
POU and Miri
learn about coral reefs
and climate change
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Pou and Miri
learn about coral reefs and climate change

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SPC/GIZ Coping with Climate Change in the Pacific Island Region programme

Pacific Community
Communauté du Pacifique

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Iteni Island

learn about coral reefs and climate change

Hello Boys and Girls!

Most of us live on islands with an incredible amount of beautiful coral reefs.
Coral reefs are home to more than twenty-five per cent of the plants and animals in our oceans.
Corals provide us with food and medicine and protect our coasts from strong waves. They also attract visitors from around the world.
Atolls were formed by coral reefs over thousands of years. Without corals, atoll islands wouldn't even exist!
Unfortunately, our precious coral reefs are threatened by the effects of climate change, such as sea level rise, global warming, ocean acidification, and stronger and more frequent storms and cyclones.
Studies show that a healthy coral reef is better able to cope with these impacts.
We hope that through this book you will learn more about coral reefs and how we can work together to keep them healthy.

Happy reading!

Dr Wulf Killmann, Director, SPC/GIZ Coping with Climate Change in the Pacific Island Region programme

Pou came back from school on a Friday afternoon feeling excited. He had been learning about Captain James Cook and had a weekend exploring project to do.

Captain James Cook was a great explorer who came from England to the Pacific more than two hundred years ago. He drew maps of some of the Pacific Islands and wrote all about his adventures.

Ms Tui, Pou's teacher, had asked the class to explore Iteni, just like Captain Cook had explored the Pacific. Everyone was given a book to write down their discoveries.

As Pou approached his house, he saw Ma putting a bright orange bucket on the veranda. The orange bucket was only used for collecting shellfish.

'Hi Ma! Are you going to collect shellfish?', Pou asked, as he ran towards her.

'Ta and I will be going tomorrow morning', she replied. 'Uncle Leli said he would be waiting for you in his canoe to take you exploring.'

Uncle Leli was Ma's brother and he was going to help Pou with his exploration project.

Ma told Pou that his friend Miri was waiting for him in the kitchen with some mango.

'You should bring Miri along tomorrow', Ma suggested.

'Miri and I are going to have such a great time tomorrow!', Pou said excitedly.

The next morning Pou, Miri, Ma and Ta headed off for the beach. The tide was out and there was hardly any water on the reef flat.

Ma and Ta got busy looking for shellfish on the reef flats, and Pou and Miri set off to join Uncle Leli.

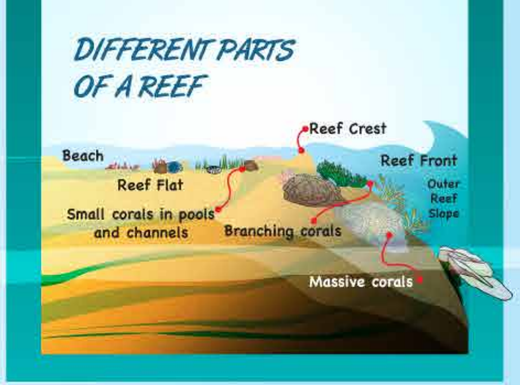
'See you at home for lunch!', Ma cried out to Pou and Miri, who had already skipped out of sight.

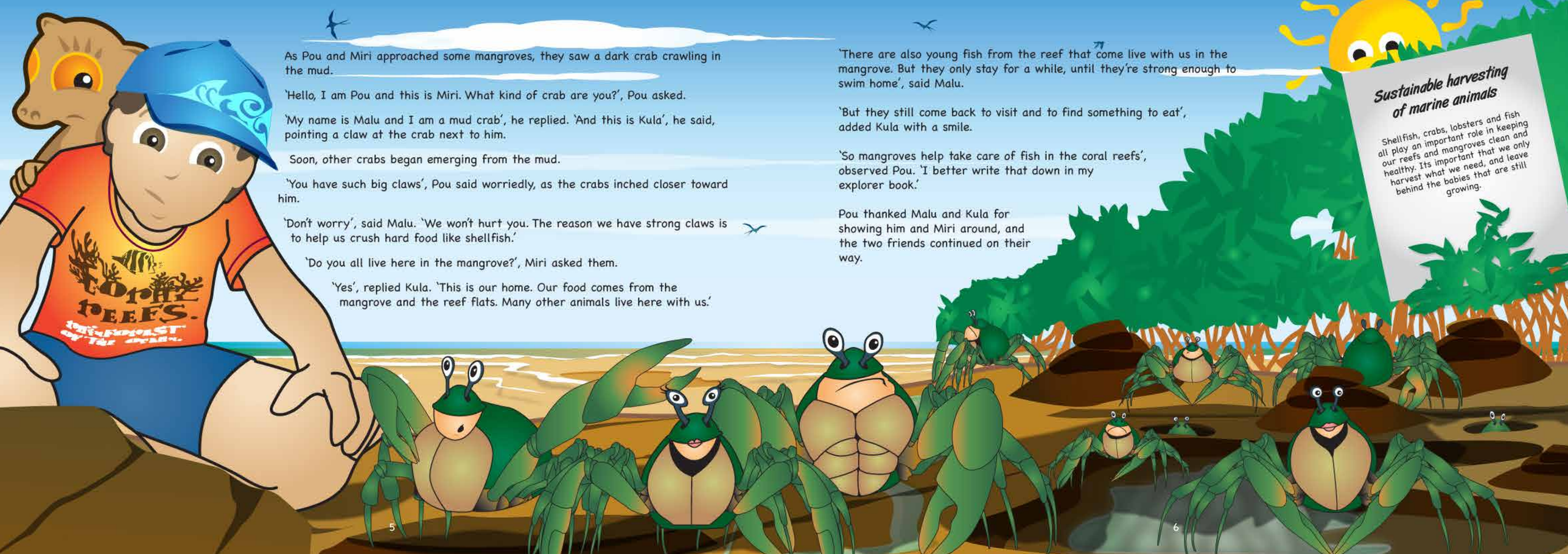
On their way to meet Uncle Leli, they came across pools of water where small fish were swimming, and stretches of sand with countless tiny crabs and snails crawling around.

'There are so many different animals and plants on this reef flat', said Miri. 'Look at the bright blue starfish and the tiny arms of brittle stars poking out of their holes.'

Pou was looking out to where the water was a darker shade of blue. That was where Uncle Leli was going to take them – the outer reef.

'I feel just like Captain Cook looking out at the Pacific Ocean searching for new islands', Pou said. 'If only we had a telescope like Captain Cook, we would be able to look all the way across the sea.'





As Pou and Miri approached some mangroves, they saw a dark crab crawling in the mud.

'Hello, I am Pou and this is Miri. What kind of crab are you?', Pou asked.

'My name is Malu and I am a mud crab', he replied. 'And this is Kula', he said, pointing a claw at the crab next to him.

Soon, other crabs began emerging from the mud.

'You have such big claws', Pou said worriedly, as the crabs inched closer toward him.

'Don't worry', said Malu. 'We won't hurt you. The reason we have strong claws is to help us crush hard food like shellfish.'

'Do you all live here in the mangrove?', Miri asked them.

'Yes', replied Kula. 'This is our home. Our food comes from the mangrove and the reef flats. Many other animals live here with us.'

'There are also young fish from the reef that come live with us in the mangrove. But they only stay for a while, until they're strong enough to swim home', said Malu.

'But they still come back to visit and to find something to eat', added Kula with a smile.

'So mangroves help take care of fish in the coral reefs', observed Pou. 'I better write that down in my explorer book.'

Pou thanked Malu and Kula for showing him and Miri around, and the two friends continued on their way.

Sustainable harvesting of marine animals

Shellfish, crabs, lobsters and fish all play an important role in keeping our reefs and mangroves clean and healthy. Its important that we only harvest what we need, and leave behind the babies that are still growing.

Pou and Miri found Uncle Leli waiting for them in his dugout canoe. They both jumped in as Uncle Leli paddled towards the outer reef. The tide was starting to come in, and the reef flats were slowly disappearing underwater.

'I can see all the way to the bottom', said Miri, looking down. 'Look at all the colourful fish and coral!'

'What is that swaying in the water?', Pou asked. 'It looks like a shrub.'

'It's a type of soft coral', replied Uncle Leli.

'But, I thought all corals were hard', Pou wondered aloud.

Uncle Leli explained that soft corals are fleshy and don't have a stone skeleton like the hard corals.

Suddenly their conversation was interrupted by a small voice calling out:

'Hello there!'

It was Priti Kalafuli, their parrotfish friend. 'Welcome to my coral reef home', Priti said excitedly.

'It's so beautiful!', Miri exclaimed. 'There are so many different fish and the coral is so colourful.'

'Thank you Miri', Priti said. 'Your forest home is also beautiful. Like trees in a forest, corals create a home for many different animals.'

By that time the tide had come in and Priti invited Pou and Miri to jump in the water and explore her coral reef home.

Miri laughed and said: 'Thank you Priti, but I prefer to stay on dry land or in the air! Make sure you report everything you see, Pou!'

As Pou put on his mask and snorkel, Uncle Leli warned him not to step on the coral.

Good land-use practices can protect coral reefs

Trees and mangroves hold soil together and soak up water during heavy rain. If forests and mangroves are removed or damaged from clearing, soil will be easily washed away during rainfall and slide into nearby bodies of water.

When soil washes out into the sea, it turns the water murky. This makes it difficult for sunlight to reach the coral, which it needs to make food. Dirty water also makes corals more prone to diseases because they become weak and stressed from filtering sediment.

It's important to apply good land-use practices, such as protecting trees on hillsides, because what we do on the land affects the survival of our coral reefs.

Soon Pou was snorkelling around the beautiful coral. 'What are those fish called?' Pou asked Priti.

'The yellowish fish with thin black stripes is called a convict surgeonfish. That school of shiny fish is blue surgeonfish', explained Priti. 'Surgeonfish and parrotfish help keep coral reefs clean and healthy.'

'How?', Pou asked curiously.

Priti explained that parrotfish love eating algae and other delicious small plants that grow on coral and rocks.

'By doing this, we prevent the algae from growing wild, so the corals have room to grow', said Priti.

They swam back to the boat and Pou recounted to Miri and Uncle Leli all he had learned.

'You must have very strong teeth', Miri remarked to Priti.

'We're called parrotfish for a reason', Priti said proudly. 'Our mouths are similar to a parrot's beak, with teeth that can scrape algae from coral and rocks.'

The coral reef cleaners

Parrotfish, surgeonfish, sea urchins and crabs play an important role in keeping coral reefs healthy. They are sometimes referred to as 'reef cleaners' or 'grass-cutters of the reef', because they munch on the algae that forms on coral and scrape the surface clean. Without their help, algae would grow out of control.

That's just one of the reasons it's so important not to overfish and overharvest our reefs. Healthy coral reefs are better able to cope with the effects of climate change.

'And did you know that without parrotfish, we would not have any white sandy beaches?', Uncle Leli added.

Pou and Miri turned to Priti: 'Is that true?'

'Ummm, yes', Priti replied shyly.

'When we are scraping away at the algae, we often end up swallowing chunks of coral. But it doesn't hurt us. We have sharp teeth in our throat that grind the coral into tiny bits before our stomachs digest it. And then we pass the coral as fine sand', Priti explained.

'We actually pass a lot of sand', she added with a smile.

'Wow! So parrotfish keep coral reefs clean and also make sand for our beaches!', Pou exclaimed with amazement. 'That's awesome! This is going into my book for sure.'

FUN FACT!

One parrot fish can produce 100kg of white sand every year!

Pou and Priti decided to explore the edge of the reef, also known as the crest. They waved goodbye to Uncle Leli and Miri as they swam toward their next adventure.

Pou saw some large and strong-looking coral.

'Those are stony corals', said Priti. 'They're also called "reef-building corals" because they create a hard structure that forms a strong reef that keeps us safe.'

Pou looked down into the water to see how deep the coral reefs go.

Priti explained to Pou how it took many, many years for the coral to grow. 'Maybe even hundreds of years!', Priti said.

'That long?!', exclaimed Pou. 'I guess that's why it's so important to take care of the hard coral and the animals and plants that protect it.'

'That's right,' said Priti. 'Make sure you share that with your classmates!'

Can you match the corals to their names? (answers are on Page 20)

- *large brain coral*
- *mushroom coral*
- *staghorn coral*
- *boulder coral*
- *table coral*

Ocean acidification will weaken coral reefs

As humans use more and more oil, diesel, and petroleum for cars, machines and electricity, large amounts of carbon dioxide gas (CO_2) are released into the atmosphere. A lot of this CO_2 is absorbed into the ocean. The huge increase of CO_2 in the ocean changes the chemistry of seawater and makes it more acidic. This effect is called ocean acidification.

Hard corals are stone-like structures made of thin layers of calcium carbonate. Ocean acidification will make it difficult for hard corals to form their stone-like structures. This causes the coral reef structure to weaken and erode. If we don't do our part to protect the oceans, we could lose our coral reefs!

Coral reefs that are in a healthy state, with a good population of 'reef cleaners', are better prepared to handle ocean acidification than those living in a polluted environment.

When Pou and Priti returned to the boat, Pou told Uncle Leli and Miri all about the different coral he saw.

Priti began to tell them about a strange event that happened a few years ago, when the coral started losing its colour.

'Yes, I remember', said Uncle Leli. 'Some coral turned as white as a sheet of paper and some started turning grey. It was very sad to see all the lovely bright colours fading away', he recalled sorrowfully.

Suddenly a rock began to move and swim towards them. The rock turned out to be a stonefish – the most poisonous fish in the reef!

'Hello', said the stonefish. 'My name is Roki.'
'Hello, Roki', said Pou. 'We didn't see you!'

'Yes, we stonefish are very good at disguising ourselves', Roki replied. 'It's a great way to listen to what others are saying without being seen,' he added cheekily.

Roki also remembered the coral turning white. 'It was hard for us stonefish because we couldn't hide from our predators against the white coral', he said.

'What caused this to happen?', Miri asked.

'Grandpa said it happened during a very hot year when the water was unusually warm for several months', said Priti.

'Yes, it could be the warm water', said Roki. 'Because when the water started returning to its normal temperature, the corals began to regain their colour. We were all so happy to have our colourful reef back!'

'Oh, dear', Miri said sadly. 'I can't believe we almost lost Iteni's rainforest of the sea!'

Coral bleaching – a real threat to our reefs

There are little algae called zooxanthellae (pronounced zoo-zan-theli) that live within the tissues of corals. These algae harvest sunlight to produce food for the coral and give corals their beautiful colour. But when the water gets too hot, the corals become uncomfortable and stressed and push out the zooxanthellae. With the algae gone, the corals lose their colour and turn white. This is called coral bleaching.

Climate change is increasing the surface temperature of our oceans. If the water stays too warm for a long period of time, corals won't be able to absorb the algae back and will begin to starve. They will turn from white, to grey, and eventually die.

By keeping our oceans clean, coral reefs can recover faster when water temperatures return to normal. We can help keep temperatures down by reducing the use of fossil fuels such as diesel and petrol. Whenever possible, ride a bicycle or walk instead of using a car.

It was approaching lunch time and stomachs were beginning to rumble.

Everyone agreed it was time for some lunch. Priti said she had found a coral with some delicious looking algae and she could not wait to munch on it.

Pou, Miri and Uncle Leli waved goodbye to Priti and Roki and set off for home.

By now the reef flats were all covered with water and they could paddle the canoe right up to the beach.

Uncle Leli pushed the canoe onshore and looked back at the ocean. There were big waves outside the reef, but inside the reef the waves were much smaller.

'See how the outside reef protects our island? If it wasn't for the coral reefs we would have bigger waves hitting our shore and washing the sand away from our beaches', said Uncle Leli.

'The coral reefs protect Priti and Roki, and Malu and Kula, and everyone living on Iteni', added Miri.

Coral reefs protect shorelines from storms

The outer reefs of our islands help stop big waves from hitting the beach. By the time the waves reach our shores, their size and power have lessened. This means the villages, homes, buildings and roads near the coast are protected.

Climate change may bring about stronger storms and cyclones in the future. Our reefs play an important role in slowing down big waves caused by these storms. However, our coral reefs can also be damaged by these strong storms.

That's why it's so important that we keep our coral reefs healthy, so they can recover faster from these events.

'Thank you so much for taking us out to the reef, Uncle Leli', Pou said. 'I learned so many new things! I can't wait to write everything down in my explorer book.'

'And I can't wait to have some sweet mango', added Miri.

Pou and Uncle Leli smiled and agreed some mango would be very nice.

They walked home to find Ma cooking the fresh shellfish they had collected that morning, and Ta preparing taro for Sunday lunch the next day.

Pou could not wait to report to his class everything he had discovered.

'I especially can't wait to tell them where sand comes from', he giggled to himself.

Coral reefs provide us with food and income

Many different types of fish and shellfish breed and live in coral reefs. Island communities rely on coral reefs for food, medicine, building materials, and income.

Tourists visit our islands to see our beautiful coral reefs. This is a big source of income for our country and local communities. If we don't take good care of our coral reefs, tourists will be less tempted to visit our islands and there will be less income for the country and the local villages.

It's important we take care of our coral reefs and ensure that we don't overfish and overharvest our waters.

Pou's tips on caring for our coral reefs

Coral reefs have a better chance of coping with climate change if they are healthy. We can keep our coral reefs healthy by:

- practising better farming by using less fertiliser and protecting soils from being washed away into rivers and the sea;
- taking care of our forests to prevent soil and sediments from being washed out into the sea and reef;
- not overfishing and overharvesting reef fish, shellfish and other marine animals, which all have a role to play in protecting our environment;
- ensuring that boats and anchors do not smash the coral;
- taking care not to touch or break coral when out swimming;
- establishing marine protected areas to ensure there is no overfishing and no harmful fishing methods are used;
- removing the coral-eating crown-of-thorns starfish when there is an outbreak.

Here are some questions on reefs and climate change. The answers are in the story.

1. Why are mangroves important for fish living in coral reefs?

2. What role do parrotfish play in protecting coral reefs?

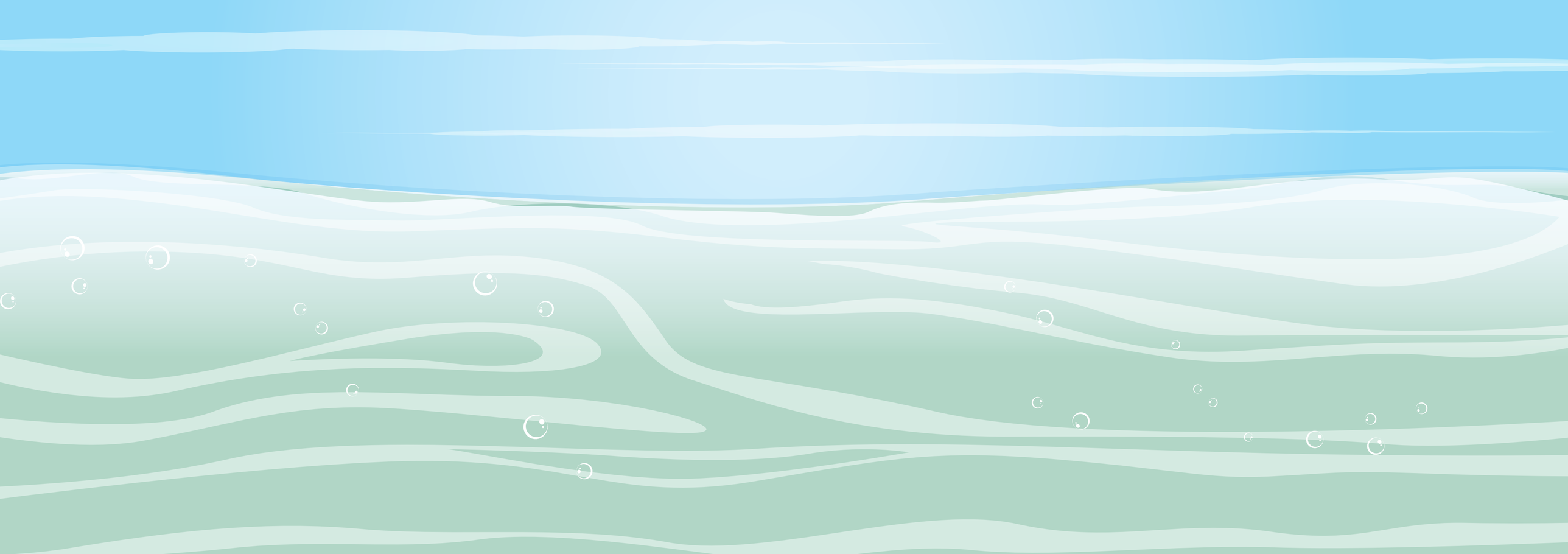
3. How does carbon dioxide affect our oceans and coral reefs?

4. What will happen to coral if the sea surface temperature rises and the ocean water stays warm for a long period of time?

5. How do coral reefs protect coastal communities?

6. How can farmers help protect coral reefs?

Answers to Page 12 questions:
A - large brain coral; E - mushroom coral; B - staghorn coral;
D - boulder coral; C- table coral

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