

SINGAPORE'S *very own*

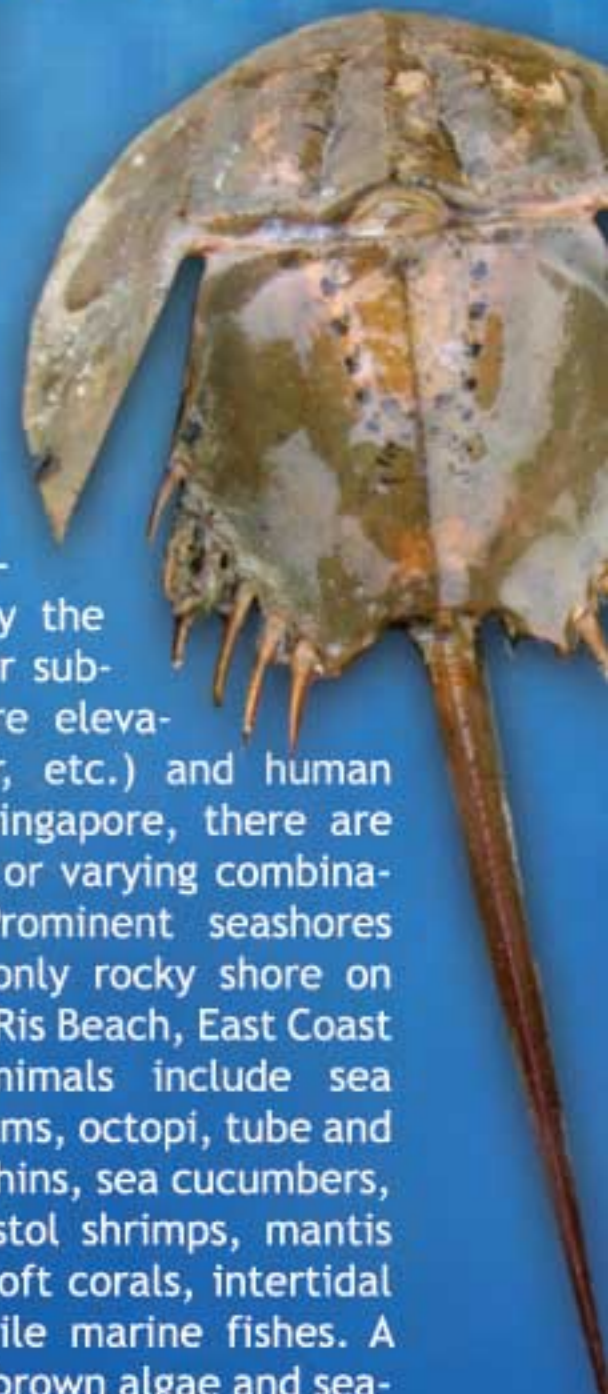
NATURAL

HERITAGE



Hawksbill Turtle
Eretmochelys imbricata

Mangrove Horseshoe Crab
Carcinoscorpius rotundicauda



Young seedling of *Rhizophora* sp.



Mangrove Forests

Mangroves are biologically rich wetlands that line about 75% of the tropical coastlines.

In Singapore, prominent mangroves are found at Sungei Buloh Wetland Reserve and Pulau Ubin. Mangrove trees like *Rhizophora*, *Avicennia*, *Sonneratia* and *Bruguiera* are highly adapted to the salty water and water-logged mud - they have specialised roots and other means to reduce water loss.

Interesting mangrove animals include local and migratory birds (Pacific Golden Plover, Common Sandpiper, Purple Heron, Greater Egret); reptiles like Water Monitor Lizard, Estuarine Crocodile; a variety of fishes like Giant Mudskipper, Archer Fish, Half-beak, Puffer Fish; many crustaceans like Mud Lobster, Mud Crab, Fiddler Crab, Tree-climbing Crab, etc.

Mangroves are important nurseries for marine fishes and invertebrates, especially food-important species. They provide people with food, timber and charcoal. Mangroves protect our coasts from typhoons and waves, removing pollutants and sediments from the water and even reclaiming land (by accumulating and stabilising sediments on muddy shores). Threats to mangroves include habitat destruction, pollution (marine litter) and over collection.

Seashores

Seashore ecosystems are complex environments where the land and sea meet. This environment is strongly influenced by the tides. Seashores differ in their substrate (ground material), shore elevation, surrounding relief (river, etc.) and human activities (e.g. shipping). In Singapore, there are muddy, sandy or rocky shores, or varying combinations of these substrates. Prominent seashores include Labrador beach (the only rocky shore on mainland), Changi Beach, Pasir Ris Beach, East Coast Beach. Common seashore animals include sea slaters, sea slugs, sea snails, clams, octopi, tube and bristle worms, sponges, sea urchins, sea cucumbers, sea stars, sea pens, crabs, pistol shrimps, mantis shrimps, anemones, hard and soft corals, intertidal spiders, sea snakes and juvenile marine fishes. A large variety of red, green and brown algae and seagrasses can also be found. Seashores are nurseries for many species of marine life - especially food important species, "hatcheries" for turtles (sandy beaches) and some sea snakes (rocky shores). People depend on seashores for their food, transport, livelihood, building materials, and recreation. Our seashores are threatened by habitat destruction, pollution and collection.



Water Monitor Lizard
Varanus salvator



Moon Crab
Matuta lunaris



Fiddler Crab
Uca vocans

Surrounded by sea, Singapore has a rich natural heritage of intertidal and marine habitats.

Seagrass Beds

Seagrasses are the only true marine flowering plants that can be found on seashores. They have high primary productivity and support a large community of fishes, invertebrates (sponges, bryozoans, crabs etc.) and large herbivores like green turtles and dugongs. In Singapore, the most extensive seagrass beds are found at Chek Jawa (on Pulau Ubin), Cyrene reefs and Pulau Semakau, with patches on other coasts. Common seagrass species include *Enhalus acoroides*, *Halophila ovalis*, *Thalassia hemprichii* seagrasses. Seagrass beds are breeding grounds for many fishes and shellfish; they trap sediments and prevent shore erosion. They can act as bio-indicators of coastal ecosystems. Seagrass beds are threatened by habitat destruction and pollution. To better understand and conserve this vulnerable ecosystem, research and monitoring work are currently being carried out.



Knobbly Sea-Star
Protoreaster nodosus

Coral Reefs

Coral reefs are massive limestone 'cities' built by hard corals. They are one of the richest ecosystems on Earth, able to support up to one quarter of the world's marine species! Reefs in Singapore are found mainly around islands south of Singapore. There is a large variety of corals, anemones, sea fans, fishes, crabs, shrimps, sea snails, sea stars, urchins and sea cucumbers. Algae and phytoplankton are the main primary producers. Coral reefs are valuable as they provide us with food, medicines and building materials. They protect our shores and support the eco-tourism and the SCUBA diving industries. Local reefs are threatened by climate change, collection (e.g. for aquarium trade), pollution and anchor damage by boats.



The Open Sea

This is the largest ecosystem in the world, considering that 70% of Earth is made up of ocean! This habitat spans the waters above the continental shelf that Singapore sits on. Water temperatures range from 16-30°C and has a salinity of approximately 30ppt. The top layer receives the most light, supporting the growth of phytoplankton, which is the basis of the open sea food web. Macroalgae like *Sargassum*, detached from seashores, form flotsam, which harbour a variety of animals like crabs, shrimps, copepods, isopods, file-fishes and pipe-fishes. In Singapore, pelagic animals include jellyfishes, comb jellies, squids, turtles, dugongs, dolphins and large schools of fishes. Migratory fishes like marlins and manta rays are occasionally sighted in our waters. The threats to our open sea are chemical pollution and marine litter.



Cuttlefish
Sepia sp.



Copperband Butterflyfish
Chelmon rostratus



False Clown Anemone Fish
Amphiprion ocellaris



Tiger Cowry
Cypraea tigris

