

# Coral reefs



Nupur Chatterjee

More than 50 millions of years ago, long, long before man struck the first light, the intricate form of life began construction of the world's greatest edifices. This pulsing mass worked on and on and on; the transparent creatures perfected their crafts – steadily building up and out. This colony continues to grow vertically towards the sea surface and laterally as far as they can.

Coral reefs begin to form when free-swimming coral larvae attach to submerged rocks or other hard surfaces along the edges of islands or continents. As the corals grow and expand, reefs take on one of three major characteristic structures – **fringing**, **barrier**, or **atoll**. **Fringing reefs**, which are the most common, project seaward directly from the shore, forming borders along the shoreline and surrounding islands. **Barrier reefs** also border shorelines, but at a greater distance.

They are separated from their adjacent mass by a lagoon of open, often deep water. The 1200-mile long **The Great Barrier Reef** off the north east coast of Australia is the world's largest example of this reef type. If a fringing reef forms around a volcanic island that

This is a middle level worksheet and is suitable for children from classes 6 – 8



Fringing Reefs Surrounding Pacific Islands



Classic Barrier Reef Morphology



Asia – Pacific Atoll

subsides completely below sea level while the coral continues to grow upward, an atoll forms. **Atolls** are usually circular or oval, with a central lagoon. Parts of the reef platform may emerge as one or more islands, and gaps in the reef provide access to the central lagoon (Lalli and Parsons, 1995; Levinton, 1995; Sumich, 1996). The reef continues to grow on an average by 1 mm per year.

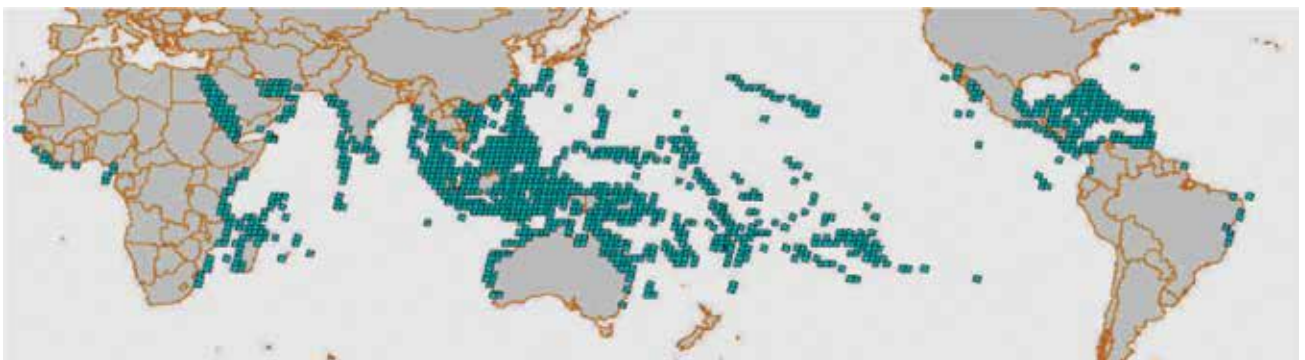
Besides corals, several other organisms in the reef, notably the mollusks and some algae, called calcareous algae, also construct calcium skeletons. Corals are related to sea anemones, and they all share the same simple structure, the polyp. A coral polyp is a tubular sac-like animal. It has a mouth in the centre. The mouth is surrounded by finger-like structures called tentacles. The tentacles are used for defense and for catching food. The polyp cannot move from place to place as it is attached. Reef building corals produce an outside skeletal cup of calcium carbonate. This skeletal cup protects the polyp. During daytime when the polyps are not feeding, the tentacles will be withdrawn into the skeletal cup. At night, they extend their tentacles to capture food.

### Importance of coral reefs

Coral reefs are some of the most diverse and valuable ecosystems on earth. Coral reefs support more species per unit area than any other marine environment, including about 4,000 species of fish. Scientists estimate that there may be another 1 to 8 million undiscovered species of organisms living in and around reefs (Reaka Kudla, 1997). This biodiversity is considered key to finding new medicines for the 21<sup>st</sup> century. Many drugs are now being developed from coral reef animals and plants as possible cures for cancer, arthritis, human bacterial infections, viruses, and other diseases.

### Where are reef building corals found?

Coral reefs are only found where the water stays warm all year around. Living coral reefs are found in places where the water is clean and clear. For instance, reef-building corals cannot tolerate water temperatures below 18° Celsius (C). Many grow optimally in water temperatures between 23°C and 29°C, but some can tolerate temperatures as high as 40°C for short periods. Most also require very saline (salty) water ranging from 32 to 42



Global distribution of coral reefs

parts per thousand, which must also be clear so that a maximum amount of light penetrates it. Warm water coral reefs occur in the coastal areas of tropical and sub-tropical regions. Warm-water corals have a symbiotic relationship with algae called zooxanthellae. This symbiotic relationship is why corals live in shallow waters, allowing the algae access to sunlight in order to perform photosynthesis. The zooxanthellae algae provide the coral with colour. When the coral is stressed, it can expel the algae in a process called 'coral bleaching'. This leaves the coral looking white because the polyp is mostly transparent and the coral skeleton is white.

**Why do we need to protect coral reefs?**

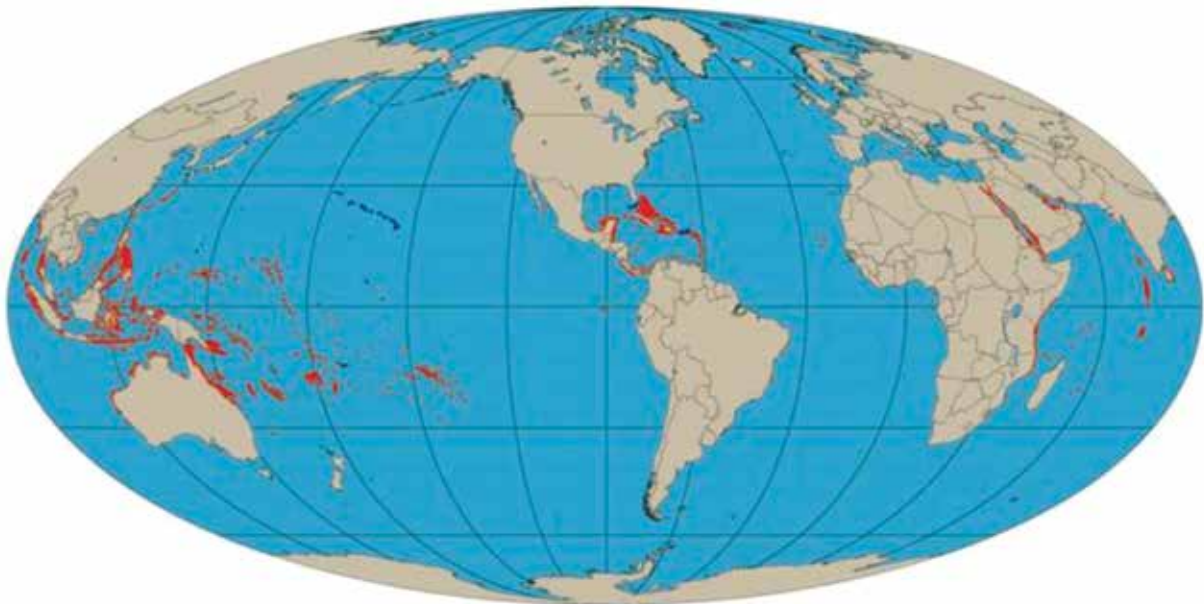
Coral reefs are the most diverse of all marine ecosystems. They teem with life, with perhaps one quarter of all ocean species depending on them for food and shelter. This is a remarkable statistic when you consider that reefs cover just a tiny fraction (less than one percent) of the earth's surface and less than two percent of the ocean bottom. Because they are so diverse, coral reefs are often called the rainforests

of the sea. Coral reefs provide numerous benefits to the local as well as the international community. At a local scale, coral reefs provide food and livelihoods. Reef associated fish are a key source of protein in developing countries. Reefs provide a number of physical functions such as storm protection by attenuating waves (reducing the wave height and energy). They provide support for mangroves and seagrass habitats by reducing the sea's energy levels close to the shore.

**Threats**

Reefs are also one of the most endangered habitats on the planet, facing dramatic declines in abundance as a result of bleaching and diseases driven by elevated sea surface temperatures. Extinction risk has been further intensified by local-scale human disturbances including coral mining, agricultural and urban runoff, pollution, damaging fisheries and the introduction of damaging invasive species.

**Activity 1**



1. Where do you find the maximum number of coral reefs on earth?

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2. What is the approximate length of the Great Barrier Reef?

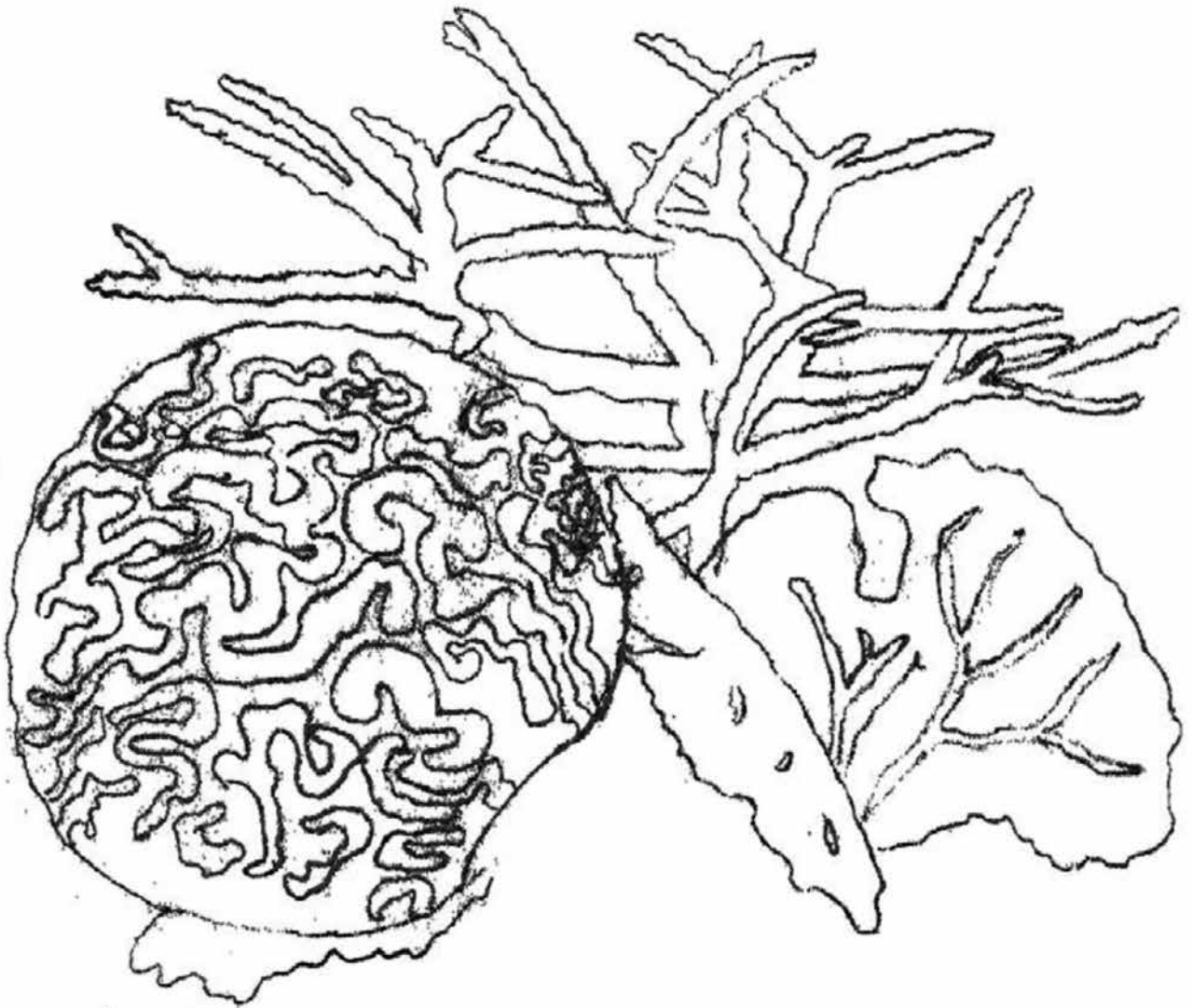
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## Activity 2

Colour me:



There are thousands of species of coral, some named after their colours, others named after their shapes. In this picture are a brain coral, a staghorn coral, and a sea fan. Can you guess which one is which?

## Activity 3

Use the clues below to solve the crossword puzzle.

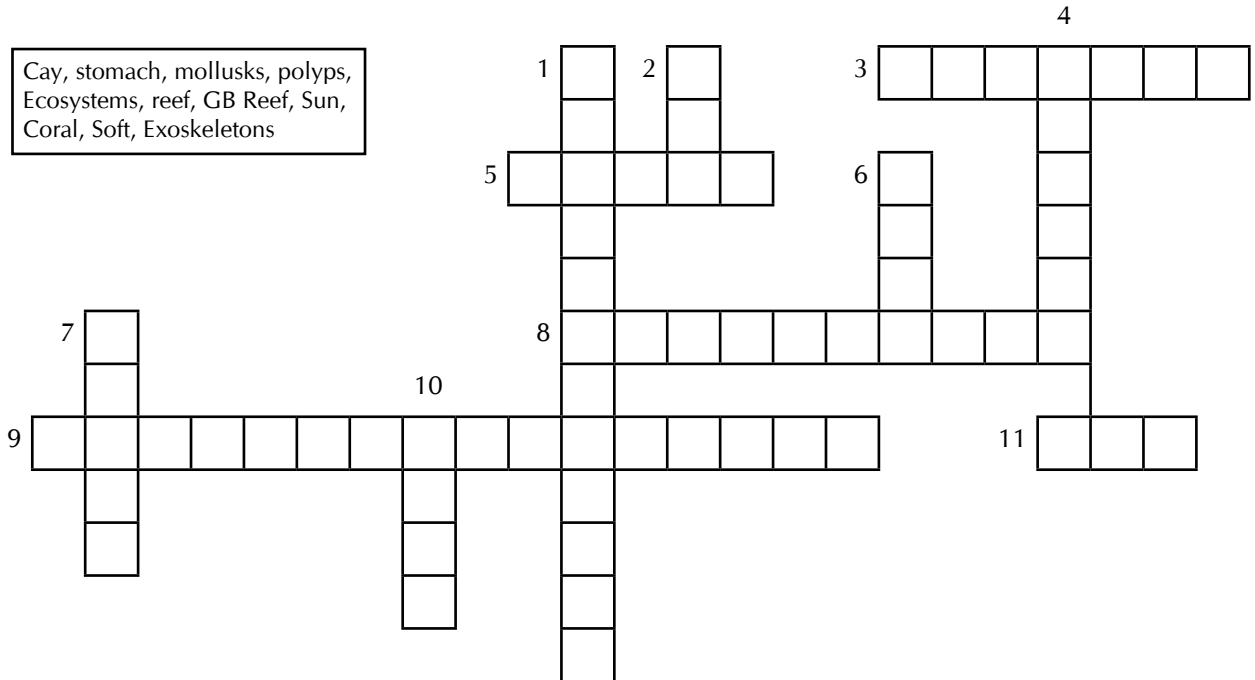
**Across**

3. Corals have some organs, including the \_\_\_\_\_, in common with many other living organisms – including us!
5. A \_\_\_\_\_ is a sedentary type of animal form with a fixed base, columnar body, and free end with mouth and tentacles.
8. The coral reef is one of the most diverse \_\_\_\_\_ on earth.
9. The \_\_\_\_\_ is the largest coral reef in the world.
11. Coral reefs get their energy from the \_\_\_\_\_.

**Down**

1. Hard coral polyps make \_\_\_\_\_ to support and protect their bodies.
2. A \_\_\_\_\_ is a small, sandy island that forms on the surface of a coral reef.
4. Coral reefs contain 25 percent of all ocean life, including organisms such as fish, worms, crustaceans, and \_\_\_\_\_.
6. There are two kinds of coral: \_\_\_\_\_ and hard.
7. \_\_\_\_\_ is a sedentary invertebrate living in warm and tropical seas.
10. A coral \_\_\_\_\_ is a ridge made of coral, existing just below the surface of the sea.

Cay, stomach, mollusks, polyps, Ecosystems, reef, GB Reef, Sun, Coral, Soft, Exoskeletons



**Activity 4**

Make a list of some animals that live in coral reefs

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**Activity 5**

**Choose the right answer:**

1. Corals grow best in

Salt/fresh water	Nutrient rich/nutrient poor water
Clear/sediment filled water	Warm (18 – 22° C)/cool (8 – 12° C) water
Shallow/deep water	Conditions where algae can/cannot

2. Draw a diagram with the appropriate answer:

a) A reef which forms close to the shore

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b) A reef parallel to the coastline separated by a lagoon or channel

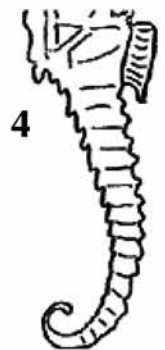
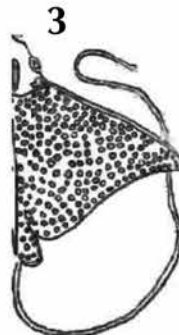
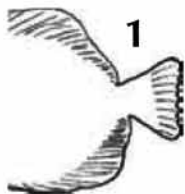
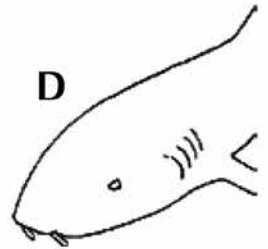
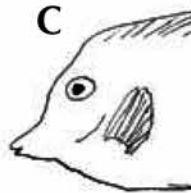
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c) An almost circular coral reef enclosing a shallow lagoon

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### Activity 6

Match the heads of the animals on the top to their tails below to complete the picture:

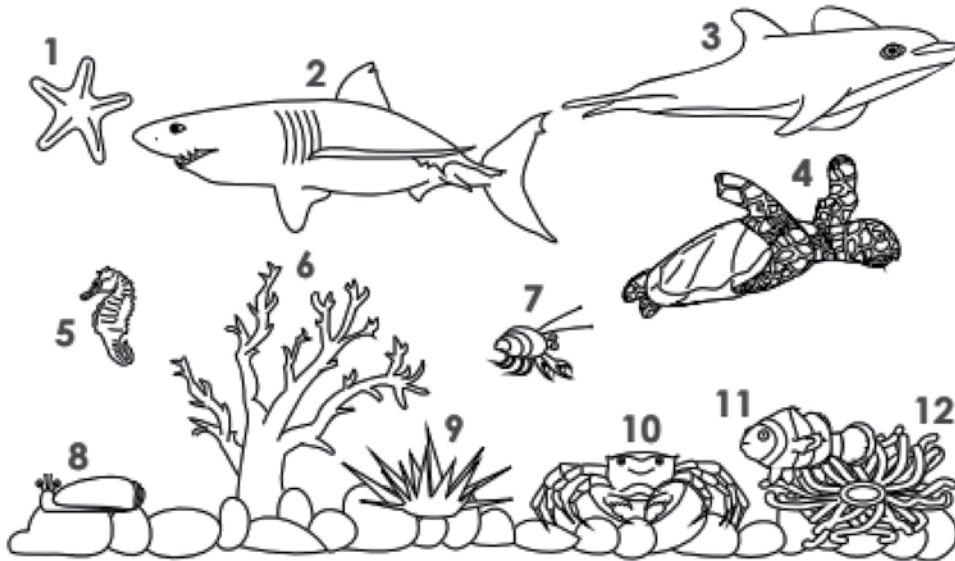


## Activity 7



Match the numbers, in the picture to the names in the word bank. Label and colour each coral reef organism. Be sure to check your spelling and write neatly.

Cone snail	Spinner dolphin	Branching coral	Sea anemone
Sea urchin	Seahorse	Starfish	Hermit Crab
Crab	Reef shark	Clownfish	Hawksbill turtle



- |          |          |           |
|----------|----------|-----------|
| 1. _____ | 5. _____ | 9. _____  |
| 2. _____ | 6. _____ | 10. _____ |
| 3. _____ | 7. _____ | 11. _____ |
| 4. _____ | 8. _____ | 12. _____ |

## Activity 8

"I am a Stag Horn Coral, kindly help me write my autobiography". (Find out from other sources to complete this activity)

1. Mention the birth of corals.  
\_\_\_\_\_
2. How does it grow?  
\_\_\_\_\_
3. How does it help the ecosystem?  
\_\_\_\_\_
4. How is it beneficial to humans?  
\_\_\_\_\_
5. How can we preserve them? (Read the write up on "Coral Reefs")  
\_\_\_\_\_

### Activity 9

Use the information from the article to outline the importance of coral reefs to humans and the environment:

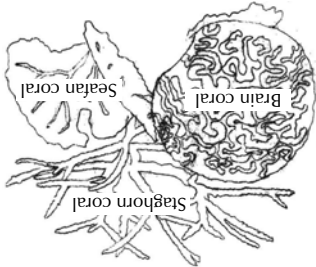
The importance of coral reefs to humans	The importance of coral reefs to the environment

This worksheet has been developed by Nupur Chatterjee, who is with the Azim Premji Foundation as a specialist in geography. She works with teachers in the area of classroom pedagogy of geography. She can be reached at <nupur.chatterjee@azimpremjifoundation.org>.

The Importance of Coral Reefs to Humans	The Importance of Coral Reefs to the Environment
Provide food and livelihoods	Provide protein to the people of developing countries
Support mangroves and seagrass	Provides oxygen to the organisms
Protect coastal people from high waves	Coral reefs have high amount of biodiversity

**Activity 9:** Use the information from the article to outline the importance of coral reefs to humans and the environment:

**Activity 1:** Tropical & Sub-tropical zone



**Activity 2:**

**Activity 3:**

**Across –** 3. stomach, 5. polyps, 8. Ecosystems, 9. GB Reef, 11. Sun, **Down –** 1. mollusks, 2. Cay 4. Exoskeletons, 6. Soft, 7. Coral, 10. reef

**Activity 4:** Shark, crab, starfish, Clown fish, Sea urchin, Seahorse, lobster

**Activity 5:** 1. Corals grow best in: Salt water, Nutrient rich water, clear water, Warm water (18 -22° C), shallow water, and conditions where algae can grow.  
2. a) Fringing reef; b) barrier reef; and c) atoll.

**Activity 6:** A-4, B-3, C-1, D-2

**Activity 7:**

1. Star Fish  
2. Spinner dolphin  
3. Reef shark  
4. Hawksbill turtle  
5. Seahorse  
6. Branching coral  
7. Hermit crab  
8. Cone snail  
9. Sea urchin  
10. Crab  
11. Clownfish  
12. Sea aneone

**Answers**