

Captivating Coral



TEACHERS

This unit of work has been designed to support your class visit for the 'Captivating Coral' programme at the National Aquarium of New Zealand. Students will participate in a range of level-specific interactive activities.

The primary focus of this programme is the Living World Strand of the Science Curriculum, however when planning your unit of work, links can be made to other essential learning areas. Similarly, different essential skills can be emphasized depending on the needs of your students.

PROGRAMME OVERVIEW

Science, Living World: Life Processes and Ecology, Level 2-4

What is a coral reef? Why are they in trouble? Students will identify ways that the coral reef is beneficial to humans, examine major threats to the coral reef and explain sustainable options that individuals can do to reduce stresses on the coral reef systems.

ESSENTIAL LEARNING AREA: Science

STRAND: Living World

LEVELS: 2, 3, 4

Level	Essential Learning Area	Strand	Sub Strand	Achievement Objective Students will:
2	Science	Living World	Ecology	Recognize that all living things are suited to their particular habitat.
3 & 4	Science	Living World	Evolution	Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human induced.

NATURE OF SCIENCE

- Understanding about Science
- Investigating in Science
- Communicating in Science
- Participating and contributing

The 'Captivating Coral' programme at the National Aquarium of New Zealand lays the foundations for developing the above investigative skills and attitudes.

SPECIFIC LEARNING OUTCOMES

- Student's will be able to identify five ways that coral reefs are beneficial to humans
- Students will be able to identify and explain three major threats to the coral reef
- Students will be able to explain things that individuals can do to reduce stresses on coral reef systems

Background Information

The Coral Reef

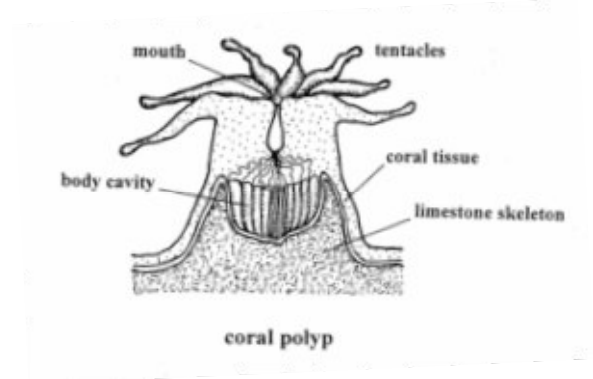
Coral reefs are enormous, solid structures in the sea built almost entirely by small marine animals. Coral reefs are found in warm water with temperatures to 18°C to 30°C mainly between the tropics of Cancer and Capricorn. Most grow in shallow water from five to thirty metres deep where the sunlight can reach them.

What are Corals?

Corals are not plants or rocks. They are animals, but pretty strange ones. Most are hard, but some are soft. Each coral is made up of tiny animals that are called polyps.

Polyps

Polyps are the building blocks of corals. Coral polyps look like an upside down jellyfish, with a cup shaped body and tentacles around the rim. Like jellyfish their tentacles contain stinging cells that help them to catch fish. Polyps don't have a brain. Instead they have a network of nerves able to pass messages from one part of the body to another.



How is a coral reef made?

Coral reefs are formed by the most common type of coral; hard coral. Hard coral use sea water to create a limestone skeleton. As the colony grows so too does the skeleton, and the coral reef.

Not all corals are hard. Soft corals lack the hard limestone skeleton of the hard corals. Just like hard corals they form colonies and feed using tiny tentacles. Soft corals have eight tentacles, whereas hard corals have six.

What do coral eat?

Each polyp uses its ring of tentacles to capture food as it floats past. But they have help from an invisible collaborator. Hard corals get their energy to build coral reefs from tiny plants that live inside them. These plants are called Zooxanthellae. They are too small to be seen but they give corals their bright colours. Zooxanthellae provide hard coral with energy from the sun and the coral provides the Zooxanthellae with shelter and protection. Any food that is captured by the corals themselves is just a top up.

How do coral reproduce?

One polyp can survive on its own, but to build a coral colony it can split into two and then those can split into two, etc. This splitting into two is called asexual reproduction. Coral polyps can also reproduce sexually. At certain times of year all corals produce millions of eggs and sperm, which they just release into the ocean. This mass joins all the other plankton floating or swimming in the ocean. If coral sperm meets the right egg, they join (fertilisation). The egg divides and develops into a small larva. This larva drifts around in the plankton for about 30 days and eventually swims down to the bottom where it settles, grows tentacles and becomes a polyp.

How long does it take for coral to grow?

Corals grow at different rates depending on water temperature, salinity, turbulence, and the availability of food. The massive corals are the slowest growing species, adding between 5 and 25 millimeters (0.2–1 inch) per year to their length. Branching and Staghorn corals can grow much faster, adding as much as 20 centimeters (8 inches) to their branches each year.

Why are coral reefs so important?

Millions of people in the world need coral reefs.

Food resources

People use the reef as a source of food. People living near the coral reefs have been using them for food for thousands of years. We eat fish, lobster and lots of other sea creatures. Reefs provide resources for fisheries including fishes, crustaceans and molluscs. The problems only come when we take too much food!

Protection

Coral reefs are a natural barrier protecting coastal cities, communities and beaches. Lying next to the land they prevent huge waves from crashing into beaches during storms.

Leisure and Tourism

Over 15 million people are trained to scuba dive; this makes it probably the world's most popular adventure sport. Millions more have learned how to snorkel. Visitors to the coral reef provide jobs and money for people who live in coral reef areas around the world.

Medicine

The coral reef holds potential treatments for many of the world's most prevalent diseases.

Nursery

They are a nursery ground for over 25% of all marine species.

Threats to the Coral Reef

Coral reefs have been around for tens of thousands of years before humans. They have coped with many natural disasters but now there are additional threats from human's activities, and the health of the coral reef is rapidly declining.

Pollution

Pollution takes on many forms such as oil spills, fertilizers, pesticides, sewerage, and rubbish.

Sedimentation

Some of the biggest problems facing the reef come from the land. Coral need clear water to get to the sunlight. They also need hard surfaces to grow on. Sedimentation is when forests are chopped down and this plows up the land. Then the soil is washed off the land and into the rivers, and from the rivers to the sea. When there is a lot of mud in the water it cuts out the light. It sinks down and creates mud on the bottom, which stops new coral from growing.

Damage from Tourists and Fisherman

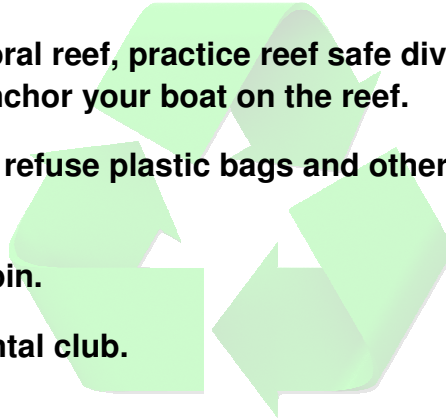
It is possible to catch a few fish and not make a difference to life on the reef, but once you take too many you can upset life on the reef. Some fisherman use explosives to catch fish on the reef. By creating a massive blast they kill all of the fish in that area and the coral, this is a waste. It will take years for the coral to recover after such a blast.

Global Warming

Gradually as a result of burning gasoline from our cars and from some power stations we are adding to certain gases in the atmosphere. These gases are trapping heat inside the planet and it is warming up. Coral are really well adapted to life in the tropics but they are not prepared for warmer temperatures. When the water gets too hot the corals "bleach" – which means they turn a bright white colour.

What can we do to help the coral reef?

- **Tell someone about the wonderful coral reef and how we have to protect and respect it.**
- **When you visit a coral reef, practice reef safe diving and snorkeling. Do not touch the reef or anchor your boat on the reef.**
- **Recycle, reuse and refuse plastic bags and other rubbish. Reduce your waste.**
- **Put rubbish in the bin.**
- **Join an environmental club.**
- **Save water.**
- **Learn more about coral reefs, their remarkable biodiversity and the special role they play as messengers for the health of our oceans and our world.**



Did you know?

- Corals have inbuilt sunscreen to stop them getting burnt.
- The Great Barrier Reef is the only natural structure that you can see from space.
- Full grown coral will eat little baby coral!
- If you cut yourself on coral and you don't clean it, the coral will grow inside your skin.
- Baby coral are smaller than a pinhead.
- Algae keeps live coral and dead coral stuck together
- There are more than 2,000 coral reefs in the world
- Some coral reefs are so small that you can't even see them
- Coral polyps have a lifespan ranging from 2 years to hundreds of years, while corals in colonies are known to live from 5 years to several centuries. Some coral reefs present today are over 50 million years old.

Pre and Post -Visit Activities

Before visiting the aquarium you might want students to test their own knowledge by doing the following activities.

Have students share their views on what they know about life on the coral reef. . Students can record their brainstorm in the left-hand column of the chart similar to the one below. The remaining columns can be filled out during the unit to track and focus student learning.

K What you Know	W What you want to know	L What You Learned

True or False

1. Coral reefs are a warm, clear, deep ocean habitat.		
2. A coral is a plant.		
3. There is less variety of life on coral reefs than anywhere else on land.		
4. Soft corals have tiny plants that live inside them.		
5. The Great Barrier Reef is the largest coral reef and can be seen from space.		
6. Hard corals are the only type of coral to build the coral reef.		
7. Coral reefs provide food resources for both sea creatures and humans.		
8. Healthy corals are white		
9. Coral reefs attract tourists from all over the world.		
10. Coral bleaches when the water becomes too cold.		

Classroom Coral Reef

Photocopy some animals from the coral reef. Blow up the images to life size. Copy the reverse image of each picture. Give each student one reverse image and a normal image. Have each student colour the creature, cut them out and glue or staple the two

images together. Stuff before closing with recycled paper. Hang the creatures from the ceiling and transform your classroom into a coral reef.

Draw a Coral

Draw a Brain Coral starting with a young one about 5cm across, and then draw it after 1, 5 and 10 years. Work out how much it would grow and use a ruler to draw the right size.

Do the same with a branching coral – you will need a big bit of paper. Don't forget to let it branch.

Make a coral reef

Each student makes one coral polyp. Use clay or play dough for molding the body inside a small paper cup, similar to that used for baking muffins. This cup represents the outside skeleton of the polyp. Use toothpicks to represent the tentacles. Groups of students join their coral polyps together to form a coral reef.

Poster design

Design a poster that educates others about activities that contribute to the deterioration of the reef environment. It must suggest actions that can reduce or eliminate this damage.

Research

What is a coral?

Where are they found in the world?

What is the difference between a plant and an animal?

How many different types of coral are there?

What do corals eat?

Do you think many sea creatures live on the reef?

How have people used the sea?

How have people used the coral reef?

What is global warming?

What is coral bleaching?

What is polluting oceans?

How is coral endangered?

What can we do to save the coral reef?

Using information from websites:

- have students make a list of ten things they can do to protect coral reefs.
- have students write letters to parliament about the need for marine protected areas.

Have students write an essay on:

- their niche in the ecosystem they are part of and what other niches are important in their lives.
- why coral reefs are personally important.

Caring for the Environment

Get students to discuss with a partner how human activities are dangerous for the reef and its creatures. Discuss what people can do.

Draw a table like the one below. In the left hand column list all the factors that cause coral reefs to become endangered. In the right hand column write about the effect of each factor on the coral reef ecosystem.

Causal Factor	Effect on the Coral Ecosystem

Activity Sheets and Answers Below

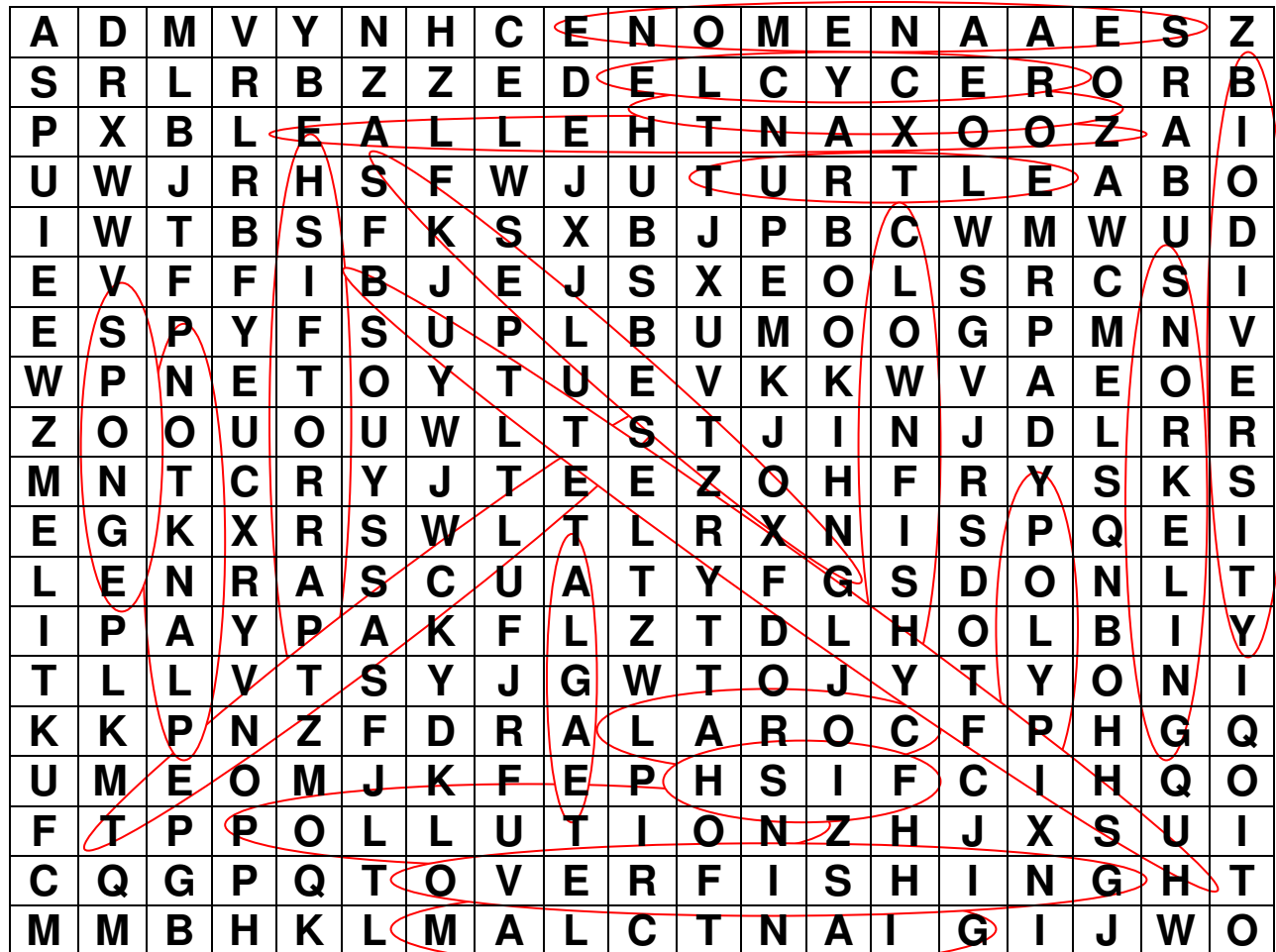


Coral Word find

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

Algae	Overfishing	Skeleton
Biodiversity	Parrotfish	Snorkeling
Butterflyfish	Plankton	Sponge
Clownfish	Pollution	Tentacles
Coral	Polyp	Turtle
Fish	Recycle	Zooxanthellae
Giantclam	Seaanemone	

Coral Word Find Answers

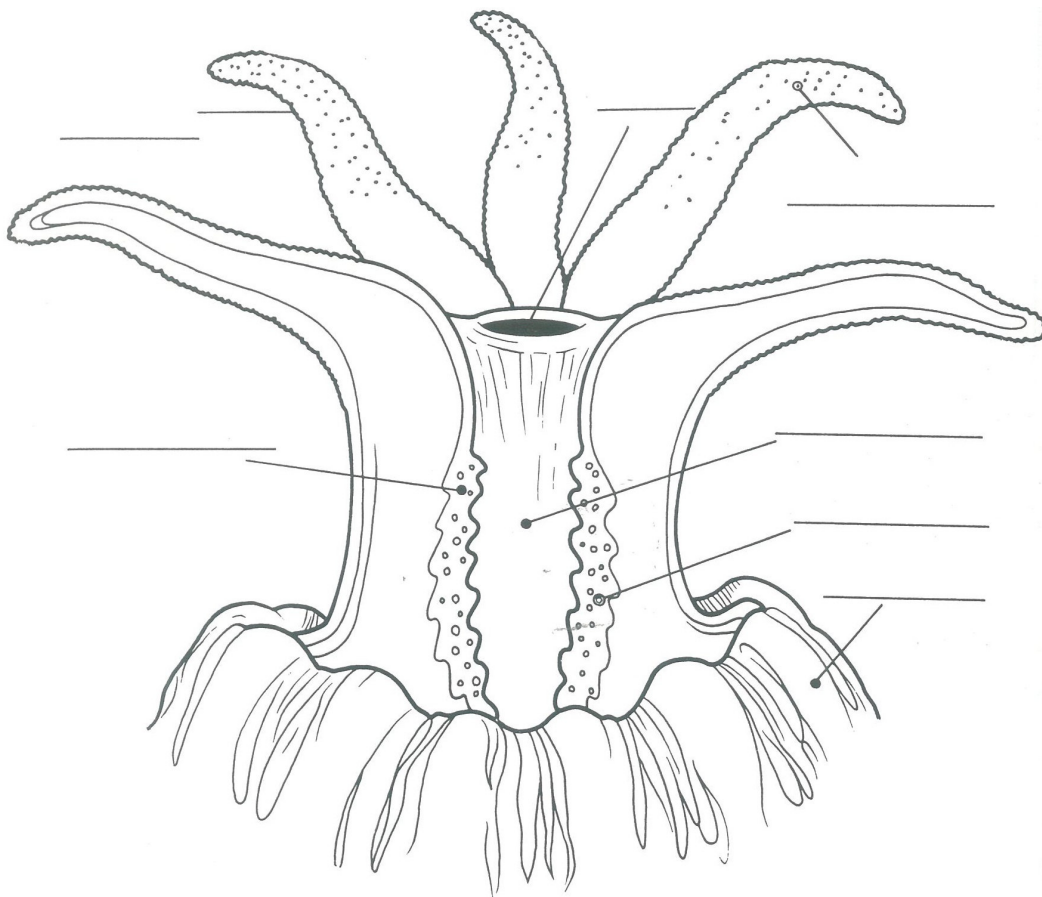


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A coral polyp

Read the following to help you label the picture.

A coral polyp is an animal with many tentacles, each with special cells that help the polyp catch it's food. These cells are called stinging cells. These cells help the polyp to catch its food – very tiny plants and animals called plankton. The tentacles push the food towards the polyp's mouth, found in the middle of the tentacles. From the mouth, the food moves to the stomach. Inside the stomach tiny plants called algae grow in the stomach lining. The algae help supply calcium, used by the polyp to build its outside skeleton that protects it's soft body. It is this hard skeleton that, combined with thousands of others, forms the coral we see.



A coral polyp - ANSWERS

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