

Episode 4: Climate Change and our Ocean

The CCMI scientists have explained many aspects of coral biology and restoration in this episode. We spoke about important terms on Reefs Go Live. Here are some key terms from this episode that are worth remembering. Draw a line between each keyword and its correct definition.

Keywords	Definitions
Ocean acidification	Reservoir where excess atmospheric carbon is stored
Carbon sink	Carbon dioxide that is absorbed from the atmosphere and stored in the ocean
Climate change	Reduction in the pH of the ocean due to increased amounts of carbon dioxide in the atmosphere that are being absorbed and stored in the ocean
Blue carbon	The total amount of carbon dioxide released into the atmosphere by all the actions of a person, a family, or a group of people
Calcium carbonate	Change in global weather patterns over time, largely due to increased carbon dioxide in the atmosphere as the result of human activities
Carbon footprint	Colourless or white crystalline compound that naturally occurs in some plants and animals; it is the primary building block of many marine animals' shells, including crabs, corals, sea snails, and bivalves

Carbon Footprint

Every action that we take that uses energy and releases emissions into the atmosphere adds to our carbon footprint. This includes many activities including driving to school, buying clothes, and using appliances at home.

In the left foot below, write down actions/activities you do that add to your carbon footprint.

In the right foot, write down ways you can reduce your footprint and help the environment. Decorate the feet to illustrate a healthy ocean and environment.



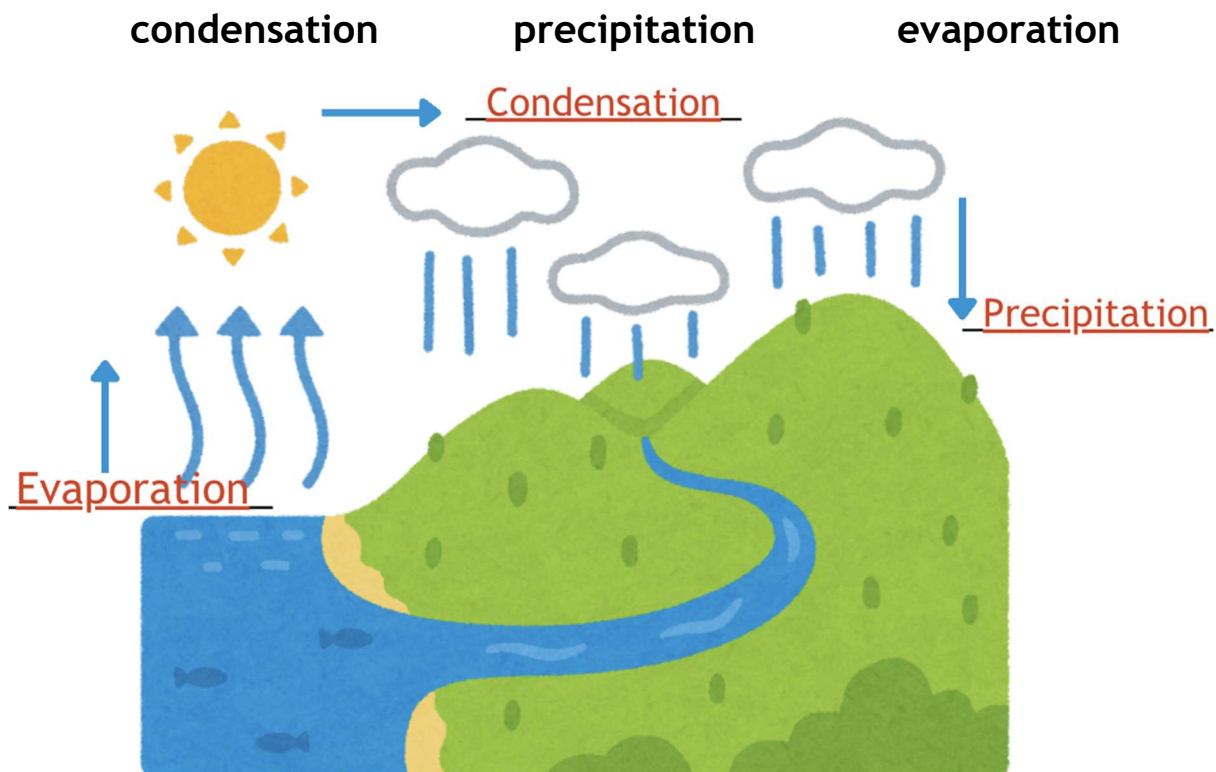
The Ocean and Earth's Processes

During this broadcast, we learnt several ways the ocean can impact the earth's climate and processes. Use the key terms below to fill in the blanks to explain the water cycle.

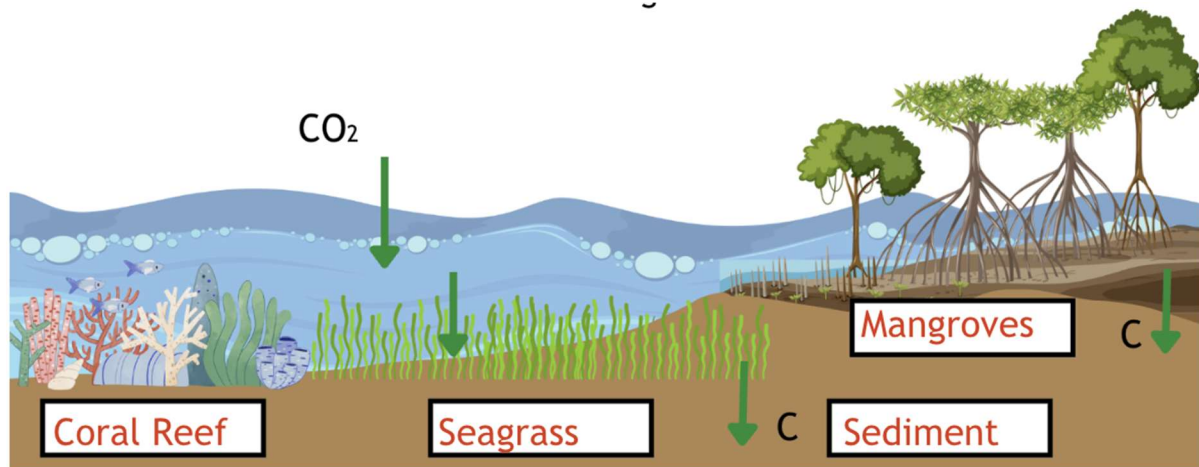
ocean sun precipitation clouds evaporate

Heat from the sun causes water from the ocean to evaporate into water vapour. This vapour condenses into clouds in the atmosphere. As clouds collect the water vapour and cool, water is released in the form of precipitation, also known as rain, snow, hail, etc. If it falls on land, this fresh water enters rivers and lakes and eventually makes its way back to the ocean.

Label the processes of the water cycle on the diagram where arrows show movement of water using the key words.



Carbon Sinks



The ocean plays a very important role in storing carbon in its biological components and ecosystems. In the diagram below, label some of the locations in the ocean where carbon is stored.

Name each ecosystem below and explain why they are important in combatting climate change.



Mangroves: captures carbon in leaves through photosynthesis; roots trap dead organic matter, which is buried in the sediment. Acts as barrier to wave action and storm damage. One hectare of mangroves can store up to 4,000 tonnes of carbon.

Seagrasses: captures carbon in leaves through photosynthesis; roots trap dead organic matter, which is buried in the sediment. Can store carbon up to 35 times faster than tropical rainforests.



Ocean Acidification Experiment

As CO₂ from the atmosphere is absorbed into the ocean, the water becomes more acidic on the pH scale (pH goes down). Currently, the ocean has a pH of about 8.1; more than 100 years ago, it was about 8.2. This change in pH to be more acidic, can harm animals, especially animals that have calcium carbonate skeletons and shells. As the water becomes more acidic, it can weaken their skeletons and shells, making it difficult to grow and add to these important structures and keep the animals strong and healthy.

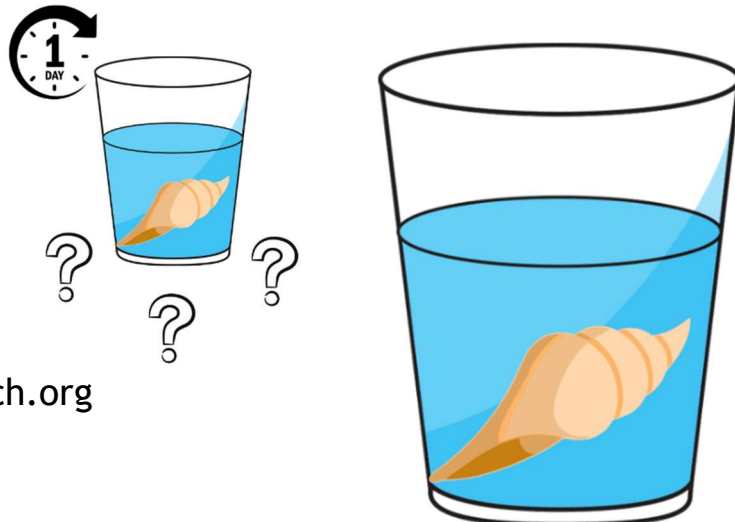
Many liquids are acidic, such as vinegar, which has a pH of 2-3. You can experiment with this at home or at school by placing a shell or eggshell in a cup with vinegar and noticing the way it changes over several days.

What you will need

- A cup
- A seashell or an eggshell
- Vinegar

What to do

1. Place the shell/egg in the cup and pour vinegar into the cup until the shell/egg is covered
2. Leave for one day
3. Remove the vinegar (but not the shell/egg)
4. Cover again with more vinegar and leave for another day
5. Pour out vinegar again and notice how the shell looks and feels. Write down your observations.



What do you think will happen to the shell? Describe how you think it will look and feel.

Weak and brittle/ easy to break

Why do you think these changes happened?

Over time, the shell will weaken and become brittle, eventually breaking apart because the acid dissolves the calcium carbonate in the shell, weakening the structure. Eventually, the whole shell would dissolve if left in the vinegar long enough.

Promise tokens

On this page are promise tokens. Each token has an action on that you can do to help protect our ocean. Cut out these tokens, sign them, and hand them in to your teacher or your family members when you are ready to start making small changes to your lifestyle. You can also ask your friends or family members to take on changes and sign the tokens.

There are some blank ones at the bottom of the page for you to invent your own ideas of how to become more environmentally friendly.

I will not eat meat for one week Signed: _____	I will reduce the amount of plastic I use Signed: _____	I will walk/ride a bike or car-pool to school Signed: _____
I will use eco-friendly products Signed: _____	I will upcycle products instead of buying new ones Signed: _____	I will learn more about how to be environmentally friendly Signed: _____
I will buy second hand clothes, not new ones Signed: _____	I will volunteer my time to help the ocean Signed: _____	I will share my knowledge of climate change with others Signed: _____
Signed: _____	Signed: _____	Signed: _____

Anything that is specific to the student and reduces carbon emissions