

Spot and colour me!



Overall details

Objective	To introduce the natural habitats of our local flora and fauna through this spotting and colouring activity. <ul style="list-style-type: none">• Marine habitat• Terrestrial habitat
Summary	An engaging activity for participants to spot and colour local flora and fauna in the various templates given.
Duration	20 minutes
What you will need:	Materials: <ul style="list-style-type: none">• Printed template (provided)• Colour pencils
Remarks	Templates can be found on pages 3 and 4.

Activity description

Participants will print out the colouring template given below in (pages 3 and 4) and look for the animals that are present in their natural habitat. Once found, they will colour the animals in. The habitat in the background can be coloured in as well.

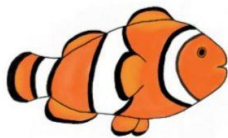
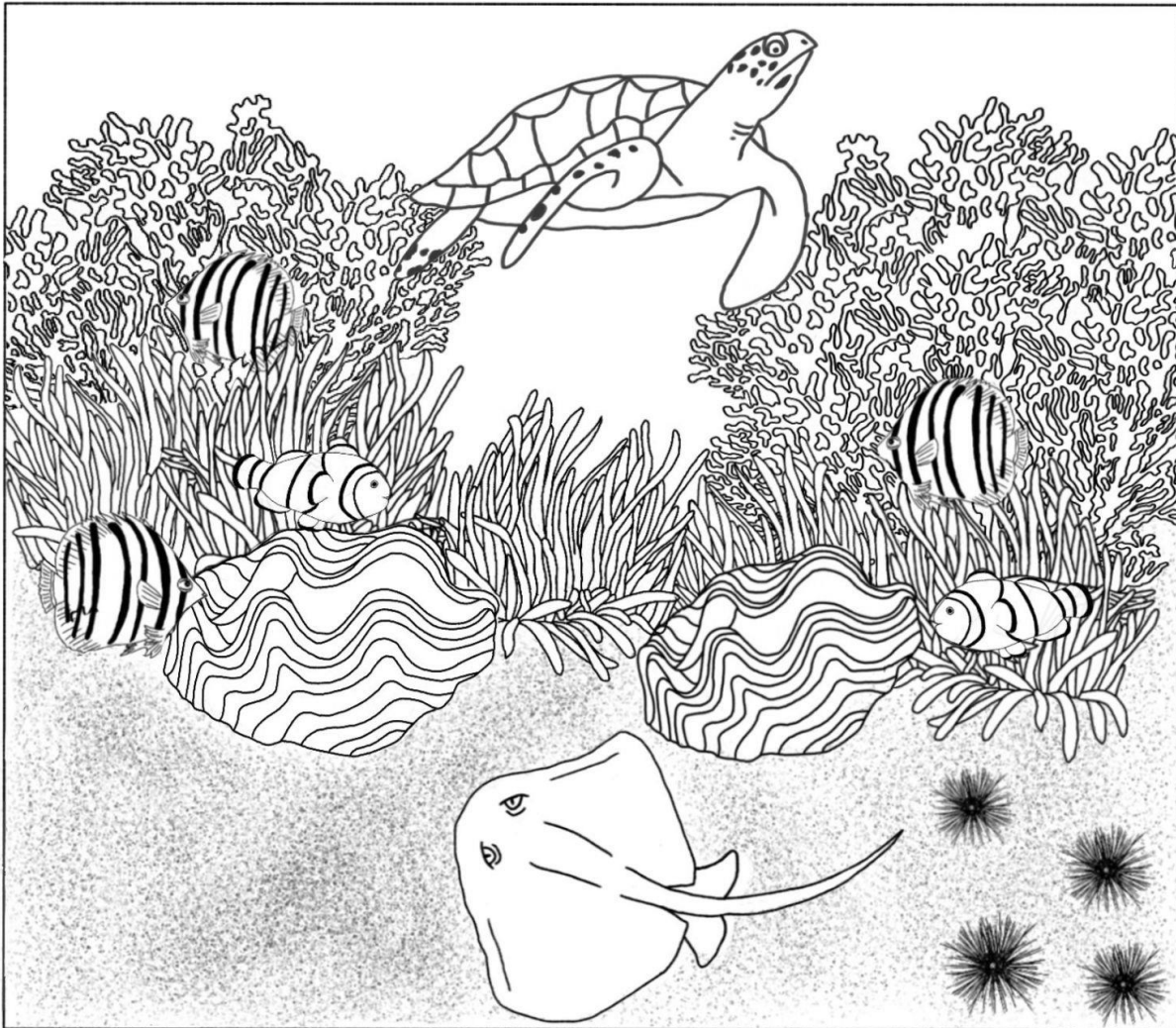
The fauna present in the spot me activity are given in the table below:

Marine habitat	Terrestrial habitat
Blue-spotted fantail ray (<i>Taeniura lymma</i>)	Black naped oriole (<i>Oriolus chinensis</i>)
Clown anemonefish (<i>Amphiprion ocellaris</i>)Eightband butterflyfish (<i>Chaetodon octofasciatus</i>)	Common sun skink (<i>Eutropis multifasciata</i>)
Eightband butterflyfish (<i>Chaetodon octofasciatus</i>)	Green-crested lizard (<i>Bronchocela cristatella</i>)
Giant clam (<i>Tridacna squamosa</i>)	Pink-necked green pigeon (<i>Treron vernans</i>)
Hawksbill turtle (<i>Eretmochelys imbricata</i>)	White-bellied sea eagle (<i>Haliaeetus leucogaster</i>)
Sea urchins (Echinodea)	White-cheeked carpenter Bee (<i>Xylocopa aestuans</i>)
Tree sea fan (<i>Melithaeidae</i>)	

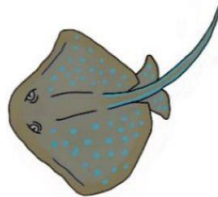
How to conduct the workshop

No.	Suggested Flow	Facilitators Notes
1	Print out colouring template in pages 3 and 4	Print the template in colour to match actual colour of native flora and fauna
2	Introduce the animals/ plants that are present in each habitat.	Facilitator to explain briefly about the animals or plants that are present in each habitat and to provide some information about the habitat. Additional information can be found on page 7 to 17
3	Provide them with the colouring template and start to colour it in.	Encourage the participants to look for the animals by themselves although help can be provided. Encourage them to refer to the colouring template below. Facts of the animal or plant can be provided as they colour in the image.

Image of marine template: Recommended for ages 3 and above



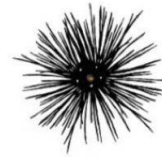
Clown anemonefish
Amphiprion ocellaris



Blue-spotted fantail ray
Taeniura lymma



Giant clams
Tridacna squamosa



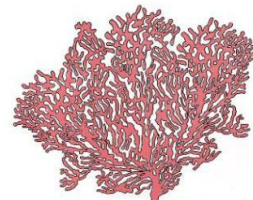
Sea urchins
Echinodea



Eightband butterflyfish
Chaetodon octofasciatus



Hawksbill turtle
Eretmochelys imbricata



Tree sea fan
Melithaeidae

Image of terrestrial template: Recommended for ages 7 and above



Black Naped Oriole
Oriolus chinensis



Green-crested Lizard
Bronchocela cristatella



White-bellied sea eagle
Haliaeetus leucogaster



Common sun skink
Eutropis multifasciata



Carpenter bee
Xylocopa



Pink-necked green pigeon
Treron vernans

Background information

The following pages are supplementary information on the topics covered in this workshop. Facilitators are recommended to read them to get a better idea of what the workshops aim to teach participants.

Marine habitat

Singapore's coastal and marine habitats, which include coral reefs, mangroves and intertidal areas, are mainly distributed along the northern and southern coasts and offshore islands. These habitats are home to a large amount of biodiversity, which includes more than 250 species of hard coral, around 200 species of sponges, 12 seagrass species and over 100 species of reef fish.

The ecosystem that we are focusing on for this activity is the coral reef.

Coral reefs

Reefs are split up into 3 zones: reef flat, reef crest and reef slope.

Reef flats: Areas of the reef where it is partly or entirely dry at low tide. Some features of the reef flats are shallow pools, potholes, coral debris and sand.

Reef slope: The reef slope is the region of the coral reef where the reef flat begins to drop off to the lagoon floor.

Reef crest: It is the area which is usually never exposed and hence has the most density of marine life.

As you go deeper than the reef crest, the density of marine life decreases and the community of marine organisms are adapted to living in low-light conditions.

Since 1986, due to land reclamation and increase in water turbulence, most coral reefs in Singapore have lost up to 65% of their live coral cover due to suffocation and lack of light penetrating the water.


Importance of coral reefs

Coral reefs are believed to have the highest biodiversity of any ecosystem on the planet. They are home to more than 25% of marine life while only occupying less than 1% of the ocean floor.

Coral reefs have provided homes for numerous species of fish and invertebrates and hence this diversity has provided humans with food, medicine and revenue from fishing and tourism.

Coral reefs also provide a buffer that protects coasts from waves, storms and floods as they form barriers to protect the shoreline.

Species of fauna featured

Native species	Information
<p data-bbox="203 304 743 340">Blue-spotted fantail ray (<i>Taeniura lymma</i>)</p>  <p data-bbox="203 772 675 808">Photo credit: wildsingapore, Ria Tan</p>	<p data-bbox="824 304 980 340"><u>Description:</u></p> <ul data-bbox="873 340 1424 808" style="list-style-type: none"> - Blue-spotted fantail ray is possibly the most commonly spotted ray in coral reefs in our region. - It can grow to about 30cm in diameter. - It has an oval body with a rounded snout. Its tail is long and thick with two blue stripes running down along the length of the tail. - It has either a grey, yellow, olive-green, brown or reddish-brown colouration with bright blue spots. - It can sometimes be spotted on sandy areas and in coral rubble on some of our shores. <p data-bbox="824 808 964 844"><u>Behaviour:</u></p> <ul data-bbox="873 844 1424 1045" style="list-style-type: none"> - As the tide level rises, the ray hunts by moving into shallow sandy areas. - It's prey consists of snails, clams, worms, shrimp and crabs. - As the tide level falls, it seeks shelter in caves and under ledges.

Clown anemonefish
(*Amphiprion ocellaris*)



Photo Credit: Joy Wong

Description:

- It can grow to between 5 to 13cm and is orange coloured with 3 vertical white stripes.
- Its fins are rounded and have a fringe of black.

Behaviour:

- Anemonefishes of the same species are usually found in groups in the same anemone.
- Anemonefish have a symbiotic relationship with sea anemones as the sea anemones will protect the anemonefish from predators and the anemonefish helps to remove parasites and drives off intruders from the sea anemone.

Diet:

- It waits until the anemone has stung and eaten its prey and it eats up the leftovers.
- It also eats dead anemone tentacles, plankton, molluscs, crustacea and certain parasites that it finds on the host sea anemone's body.

Fun fact:

- Anemonefish can change their gender.
- The largest clown anemonefish will be the female while the second largest will be the dominant male and the rest are non-dominant males.

Eightband butterflyfish
(*Chaetodon octofasciatus*)



Photo Credit: wildsingapore, Ria Tan

Description:

- It is a flat, disc-shaped fish with eight vertical stripes, and a slightly pointed snout.
- Some eightband butterfly fish have a broad horizontal black band between the middle narrow bars.
- It has a yellowish base on its fins, belly and mouth and has yellow pectoral fins.
- It has white-ringed black spot near the tail.
- It can sometimes be spotted on our Southern shores amongst the live corals.

Behaviour:

- Juveniles are often seen in groups and adults are seen in pairs.

Diet:

- It usually eats coral polyps.

Giant clam (*Tridacna squamosa*)



Photo credit: wildsingapore, Ria Tan

Description:

- Out of all bivalves to have existed, the giant clam is the largest.
- To protect the giant clam from excessive sunlight, it has brightly colored spots in its body.
- The giant clam has a row of eyespots along the edge of its mantle (soft tissue) to detect potential danger.
- The giant clam can grow up to around 15 to 40cm in length.

Behaviour:

- Upon sensing danger, it will retreat into its shell for protection.
- The mantle of a giant clam is sensitive to light and will close up when divers swim over it.

Diet:

- The giant clam obtains food from zooxanthellae, which is an algae that lives in them and it filters the seawater for plankton.
- The algae produces food for the clam through photosynthesis and acts as a "farm" for giant clams.
- To aid in the photosynthesis in the algae, the clam faces the shell opening to sunlight.

Spotted at:

- It can be spotted at our southern shores such as the Sisters' Islands.

Hawksbill turtle (*Eretmochelys imbricata*)



Photo Credit: NParks Flora&FaunaWeb, Karenne Tun

Description:

- It has a brown shell which is coloured with bright and sporadic yellow and orange patches.
- The upper jaw of the hawksbill turtle juts out beyond the lower one, giving its mouth the beak-like shape.
- Another unique feature of the hawksbill turtle is that there are claws on its front flippers, unlike other sea turtles.

Behaviour:

- Hawksbill turtles prefer shallow coral reefs and it avoids deep waters.

Spotted at:

- It can be spotted along the Singapore Strait.
- Females have also been spotted laying



	<p>eggs on East Coast Park.</p> <p><u>Diet:</u></p> <ul style="list-style-type: none"> - It is carnivorous, feeding mainly on sponges and crustaceans. <p><u>Why they are endangered:</u></p> <ul style="list-style-type: none"> - Hawksbill turtles have been greatly affected by sea pollution and loss of nesting beaches due to land reclamation. - Many hawksbill turtles have also been caught in fishing nets and died.
<p>Sea urchins (Echinodea)</p>  <p>Photo Credit: wildsingapore, Ria Tan</p>	<p><u>Description:</u></p> <ul style="list-style-type: none"> - Sea urchins are mostly spiny and have globular shaped bodies, giving them their nickname 'sea hedgehog'. - They have sharp spines that surround them to warn predators to keep away or to also tear the skin of predators when they get too close. - They have various predators including otters such as the asian small-clawed otter (<i>Aonyx cinereus</i>) and sea stars. - The internal skeleton of sea urchins are called tests (hard shells). - The tests are rounded and spiky and it encloses its internal organs. <p><u>Fun fact:</u></p> <ul style="list-style-type: none"> - Sea urchins have thousands of tiny tube feet that are surrounded by their spines. - Their tube feet help them slowly crawl across the sea bed. - The sea urchins breathe and excrete wastes through their tube feet too.
<p>Tree sea fan (<i>Melithaeidae</i>)</p>  <p>Photo Credit: wildsingapore, Ria Tan</p>	<p><u>Description:</u></p> <ul style="list-style-type: none"> - Sea fans (left, top) are brightly coloured animals closely related to corals. - It can be red, pink or white in colour and can grow to over 1 metre in height. - The sea fan has a thick and sturdy base which looks like a tree trunk, and it branches into finer stems, which results in a flat tree shape. - It is often covered with colourful feather stars (left, bottom) that use the sea fans as a convenient perch.



Photo Credit: NParks

Terrestrial habitat

Terrestrial habitats in Singapore are made up of a few ecosystems, those mainly being the forests ecosystems, the grassland ecosystems, recreational parks in urban ecosystems and freshwater streams, ponds and reservoirs.

This activity focuses on the forest ecosystems in Singapore.

Forest ecosystem

In Singapore, there are several forest types that can be distinguished.

The first of which is the lowland dipterocarp forest. This refers to tall forests that have never been cleared and they have a high density of tree cover of native species. There is a large amount of species diversity in these forests. Most of the canopy-forming trees are dipterocarps, which are a family of tropical lowland forest trees. There are other plants that grow in the forests, however due to the canopy cover, there is limited light that can pass through to the bottom. These forests can be found in the Central Catchment Reserve, Bukit Timah Nature Reserve and Singapore Botanic Gardens' Rainforest.

The next forest that was identified are the coastal hill forests. These coastal hill forests are never exposed to the sea and usually situated on hills and cliffs that are exposed to drying winds. These forests are shorter than the primary dipterocarp forests and they often contain the *Tristania* and *Rhodamnia* family of trees and shrubs. These forests can be found on the hills at Labrador Nature Reserve and in the Western Catchment.

Forest ecosystems also include freshwater swamp forests, where the forest grows entirely damp conditions. Freshwater swamp forests are often constantly flooded and hence create slow-flowing streams. The trees that grow in these forests show adaptations such as stilt roots and aerial roots. Many of the species in the freshwater swamp forests are amongst the rarest and most concerned about. These forests can be found in Central Catchment Reserve and the centre of Pulau Tekong.

However, most of Singapore's forest ecosystems are secondary forests, which means that these forests were grown following the removal of existing forests. In the early days, forests were removed in order to cultivate crops such as rubber trees and fruits. After these plantations were abandoned, native species gradually accumulated over many years to form the secondary forests.

Importance of forests


Forests are important as they provide habitats for animals and livelihoods for humans. Forests also offer watershed protection, prevent soil erosion and mitigate climate change.

Forests are home to 80% of the world's terrestrial biodiversity and over 2 billion people rely on forests for shelter, livelihoods, water, food and fuel security.

After oceans, forests are the world's largest storehouses of carbon. They absorb harmful greenhouse gases that contribute to climate change. Tropical forests store trillion tons of carbon above and below ground biomass.

Forests reduce soil erosion and reduce the amount of chemicals that run into waterways and also serve as buffer zones in natural disasters such as floods and heavy rainfall.

Species of fauna featured

Native Species	Animals
<p data-bbox="203 304 698 336">Black naped oriole (<i>Oriolus chinensis</i>)</p>  <p data-bbox="203 1232 799 1297">Photo Credit: NParks Flora&FaunaWeb, Francis Yap</p>	<p data-bbox="824 304 982 336"><u>Description:</u></p> <ul data-bbox="873 340 1425 777" style="list-style-type: none"> - The black naped oriole is one of the most common bird species in Singapore. - It is the only oriole in Singapore from the oriole family. - It has a bright yellow body, with some black on its wings and tail, and a red bill. - It is called black naped oriole due to a distinctive black band across its eyes to its neck. - Adult black-naped orioles are about 27cm in length. <p data-bbox="824 781 966 812"><u>Behaviour:</u></p> <ul data-bbox="873 816 1425 1075" style="list-style-type: none"> - The oriole has a range of calls, the most distinct sounds is “tooo-diddlyoo”. - It is also capable of making harsh grinding noises. - The black-naped oriole can be aggressive during the breeding season and have been known to attack other birds’ nests. <p data-bbox="824 1079 928 1110"><u>Habitat:</u></p> <ul data-bbox="873 1115 1425 1213" style="list-style-type: none"> - It is found in a variety of forest habitats, including plantations and gardens; forages in forest canopy. <p data-bbox="824 1218 950 1249"><u>Fun Fact:</u></p> <ul data-bbox="873 1253 1425 1411" style="list-style-type: none"> - The black-naped oriole is featured on Singapore’s \$500 note of the “Bird Series” currency notes issued by the Monetary Authority of Singapore between 1976 and 1984.

Common sun skink (*Eutropis multifasciata*)



Photo Credit: NParks Flora&FaunaWeb, Cai Yixiong

Description:

- It measures about 35cm from snout to the end of the tail.
- Its body is covered in shiny, overlapping and strongly keeled scales.
- There are also large scales on top of its head.
- Its body is bronze-brown in colour with or without thin black stripes running down its back.

Behaviour:

- It can usually be seen basking in the open or along hiking trails on rocks, logs or on the ground.
- It is diurnal, which means it is active during the day.
- It is an active animal and tends to run off when approached.
- If sunskinks are under stress, it may shed their tail in defense.

Habitat:

- In Singapore, it is common to spot them in wooded areas, mangroves, grasslands and in more urbanised areas such as in parks.
- It thrives in protected areas like Central Nature Reserve (CNR) and Sungei Buloh Wetland Reserve.

Diet:

- It feeds mainly on insects.

Green-crested lizard
(*Bronchocela cristatella*)



Photo Credit: NParks Flora&FaunaWeb, Cai Yixiong



Photo credit: Isaac Sim

Description:

- This large green lizard is able to camouflage very well amongst the green vegetation.
- It has a total length of about 57cm including the tail.
- It has a slim body with keeled scales and it has a spiny crest on the back of its neck and a very long tail.
- It is generally a bluish green colour although it may change to dark brown or grey.
- It has a dark ring around its eyes and it is dark brown around the ears and the tip of the tail.

Habitat:

- Green-crested lizards are active during the day.
- It is tree-dwelling in nature and is usually found in bushes and trees and usually in forested areas.

Diet:

- It eats insects such as beetles, flies and ants.

Fun fact:

- Green-crested lizard numbers have declined over time due to the introduction of the more aggressive changeable lizard (*Calotes versicolor*), which was first seen in Singapore in the 1980s.

Pink-necked green pigeon (*Treron vernans*)



Photo credits: NParks Flora&FaunaWeb, Cai Yixiong. (male, left), (female, right)

Description:

- This pigeon has brown coloured undertail feathers, light green wings, black flight feathers and black bands located at the end of the tail.
- Sexual dimorphism is present where the male and female look different.
- The male pigeon has bluish grey heads, pinkish necks and upper chest as well as orange lower chest while the rest of the feathers are green while the females are fully green in colour.
- Juveniles look similar to the females except that they have brown tips on their flight feathers.
- Before fledging, the nestlings are fed crop milk from their parents. Crop milk is only produced in doves and pigeons.

Behaviour:

- The pink-necked green pigeon's call is a sequence of low trills which then sharp cooings come after, ending in two harsh sounds of 'krrak kkrak'.

Habitat:

- The pink-necked green pigeon is known to occupy terrestrial habitats such as secondary forests, mangroves and parks.

Fun facts:

- According to the 'A Review of Garden Bird Watch (2015-2019)' by NParks, the pink-necked green pigeon is ranked the 3rd most common bird, after the javan myna and asian glossy starling.

White-bellied sea eagle
(*Haliaeetus leucogaster*)



Description:

- It is the largest resident raptor in Singapore, with some adults growing a wingspan of over 2m in length.
- It has a white head and underparts with greyish wings and a wedge-shaped tail.
- It has excellent eyesight to help it spot prey from far away, and it uses its sharp talons to grab its prey from the water.
- The eaglet has light brown feathers and a dull, cream-coloured head.
- The feather colouration gradually turns

<p>Photo credit: NParks Flora&FaunaWeb, Francis Yap</p>	<p>to white as the young eagle grows up.</p> <p><u>Behaviour:</u></p> <ul style="list-style-type: none"> - The call of the eagle is described as a loud goose-like honk. - It is often seen flying over large bodies of water like reservoirs to search for fish. - It has also been observed to drop crabs from a height to break their shells before eating them. - It builds large nests on tall trees and even man-made structures such as telecommunication towers. <p><u>Habitat:</u></p> <ul style="list-style-type: none"> - In Singapore, the eagles have been observed in locations such as Mount Faber Park and Kent Ridge Park, Sungei Buloh Nature Reserve, and the Istana. - It has also been observed at offshore islands like Pulau Ubin, St John's Island and Sentosa. <p><u>Diet:</u></p> <ul style="list-style-type: none"> - The eagles primarily live off a diet of fish, sea snakes and crustaceans.
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White-cheeked carpenter
(*Xylocopa aestuans*)



Female white-cheeked carpenter



Male white-cheeked carpenter

Photo credits: Zestin W.W. Soh

Description:

- Carpenter bees are subsocial bees, where the mother bee shares its nest with its larvae and provides them with food and protection.
- Males and females are sexually dimorphic- females are black with gold on their back while males are brown with black wings.
- All bees have 5 eyes in total - 2 compound eyes and 3 simple eyes which can only detect light.
- They pollinate many local plants like the sendudok (*Melastoma malabathricum*) and simpoh air (*Dillenia suffruticosa*).

Behaviour:

- Every female is able to reproduce.
- Sometimes, it exhibits social behaviour where 1 or 2 female adults will share a nest.
- Carpenter bees are subsocial bees that do not live in hives.
- It has the ability to create burrows in wooden structures.

For more information on our native flora and fauna, visit:
<https://www.nparks.gov.sg/florafaunaweb/>

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