



# OUR OCEAN: CORAL REEFS

**Objectives:** Students learn about ways in which they can care for coral reefs in Singapore.

**Time:** 30 minutes

**Materials:** Appendix 1, Activity sheet

**Key question:** Why are coral reefs important?

**Purpose of this activity:** Coral reefs bring about numerous benefits – home to 25% of marine life, coastal protection from storms, and sources of ingredients for new medicines to treat diseases. This activity is designed to get students to be concerned citizens by first understanding the importance of coral reefs, the threats they face, and what can be done to take care of corals.

**Background:** A coral is made up of thousands of invertebrate animals called polyps. Corals feed by obtaining food from algae that live in them or by capturing small animals that drift near them with their tentacles. Coral reefs are described as "the rainforests of the ocean" as they are one of the most diverse ecosystems. Coral reefs support one out of four marine creatures, such as fish, crustaceans, sponges and more, in the following ways:

- homes to marine creatures, especially the young of animals who take shelter in reefs to avoid predators;
- breeding and nursery grounds;
- cleaning stations to remove parasites;
- source of food.

Despite the vital importance of coral reefs, they occupy less than **0.1% of the world's ocean surface** and are under constant threat. **Singapore has lost 60% of our reefs** largely due to land reclamation, which leads to murky waters caused by sedimentation. This interferes with the coral's ability to feed and reduces the amount of sunlight needed for photosynthesis by the algae living in these corals. If the algae are not well taken care of, corals lose an important source of nutrients.

In Singapore, groups like **Our Singapore Reefs**, **Hantu Bloggers**, and **Celebrating Singapore Shores** have stepped up to promote awareness of Singapore's beautiful coral reefs.

- <https://www.facebook.com/oursingaporereefs/>
- <https://www.pulauhantu.sg/>
- <https://celebratingsingaporeshores.blogspot.com>



## Suggested discussions for video:

### Recall

- Are corals plants or animals? [Animals.]
- Corals support one out of every \_\_\_\_ marine species. [Four.]
- Name one benefit of corals. [Coastal protection, home to marine life, source of food for marine species, a valuable source of medicines, recreation, source of jobs for fishing and ecotourism industries.]

### Explain

- Explain how global warming threatens corals. [Global warming causes seawater temperatures to rise, which stresses corals and the algae living in them. When algae leave their host corals, corals lose a key source of food and could experience bleaching, and even die.]
- Why would people living near the sea lose their homes if corals disappeared? [Coral reefs are strong and stable underwater barriers that can dissipate the energy of strong waves and storms. Without coral reefs, people living near the sea could face greater damage to infrastructure, livelihoods, and lives.]

### Infer

- What do you think will happen to Blue Buddy if corals are no longer around? [Blue Buddy will lose the rich biodiversity that calls the ocean home.]
- What future threats might corals living in Singapore face if we do not play a part to care for them today? [Extinction, coral bleaching, become deadzones.]





## What to do:

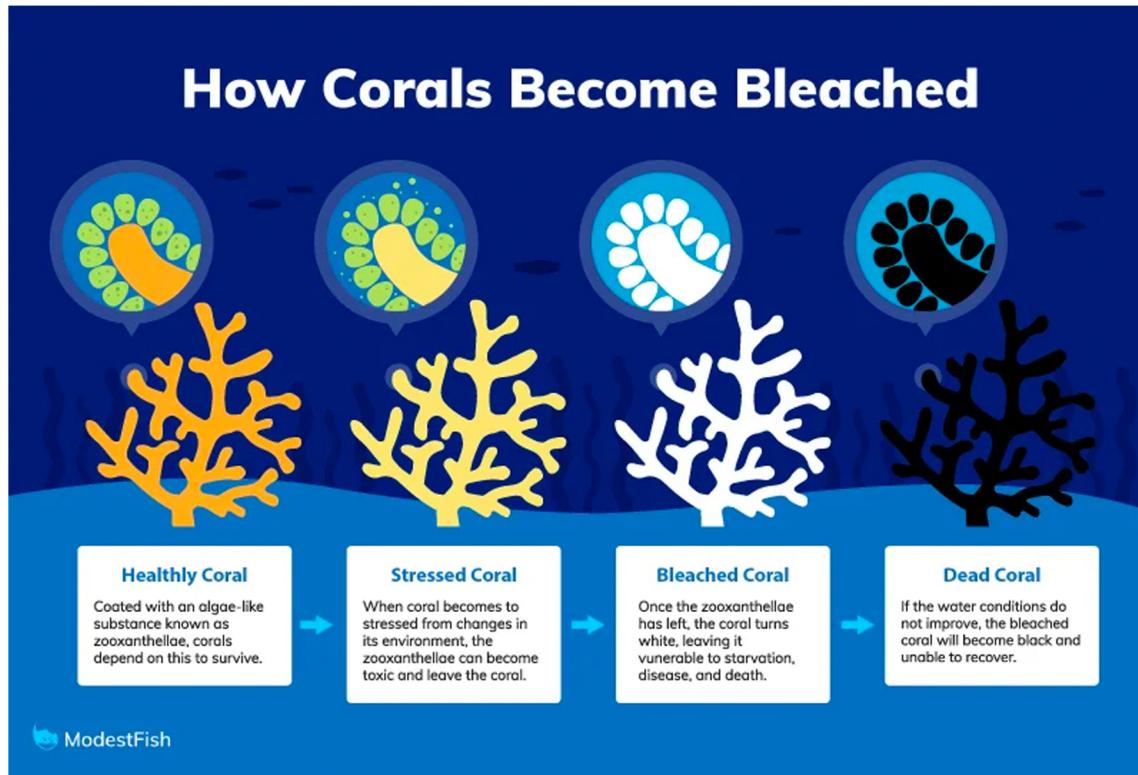
1. Watch the video. Use the suggested discussion questions above to find out what students have learnt, such as:
  - a. What a coral is
  - b. What the importance of coral reefs is and the consequences of losing them
  - c. What Singapore is doing to restore coral reefs
2. Ask students: Name one threat that coral reefs face in Singapore. [Suggested answers: Sedimentation, land reclamation, pollution, warming waters]
3. Share that coral reefs live and thrive under specific conditions. For instance, shallow reef corals require:
  - a. Light: To allow the algae that grow on the corals to photosynthesise and provide nutrients for their host corals.
  - b. Suitable temperatures: Warm water conditions at temperatures of 20-32°C.
  - c. Moving currents: To obtain food in the form of marine organisms such as plankton and small fish, using their tentacles.

[<https://coral.org/coral-reefs-101/coral-reef-ecology/what-do-coral-reefs-need-to-survive/>]
4. Ask: How are the living conditions (light, temperature, and moving currents) of corals affected by these threats? Suggested answers might be:
  - a. Sedimentation, pollution, and land reclamation block the amount of light reaching shallow reef corals, reducing the ability of algae to photosynthesise in these corals.
  - b. Warming waters accelerated by climate change increases ocean temperatures, resulting in coral bleaching. [**Refer to Appendix 1**]
5. Review with students about the consequences losing corals, as mentioned in the video. This can be done by asking the key question: Why are coral reefs important? Suggested answers include loss of a source of new medicines, loss of coastal protection for coastal communities, loss of homes for marine life.
6. Using the **activity sheet**, get students to decode the message to find out where Singapore's most intact coral reefs can be found. [Answer: The Southern Islands.]
7. Share with students that only by knowing what types of corals there are and where they can be found in Singapore, would we know how to protect coral reefs. When visiting marine spaces, it is always important to respect wildlife and be responsible. Suggested **differentiated methods**:
  - a. For lower primary students: Draw what these two phrases "respect wildlife" and "visit marine spaces responsibly" mean to them. [Suggestions: Don't feed wildlife, observe from a distance, do not remove them from their natural environment, dispose of trash responsibly]
  - b. For upper primary students: Besides drawing, get students to imagine themselves as a coral and what they wish to tell a Singaporean visiting a coral reef. Sentence starters include:
    - i. I am fragile. When you visit my home, you can care for me by...
    - ii. I am sensitive to pollution. You can care for me by...
  - c. For secondary students: Singapore is home to about 250 species of corals. Conduct some research to find the one you like best. What does it look like? Where can it be found? What is unique about it?
8. Conclude: Recall from the video about the importance of citizen science. Documenting and submitting records of wildlife can be an effective way to monitor nature areas. The data collected can also help developers and the government to make better conservation decisions. If students need help with identifying marine wildlife spotted on Singapore's shores, they can post their images and questions in this Facebook group "SG seashore ID, can?". Also, share the numerous identification guides and apps such as SGBioatlas and iNaturalist that students can tap on to identify species and see what other people have spotted in nature.

[ SG seashore ID page: <https://www.facebook.com/groups/1853795287968240> ]



## Appendix 1: How coral bleaching occurs



Source: <https://modestfish.com/coral-bleaching/>

### Dive deeper: For more information...

- What would happen if there were no coral reefs: <https://reef-world.org/blog/no-coral-reefs>
- Soft and hard corals in Singapore: <http://www.wildsingapore.com/wildfacts/cnidaria/coralhard/coralhard.htm>
- What do coral reefs need to survive: <https://coral.org/coral-reefs-101/coral-reef-ecology/what-do-coral-reefs-need-to-survive/>

Corals and algae have a symbiotic relationship. This means that they live in harmony with each other and support each other's needs. Coral provides algae with shelter. In turn, algae photosynthesise in the presence of light to make food for the coral.

However, this relationship only thrives in temperatures of about 20-32 °C. The presence of algae gives corals their colours.

But when the waters get too warm, the relationship becomes stressed. A bleached coral results when all the algae leave it. At this stage, the coral is still alive but is vulnerable to factors like starvation and disease. After prolonged periods of unfavourable conditions, the coral dies.

# OUR OCEAN: CORAL REEFS



Did you know that although corals cover less than 1% of the ocean, 25% of all marine life depend on them.

**Secret message decoder!**



Termed as rainforests of the sea, our actions have an impact on coral reefs around the world. Decode the message to find out where in Singapore can we find the most untouched corals.

A =		F =		K =		P =		U =	
B =		G =		L =		Q =		V =	
C =		H =		M =		R =		W =	
D =		I =		N =		S =		X =	
E =		J =		O =		T =		Y =	

S — O — U — T — H — E — R — N — I — S — L — A — N — D — S



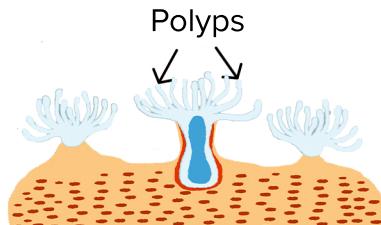
**Dive Deeper:** Singapore is home to about 250 species of corals. Choose one species and research on it. What does it look like? Where can it be found? What is special about it?



Here are some resources you can consider for your research:  
<http://www.wildsingapore.com/wildfacts/cnidaria/coralhard/coralhard.htm>  
<https://www.facebook.com/stjohnsisclandmarinelab/>  
<https://www.facebook.com/oursingaporereefs>  
<https://www.facebook.com/CelebratingSingaporeShores>



## Vocabulary

Corals	Marine organisms that are made up of polyps.
Polyps	<p>Looking like a jellyfish, it can move, feed and reproduce just like any other animal. These animals have special stinging cells in their tentacles to catch prey like plankton or small fish and squid.</p> 
Erosion	The removal of the shoreline caused by strong waves and currents. Corals protect people from this by absorbing the energy from strong waves and acting as a barrier for the coast.
Coral bleaching	An event that happens when the water surrounding corals get too warm. When this happens, corals get stressed out and lose the algae that live in them. Because algae provide the colours in corals, corals turn white when they lose those algae. Since algae also provide food for corals, stressful conditions over a long time could cause corals to die.
Symbiotic relationship	A close ecological relationship between organisms of two different kinds of species that is beneficial.
Artificial reefs	A manufactured reef that provides a hard surface on the sea floor for coral colonies to settle and grow into natural reefs. Artificial reefs are created to restore natural reefs by supporting marine habitats and biodiversity.