Snipes, Sandpipers)

Status

Not Common
Winter visitor



YAGNESH BHAT

ID: Greyish brown bird with prominent scaly pattern on upperside.

Habits & Habitat: Flocks seen on muddy shores of brackish wetlands, tidal mudflats, and lagoons. At places like Navi Mumbai, this winter visitor is common and at times a flock of 40–50 individuals can be seen foraging.

Food: Insects like caddisflies, waterbugs, mayflies, and grasshoppers; small crabs, shrimps, spiders, small snails, annelid worms, small fish, and seeds of rice and other cereals, sedges, grasses, and aquatic plants.

BLACK-WINGED STILT *Himantopus himantopus*

YAGNESH BHAT



Local name

Shekatya

Family

Recurvirostridae
(Avocets, Stilts)

Status

Local migrant
Winter visitor

ID: Partridge-sized, black and white bird with slender, long, reddish legs and slender, straight black bill.

Habits & Habitat: Seen in estuaries, coastal lagoons, brackish pools and extensive areas of mudflats, saltpans, and coastal marshes. It also occurs in freshwater wetlands. Nesting season is from April to August. Often breeds in large colonies.

Food: Aquatic larvae of beetles, mayflies, bugs, dragonflies, and flies; snails, shrimps, spiders, polychaete worms, tadpoles, small fish, fish eggs, and occasionally seeds.

PIED AVOCET *Recurvirostra avosetta*

YAGNESH BHAT



Local name

Oochatya

Family

Recurvirostridae
(Avocets, Stilts)

Status

Not common
Winter visitor

ID: Graceful black and white bird with a slender black upcurved bill. Long bluish legs.

Habits & Habitat: While wintering this bird prefers mangrove mudflats, saltpans, estuaries, and sandy beaches. Also breeds in the Great Rann of Kutch in Indian region. Nests in colonies.

Food: Mostly aquatic insects like small beetles, midges, and brine flies, crustaceans, oligochaete and polychaete worms, snails, as well as small fish.

LITTLE PRATINCOLE *Glareola lactea*

Local name

Chota Arlee

Family

Glareolidae
(Coursers, Pratincoles)

Status

Not Common
Resident



YAGNESH BHAT

ID: Sandy grey bird with short legs, long pointed wings, and short tail. Bill short, head with a brown crown, belly white. Sexes alike.

Habits & Habitat: Active during early morning and late evening. Often seen near waterbodies in the evening, catching insects on the wing. Seen in small flocks along coastal swamps. Forages on the ground for insects.

Food: Mostly insects.

PALLAS'S GULL *Larus ichthyæetus*

Local name

Pallascha Kurav

Family

Laridae
(Gulls, Terns, Skimmers)

Status

Not Common
Winter visitor



NIKHIL BHOPALE

ID: Largest among gulls, with yellow bill having a red patch. In winter, head is white with brown streaks, turns black by February.

Habits & Habitat: Often seen singly or in a small party of two to three birds wintering on beaches and in harbours, and even around refuse dumps.

Food: Omnivorous, though it mainly feeds on fish (more often dead fish), crabs, shrimps, insects, and small mammals, and may take young birds and bird eggs, reptiles, and seeds.

BROWN-HEADED GULL *Larus brunnicephalus*

NKHIL BHOPALE



Local name

Tapkiri Dokyacha
Kurav

Family

Laridae
(Gulls, Terns, Skimmers)

Status

Common
Winter visitor

ID: Head greyish white as seen in winter, head becomes brown by March. Prominent white patch near the black wing tips, and this characteristic distinguishes it from the Black-headed Gull.

Habits & Habitat: A familiar bird on the coast during winter, in large flocks of 200–250 birds. Seen along the coast, harbours, and fishing villages. Breeds in Ladakh in June-July.

Food: Fish, insects, grubs, green shoots, and even garbage thrown from ships and harbours.

BLACK-HEADED GULL *Larus ridibundus*

ISAAC KEHIMIKAR



Local name

Kalya Dokyacha
Kurav

Family

Laridae
(Gulls, Terns, Skimmers)

Status

Common
Winter visitor

ID: Resembles Brown-headed Gull, but is smaller and leading edge near wing tips pure white with no white patches. Head darkens to coffee colour by March.

Habits & Habitat: A common sight during winter, flying near waterbodies all along the coast. Forages on the seashore during low tide. More often seen roosting along with Brown-headed Gulls. Does not breed in India.

Food: Scavenges from garbage thrown in sea from ships and harbour. Otherwise it feeds on fish, insects, and grubs.

SLENDER-BILLED GULL *Larus genei*

Local name

Paatal Chocheecha
Kurav

Family

Laridae
(Gulls, Terns, Skimmers)

Status

Common
Winter visitor



ARBINDA PAL

ID: Head, neck, rump, and tail white, back and upper sides of the wings grey, with black tips to the outer edge. Belly white. There may be a small dusky spot on the side of the head.

Habits & Habitat: Seen in small flocks on mudflats and salt pans. This gull breeds in colonies, nesting on the ground. In India, it breeds only in the north-western state of Gujarat.

Food: Feeds mainly on fish, besides small crabs and shrimps. It will sometimes scavenge food.

LESSER CRESTED TERN *Thalasseus bengalensis*

Local name

Chota Turevala Surai

Family

Laridae
(Gulls, Terns, Skimmers)

Status

Not Common
Winter visitor



YAGNESH BHATT

ID: Forehead white, upper wings, rump, and central tail feathers grey, underparts white. Legs black and long sharp bill orange.

Habits & Habitat: This winter migrant is seen over salt pans, coastal lagoons, mudflats, marshes and estuaries, lagoons and salt marshes. Like typical terns, it hunts by diving for fish. Does not breed in India. During courtship, male offers fish to the female.

Food: Mainly fish and shrimps, but will readily feed on the eggs and young of other birds, carrion, aquatic invertebrates, insects, and earthworms.

WHISKERED TERN *Chlidonias hybridus*

NIKHIL BHOPALE



Local name
Kalledaar Surai

Family
Laridae
(Gulls, Terns, Skimmers)

Status
Common
Local migrant

ID: Pigeon-sized bird, but much slimmer with red bill. Grey on upperside and white below. Tail only slightly forked.

Habits & Habitat: Seen during winter along the coast in estuaries, coastal lagoons, creeks with mangroves, and tidal mudflats. Breeds in north India in Kashmir, in the Gangetic plain, and Assam. In winter, it occurs throughout the Indian subcontinent.

Food: Prefers terrestrial as well as aquatic insects, spiders, frogs, tadpoles, small crabs, shrimps, and small fish.

WHITE-THROATED KINGFISHER *Halcyon smyrnensis*

ANAND AMEMBAL



Local name
Pandhrya Chaticha
Dheever

Family
Alcedinidae
(Kingfishers)

Status
Common
Resident

ID: A large kingfisher. Bright blue on the back, wings, and tail. Head, shoulders, sides, and lower belly pale brown, throat and breast white. Bill large, red. Legs bright red.

Habits & Habitat: Seen on the seashore, but otherwise it may not always be found near water. Nests in an excavated hole on the mud bank of a river, stream, or roadside.

Food: Fish, crabs, lizards, snakes, young birds, and mice.

BLACK-CAPPED KINGFISHER *Halcyon pileata*

Local name

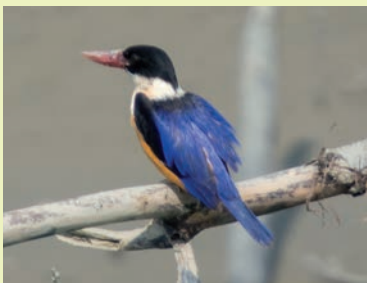
Kalya Topicha Dheever

Family

Alcedinidae
(Kingfishers)

Status

Common
Resident



ISAAC KEHIMKAR

ID: Deep blue on upperside, pale rusty below. Black cap on head, white collar, and bright coral red bill. Sexes alike.

Habits & Habitat: Seen perched along the mangroves. Nests in an excavated hole on the mud bank of a creek.

Food: Fish and crabs.

GREEN BEE EATER *Merops orientalis*

Local name

Veda Raaghu

Family

Meropidae

Status

Common.
Resident



ISAAC KEHIMKAR

ID: A small, slender, bright green bird. Plumage slightly tinged with blue, especially on the chin and throat. Crown and upper back tinged with golden rufous. Eyes red, bill slender and sharp. Tail feathers elongated. Sexes alike.

Habits & Habitat: Bee-eaters are commonly seen along seashores in small groups around trees. They often roost together. Green Bee-eaters nest between March and June in tunnels dug into sand banks or mud banks.

Food: As the name suggests, Green Bee-eater mainly feeds on insects, and to supplement its diet, it also feeds on fruits and berries.

WHITE-EARED BULBUL *Pycnonotus leucotis*

ANAND AMEMBAL



Local name

Pandharya Galacha
Bulbul

Family

Pycnonotidae

Status

Common
Resident

ID: Similar to Himalayan White-cheeked Bulbul *Pycnonotus leucogenys*, but smaller and lacks the crest, and white cheek patch is larger. Vent orange yellow. Sexes alike.

Habits & Habitat: Prefers drier habitats. Seen in flocks or pairs in mangroves, where it feeds on *Salvadora* or Mesvak berries. Breeds from March to September. Nest is built in bushes or in small trees.

Food: Fruits and insects.

ROSY STARLING *Pastor roseus*

ARABINDA PAL



Local name

Bhordi

Family

Sturnidae
(Starlings)

Status

Common
Winter migrant

ID: Rosy pink myna-like bird with black head, neck, and upper breast, wings and tail. Usually seen in noisy flocks on flowering trees.

Habits & Habitat: Seen in the mangroves where *Salvadora* or Mesvak grow. Mesvak berries are their favourite and flowering trees like Indian Coral attract them. They remain here till mid-April, and then depart to their nesting grounds.

Food: Grasshoppers and other insects on a large scale, besides berries and flower nectar.

MAMMALS

ISAAC KEHIMKAR

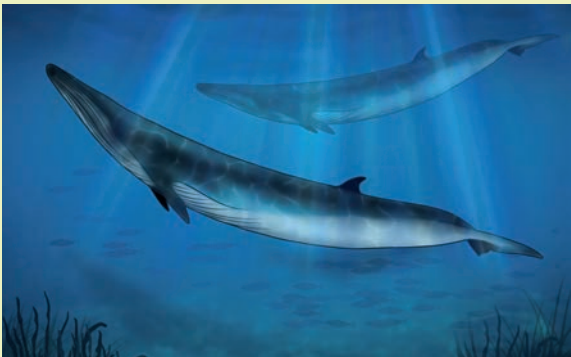


Marine Mammals

About 29 species of marine cetaceans (whales and dolphins) are known to occur in the Indian waters. Marine mammals are important indicators of ecosystem health. Though much of the information on marine mammals is lacking in most coastal states of India.

BRYDE'S WHALE *Balaenoptera brydei*

SAMEER KEHIMKAR



Local name: Dev Maasa

Description: Bryde's Whale belongs to same group as Blue Whales and Humpback Whales. It has twin blowholes and surprisingly there are no teeth in its mouth, but it has

two rows of baleen plates. They can grow up to 5.51 m. Dark smoky grey on the upper side and underside is usually white, and has an irregular white patch on the throat. The broad, centrally notched tail flukes never break the surface. Flippers are small and slender. Sexual maturity is reached at 8–11 years for both sexes. Seen in pairs or single, and sometimes in a group of 20 in feeding area. Feeds on a fish, crab and shrimps.

Habits & Habitat: Seen in pairs or single, and sometimes in a group of 20 in feeding area. Feeds on fish, crab and shrimps.

BLUE WHALE *Balaenoptera musculus*



Local name: Dev Maasa

Description: This marine mammal belongs to the group of baleen whales. Being the largest and heaviest mammal, it can weigh more than 180,000 kg and grow as long as 30 m. It is bluish grey on top and paler below. These whales do not have teeth, but have a row of plates fringed with bristles to filter plankton from the water.

Habits & Habitat: Usually seen in pairs or singly, but occasionally swim in small groups. Despite its size and weight, Blue Whale is a graceful swimmer and can move

at more than 8 km/hour, at times reaching a speed of over 30 km/hour.

Blue whales communicate with each other in a series of low frequency pulses, groans, and moans, which humans cannot hear. These vocalizations are possibly not only to communicate, but to sonar-navigate in the dark waters of the sea. Whales hunt by diving, and can go as deep as 500 m. With every gulp a whale takes in about 5,000 kg of water and plankton, and then forces the water out of its mouth. What remains is plankton, which the whale licks from these bristles.

Though whales live in deep sea, they come to the surface of the sea to breathe. As they exhale out of the blowhole, a cloud of pressurized vapour spouts out. Female whales breed only once in three years, and gestation period is around 11–12 months. Usually one young is born.

INDO-PACIFIC FINLESS PORPOISE

Neophocaena phocaenoides



SAMEER KEHIMKAR

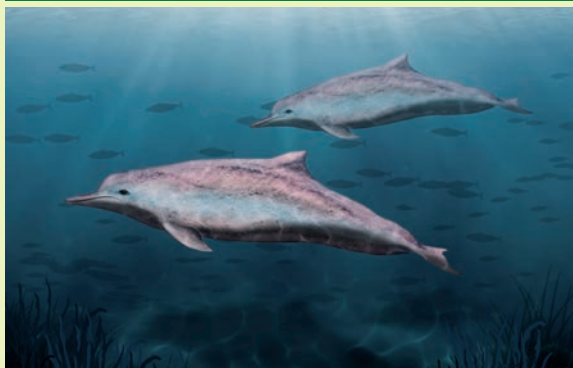
Local name: Dev Maasa

Description: This slender bodied marine mammal is the only porpoise which does not have a true dorsal fin, hence the name. Instead it has a ridge on the middle of its back.

It has a rounded head and the forehead is unusually steep, but typical beak is absent. It is dark to pale grey on the upperside and lighter on the underside. Young porpoises are paler, but soon turn darker as they mature. A scattering of horny tubercles is found on the back. Usually this porpoise can grow up to 1.55 m and weigh up to 30–45 kg (65–100 lb).

Habits & Habitat: This finless porpoise is mainly seen in the coastal waters. Usually it prefers to stay in shallow waters, close to the shore, in waters with sandy sea beds, estuaries, and mangrove swamps.

INDO-PACIFIC HUMPBACKED DOLPHIN *Sousa chinensis*



SAMEER KEHIMKAR

Local name: Dolphin

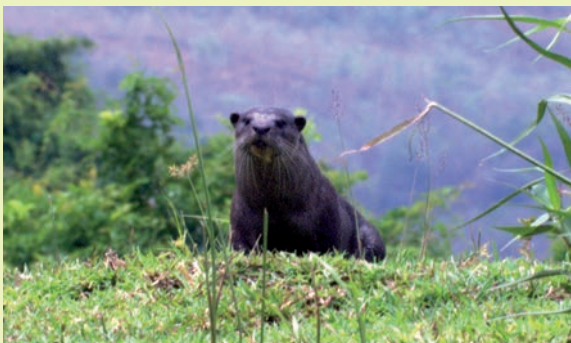
Description: This dolphin can grow up to 2.8 m and weigh up to 200 kg (440 lb). This medium-sized dolphin gets its name from the fatty hump on its back. Adults are dark grey.

Habits & Habitat: Seen along the coasts within a few kilometres of the shore. At times it is known to inhabit estuaries and even rivers, but they are never seen swimming far upstream. This dolphin typically surfaces with its beak, while its head is seen only partly, but sometimes the full head is seen as it arches its back to dive, and then the tail may be seen too.

Land Mammals

SMOOTH-COATED OTTER *Lutrogale perspicillata*

ISAAC KEHIMKAR



Local name: Paan Manzer

Description: These otters get their name from their short, smooth coat, which is an adaptation to their aquatic lifestyle, with short tightly packed underfur and longer guard hairs, all making the coat water repellent. The head is round, with naked nose, and the tail is flattened. Paws are strongly webbed.

Habits & Habitat: Seen in mangroves, estuaries, and rivers, they usually dig burrows near water, with an underwater entrance. Otters are excellent swimmers, and mainly feed on fish, but will catch crabs, snails, frogs, turtles, and even birds. They often hunt in groups with a feeding territory of 7–12 sq. km. Otters are most active during the early part of the day or in the evening. They communicate with each other with short yelping barks. They have a pair of scent glands at the base of the tail to mark their group's territories. Interestingly, these otters are known to have a common area as communal latrines. Otters are monogamous, and have strong pair bonding. Usually one or two cubs are born after a gestation period of 65 days. The otter family group lives together and can include up to four young otters born earlier too.

INDIAN JACKAL *Canis aureus indicus*



ISAAC KEHIMKAR

Local name: Kolhaa

Description: Typical dog-like. Appears brownish with a mix of black and white. Darker on the back and tail, while the belly is paler.

Habits & Habitat: Seen among mangroves, which is possibly their last shelter as human population grows. Here they are active from dusk till dawn. Mainly scavengers, they feed on crabs, dead fish, rodents, reptiles, insects, and even berries. Usually seen in pairs or may form a small pack.

INDIAN WILD BOAR *Sus scrofa cristatus*



ISAAC KEHIMKAR

Local name: Raan Dukkar

Description: A short, stout animal with relatively thin legs. Neck short and thick, with a slight hump behind the

shoulder. Such a body is well suited for digging soil. Adult males have prominent canine teeth that are seen outside of the mouth. Males are larger than females, and have a mane on their back.

Habits & Habitat: Wild boars are highly adaptable and social animals. They live in female-dominated groups. Males leave their group when they are 8–15 months old, while young females may remain in the mother's group or may form new territories. Young adult males live in loose groups, and later adult males are solitary when not breeding. Along the shore, wild boars are usually seen among mangroves. Here they feed on berries, molluscs, fish, rodents, bird eggs, lizards, snakes, and carrion. Like Mongoose, wild boars too possess immunity that protects them against snake venom.

INDIAN GREY MONGOOSE *Herpestes edwardsii*



YAGNESH BHAT

Local name: Mungoos

Description: A long, slender bodied carnivore with short legs. Its grizzled salt-and-pepper coat has coarse hair. Underside is paler, feet darker, and the tail dark red

tipped. The tail is as long as its body. Males are larger than the females. Female can give birth up to three litters per year. Two to four young are born after a gestation period of 60–65 days.

Habits & Habitat: Commonly seen in mangrove areas and in human habitation close to the shore. Seen foraging singly or in pairs. Feeds on rodents, birds' eggs and hatchlings, snakes, lizards, crabs, fish, and other invertebrates. It has immunity against snake venom. Breeds round the year.

CONSERVATION ISSUES

- i. It has been found that during the last 25 years, there has been about 40% reduction in the mangrove cover of Maharashtra due to human interference. Wood felling and habitat conversion under tremendous pressure of urbanization and industrialization are the two major threats observed for the mangroves of Maharashtra. Pollution of the rivers and creek water due to industrial and sewerage discharge is another serious factor along the coastal belt of Maharashtra. Several aquaculture farms have come up at the cost of mangroves.
- ii. Afforestation of intertidal zones with mangrove plantations is a viable option to improve coastal environment and enrich marine biodiversity. This also protects the coastline from strong currents and supports the accumulation of sediments and organic matter in the intertidal zones. These changes would improve the quality of mudflats and promote the survival and growth of intertidal zone fauna. However, it is also important to leave some areas of mudflats bare and open, because some of the fauna prefers just those bare habitats only.

- iii. Coastal waters and beaches are under constant threat from pollution originating from landward activities as well as from the sea. Such pollutants have often proved to be the primary cause of death of marine plants and animals.
- iv. Discharge of organic sewage, nutrients, and fertilisers in sheltered lagoons and creeks tends to accumulate and hasten the process of algal bloom and seaweed growth, changing the food chain composition.
- v. Heated water from power stations and industrial plants released in creeks and offshore waters changes the water temperatures, significantly altering the distribution pattern of marine life.
- vi. Petroleum hydrocarbons and crude oil from oil spills cause severe damage to marine life worldwide. Floating crude oil in the immediate offshore waters gets coated on the eyelids, nostrils and mouths of sea turtles, often leading to death. Birds coated with crude oil too face certain death. Crude oil spills into the sea selectively destroy or damage phytoplankton and zooplankton of reef and lagoon communities as well as planktonic larvae. Such accumulation has severe physiological effects on filter feeding animals and reef fish and may be accumulated in animals like the sea turtles. Already some fish like catfishes and mullets smell of kerosene. Pesticides and other industrial chemicals may not kill, but it is known that they impact the reproductive system of animals including turtles.
- vii. It has been found that radioactive waste in the sea is probably causing carcinogenic growths and deformities in marine turtles due to radioactive residues. It is also feared that radioactive waste may result in long-term and unpredictable effects on the genetic nature of the biological communities in the sea.

viii. Our own habit of dumping unwanted things in the sea has led to marine debris being prevalent in nearshore habitats, and there are numerous reports of the occurrence of marine debris in the digestive tracts of hatchling and adult sea turtles. The amount of materials found in the digestive tract of sea turtles is indeed shocking. These were mainly plastic bags, sheets, beads, pellets, lines, rope, strapping, pieces from bottles and hard pieces of plastic ingested by sea turtles, which has often resulted in death. Leatherbacks feed principally on jellyfish and are known to swallow plastic bags by mistake, that usually choke them to death. Such accidental ingestion of plastics has been the major cause of death of several species birds and other marine animals.

LAWS AND REGULATIONS

What is the Wild Life (Protection) Act, 1972?

The Wild Life (Protection) Act, 1972 was enacted by the Government of India with the aim to effectively protect India's wild life and to control poaching, smuggling, and illegal trade of wild life. In this Act, the term wild life refers to any wild bird, mammal, reptile, frogs, bees, butterflies, moths, crustaceans, and fish; and aquatic or land vegetation which forms part of any habitat.

The Act has been adopted by all the States except that of Jammu & Kashmir which has a similar law enacted for the purpose of wildlife protection. The Wildlife (Protection) Act of 1972 provides the basic framework to ensure the protection and management of wildlife. The Act has been amended several times to make it more effective in implementation. This Act has 7 Chapters, 66 Sections, and 6 Schedules. The Act with its various amendments provides the necessary legal framework to prevent damage to the wildlife.

The six schedules of the Act give varying degrees of protection. Schedule I and part II of Schedule II provide absolute protection – offences under these are prescribed the highest penalties. Species listed in Schedule III and Schedule IV are also protected, but the penalties are much lower. Schedule V includes the animals which may be hunted. The plants in Schedule VI are prohibited from cultivation and planting. This Act gives the Enforcement authorities the power to deal with offences under these Schedules.

Penalties are prescribed in Section 51. Enforcement can be performed by agencies such as the Forest Department, the Police, the Wildlife Crime Control Bureau (WCCB), the Customs, and the Central Bureau of Investigation (CBI). Charge sheets can be filed directly by the Forest Department. Other enforcement agencies, often due to the lack of technical expertise, hand over cases to the Forest Department.

What is the Coastal Regulation Zone (CRZ) law?

The Ministry of Environment and Forests (MOEF) had issued a notification under Section 3 of the Environment Protection Act of 1986, seeking to regulate development activity on India's coastline on February 19, 1991. The primary aim of this Act was to define the 'High Tide Line' (HTL) and 'Coastal Regulation Zone' (CRZ) and thereafter specify the activities permitted and restricted in the vicinity of the CRZ. This regulated zone was further divided into four categories (CRZ I-IV) as per permitted land use.

Under Section 3(1) and Section 3(2)(v) of the Environment (Protection) Act, 1986, all coastal stretches of seas, bays, estuaries, creeks, rivers, and backwaters which are influenced by tidal action (on the landward side) up to 500 m from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) were declared as Coastal Regulation Zone (CRZ).

The distance up to which development along rivers, creeks, and backwaters is to be regulated shall be governed by the distance up to which the tidal effect of sea is experienced in rivers, creeks or backwaters, as the case may be, and should be clearly identified in the Coastal Zone Management Plans.

The following activities are declared as prohibited under the CRZ: setting up of new industries and expansion of existing industries; manufacture or handling or storage or disposal of hazardous substances; setting up and expansion of fish processing units including warehousing; setting up and expansion of units/mechanism for disposal of waste and effluents; discharge of untreated wastes and effluents from industries, cities or towns and other human settlements; dumping of city or town waste for the purposes of landfilling; dumping of ash or any wastes from thermal power stations; land reclamation, bunding or disturbing the natural course of sea water; mining of sands, rocks, and other substrata materials; harvesting or drawing of ground water and construction of mechanisms within 200 m of HTL; dressing or altering of sand dunes, hills, natural features. For regulating development activities, the coastal zone stretches within 500 m of High Tide Line on the landward side are classified into four categories.

Subsequently, the Ministry of Environment and Forests brought out a fresh notification in September 2010, and was passed as Coastal Regulation Zone Notification 2011 on January 6, 2011.

Features of the current notification:

- It widens the definition of CRZ to include the land area from HTL to 500 m on the landward side, as well as the land area between HTL to 100 m or width of the creek, whichever is less, on the landward side along tidal influenced waterbodies connected to the sea. The CRZ also includes, for the first time, water area

up to 12 nautical miles in the sea and the entire water area of a tidal waterbody such as creek, river, estuary without imposing any restrictions of fishing activities. Thus, the main change in the scope of regulation has been to expand the CRZ to include territorial waters as a protected zone. This may have been in response to the criticism that while the earlier CRZ notification regulated development on the coastal stretches, it did not per se deal with pollution of the sea in any direct terms.

- The concept of a 'hazard line' has been introduced. While the notification merely states that the hazard line will be demarcated by the MOEF through the Survey of India, by taking into account tides, waves, sea level rise, and shoreline changes, this concept owes its introduction to the realisation of natural disasters such as tsunami and floods that may take place in this zone. In May 2010, the MOEF signed a Memorandum of Understanding with the Survey of India for undertaking this exercise over a period of four and a half years. The concept of classification of CRZ into four zones has continued in the 2011 notification with the following delineation:
 1. CRZ I: Ecologically sensitive areas such as mangroves, coral reefs, salt marshes, turtle nesting ground, and the intertidal zone.
 2. CRZ II: Areas close to the shoreline, and which have been developed.
 3. CRZ III: Coastal areas that are not substantially built up, including rural coastal areas.
 4. CRZ IV: Water area from LTL to the limit of territorial waters of India.

CRZ IV has been changed from the 1991 notification, which covered coastal stretches in the islands of Andaman & Nicobar and Lakshadweep. The MOEF has issued a

separate notification titled Island Protection Zone 2011 in relation to these areas.

- A new category called areas requiring special consideration has been created which consists of (i) CRZ areas of Greater Mumbai, Kerala and Goa, and (ii) Critically vulnerable coastal areas such as Sundarbans.
- Clearances for obtaining CRZ approval have been made time-bound. Further, for the first time, post-clearance monitoring of projects has been introduced in the form of the requirement to submit half-yearly compliance reports, which are to be displayed on the Ministry's website.
- With respect to the list of prohibited activities, one of the most important changes has been that of expanding the list of exceptions to the rule prohibiting setting up of new industries and expansion of existing industries. While the earlier exception was limited to those activities which required access to the water front, four other exceptions have been now incorporated which include:
 1. Projects of Department of Atomic Energy
 2. Facilities for generating non-conventional energy sources and desalination plans, except for CRZ-I zones on a case-by-case basis after doing an impact assessment study;
 3. Development of greenfield airport permitted only at Navi Mumbai; and
 4. Reconstruction, repair works of dwelling units of local communities including fishers in accordance with local town and country planning regulations.
- Another important aspect is the introduction of the Coastal Zone Management Plans, which will regulate coastal development activity and which are to be formulated by the State Governments or the administration of Union Territories.

- In Greater Mumbai, the redevelopment of the existing slums in CRZ areas has been permitted, provided that the stake of the state government or its agencies in these projects is not less than 51%. Redevelopment and reconstruction of old, dilapidated, and unsafe buildings in the CRZ-II area has also been permitted. Also, the floor space index (FSI) or floor area ratio (FAR) prevailing in the Town and Country Planning Regulations as on the date of the project being sanctioned, will apply. In order to ensure that the redevelopment of slums and dilapidated structures in Mumbai are done in the most transparent and accountable manner the Right to Information Act, 2005 will be applicable and auditing will be done by the office of the Comptroller and Auditor General (C&AG) of India.
- The 2011 Notification also lists out certain measures that have to be taken to prevent pollution in the coastal areas/coastal waters.

While the CRZ Notification 2011 has introduced several positive concepts seeking to protect the interest of the local traditional communities, it does have a few drawbacks namely:

- Although the no-development zone of 200 metres from the HTL is reduced to 100 metres, the provision has been made applicable to “traditional coastal communities, including fisher-folk”, thereby giving the chance for increased construction on the coast and higher pressure on coastal resources.
- Disallowing Special Economic Zone (SEZ) projects in the CRZ.
- There are no restrictions for expansion of housing for rural communities in CRZ III.

The CRZ Notification 2011 is a major step-up from the 1991 Notification and the MOEF has made special

efforts to include specific provisions to benefit the fisher-folk community in all the coastal areas and address the shortcomings of the 1991 Notification such as time-bound clearances, enforcement measures, special provisions for specific coastal stretches, etc. These changes are significant in the new notification.

Marine Protected Areas of Maharashtra

A marine protected area (MPA) is essentially a space in the ocean where human activities are more strictly regulated than the surrounding waters – similar to parks we have on land. These places are given special protections for natural or historic marine resources by local, state, territorial, native, regional, or national authorities.

In order to provide protection to the ecologically important coastal areas, India initiated action through the state governments for the conservation and management of the marine ecosystems. Marine ecosystems were declared as ecologically sensitive areas under the Environment Protection Act, 1986 banning their exploitation, followed by a Coastal Regulation Zone (CRZ) Notification 1991 prohibiting development activities and disposal of wastes in the mangroves and coral reefs.



YUVRAJ GURJAR

Forest officials releasing turtle hatchlings at Velas during the Turtle Festival

There are a total of 31 Marine Protected Areas (MPAs) in India, out of which two MPAs are in Maharashtra. They are the Malvan Marine Sanctuary and Thane Creek Flamingo Sanctuary.

The MPAs in India are managed by the wildlife wing of the Forest Department, which is also custodian of the PAs. The common issues and problems that need to be tackled urgently for ensuring an effective management setup of the MPAs of the country are: legal issues, including settlement and demarcation of boundaries; lack of adequate management and protection infrastructure; inadequate scientific and technical person in management; absence of scientific management plans for majority of the MPAs; uncontrolled exploitation of fishes, crabs, corals, shells, and marine algae; increasing use of the areas for ports and jetties, loading and unloading of large number of ships and oil tankers; discharge of pollutants; expansion of salt and aquaculture ponds.

ECOTOURISM

Ecotourism is now defined as “responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education”.

Ecotourism is about uniting conservation, communities, and sustainable travel. This means that those who implement, participate in, and market ecotourism activities should adopt the following ecotourism principles:

- Minimize physical, social, behavioural, and psychological impacts.
- Build environmental and cultural awareness and respect.
- Provide positive experiences for both visitors and hosts.
- Provide direct financial benefits for conservation.
- Generate financial benefits for both local people and private industry.

- Deliver memorable interpretative experiences to visitors that help raise sensitivity to local political, environmental, and social climate.
- Design, construct, and operate low-impact facilities.
- Recognize the rights and spiritual beliefs of the local people and work in partnership with them to create empowerment.

Ecotourism focuses on Indian local cultures, wilderness, adventures, and environmental protection. In India, the movement is now gathering good momentum with the development of more such destinations and facilities for ecotourists.

SOME GUIDELINES FOR AN ECO (TURTLE) FRIENDLY COASTAL TOURISM

Coastal tourism is catching up very fast in coastal Konkan. Lots of coastal resorts are coming up in this region. Tourism in this region will certainly provide good job opportunities. So here are some guidelines for an eco (turtle) friendly coastal tourism:

- Regulating tourist activities on nesting areas on beaches and lagoons during nesting season.
- Tourism infrastructure and other tourist facilities should be permitted beyond 200 m from the high tide line or on the landward slope of the sand rather than the seaward slope.
- Managers and owners of all tourist resorts should be made aware of effects of beach illuminations on turtle hatchlings, and how they can make the beach more sea turtle friendly.
- During nesting season, and till the hatchlings emerge, there should be a total ban on beach rides on nesting beaches using animals or heavy vehicles.

- Any alteration like beach levelling, removal of natural vegetation, or planting of trees on the beach should be done only after consultation with experts or coastal zone management authorities.
- Need to keep turtle nesting areas off limits for any strolling to avoid compaction of sand, and at night to avoid disturbing nesting turtles. In such areas, special turtle watch programmes could be organized for tourists.
- The tourism department, beach resorts, and other beneficiaries of beach tourism can involve local communities and schools to adopt a particular sea turtle nesting beach and demonstrate turtle friendly practices.

To ensure that turtle nesting beaches get more turtles to nest and more tourists to watch them, here are some suggestions:

- a. Provision of trash bins
- b. Putting up warning notices and boards
- c. Demarcation of turtle sensitive areas
- d. Announcements of special programmes like turtle watch in lagoons, nesting turtle watch, turtle egg collection, hatchery operation and release of hatchlings, and voluntary nesting turtle counts.

Such activities will bring in more participation and cooperation as people get more aware and will then readily support for sea turtle conservation.

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Notes:-

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