Lesson Plan

Why Do We Need Coral Nurseries?

Mini-Module Summary

This lesson introduces students to CCMI's coral restoration programme and allows them to "dive" into one of the Little Cayman coral nurseries. In this live lesson, our CCMI educators will give an introduction to coral biology and ecology before explaining some of the threats corals and coral reefs are currently facing, how the use of coral nurseries can help combat some of these threats, and what students can do to help save corals and coral reefs. In this lesson, students review what corals actually are, how they are grown in a nursery environment, and some of the methods scientists use to monitor the health and growth of them in the nursery, such as total linear extension measurements. Students and teachers will be given an activity sheet to assist with understanding the importance of these corals, coral reef ecosystems, coral reef threats, and coral nurseries.

Curriculum Aim – Key Stage 1 and 2

Learning objectives

- Define a coral and a coral nursery
- Explain some of the threats which corals and coral reefs face
- Describe the importance of coral nurseries in education and coral conservation
- Recognise the role humans can have in helping and protecting coral reefs
- Summarize the scientific method scientists use to measure coral growth

The Cayman Islands - Science National Curriculum Alignment

- Identifying and classifying measurements and observations (Year 1 and 2)
- Identifying that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on one another (Year 2)
- Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get nutrition from what they eat (Year 3)
- Recognise that environments can change and that this can sometimes pose dangers to living things (Year 4)
- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals (Year 6)
- Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution (Year 6)

Necessary materials

Live Lesson: Internet connection, YouTube.com account, computer, speakers, note paper, pencil or pen
Activities: #1-activity sheet (one per student), scissors, and pen or pencil #2- two hardboiled eggs, two empty cups, vinegar, and tap water #3- empty egg carton or paper cups, scissors, blank paper, and markers

Useful resources

- www.reefresearch.org/reefs-go-live
- www.projectaware.org
- www.doe.ky
- www.education.gov.ky/education/curriculum
- www.caymanecodivers.com/cayman-coral-nursery-program/

Glossary

Why Do We Need Coral Nurseries?

Climate change - change in global weather patterns over time, much of which can be attributed to the effects of increased carbon dioxide in the atmosphere from human activities

Coral bleaching – process of corals appearing white due to the loss of the algae living inside of them

Coral nursery – place where scientists grow corals underwater on specialized structures with the goal of replenishing depleted coral reefs from what is grown in these places

Coral reef – marine structure composed of a layer of living coral atop coral skeletons, minerals, and organic matter

Endangered – in great danger or at risk of becoming extinct

Hermatypic coral – stony coral; a coral that helps build the reef and becomes limestone over time

Outplanting – transplanting of corals from a nursery onto a reef or other structure in the ocean

Photosynthesis – process by which green plants convert carbon dioxide and water into organic chemicals using light energy from the sun with oxygen released as a by-product

Reef health - a simple observation of the status of coral reefs using key indicators, scientific measurements, and the presence or absence of certain organisms

Total linear extension (TLE) – measurement scientists use to determine how much corals grow

Student Vocabulary Assessment

Why Do We Need Coral Nurseries?

Below is a list of 10 vocabulary terms used in the Reefs Go Live Mini-Module "How Do Scientists Grow Coral? – Measuring Coral". Show the CCMI educator that you understand the concepts demonstrated in this broadcast by matching the definition on the right with the correct term on the left. Thanks for your help and good luck!

1. Climate change: _____
2. Coral nursery: _____
3. Coral reef: _____
4. Endangered: _____
5. Hermatypic coral: _____
6. Coral bleaching: _____
7. Outplanting: _____
8. Photosynthesis: _____
9. Total linear extension (TLE): _____
10. Reef health: _____

a) process by which green plants convert carbon dioxide and water into organic chemicals using light energy from the sun, with oxygen released as a by-product

b) marine structure composed of a layer of living coral atop coral skeletons, minerals, and organic matter

c) measurement scientists use to determine how much corals grow

d) a simple observation of the status of coral reefs using key indicators, scientific measurements, and the presence or absence of certain organisms

e) stony coral; a coral that helps build the reef and becomes limestone over time

f) place where scientists grow corals underwater on specialized structures with the goal of replenishing depleted coral reefs from what is grown in these places

g) transplanting of corals from a nursery onto a reef or other structure in the ocean

h) in great danger or at risk of becoming extinct

i) process of corals appearing white due to the loss of the algae living inside of them

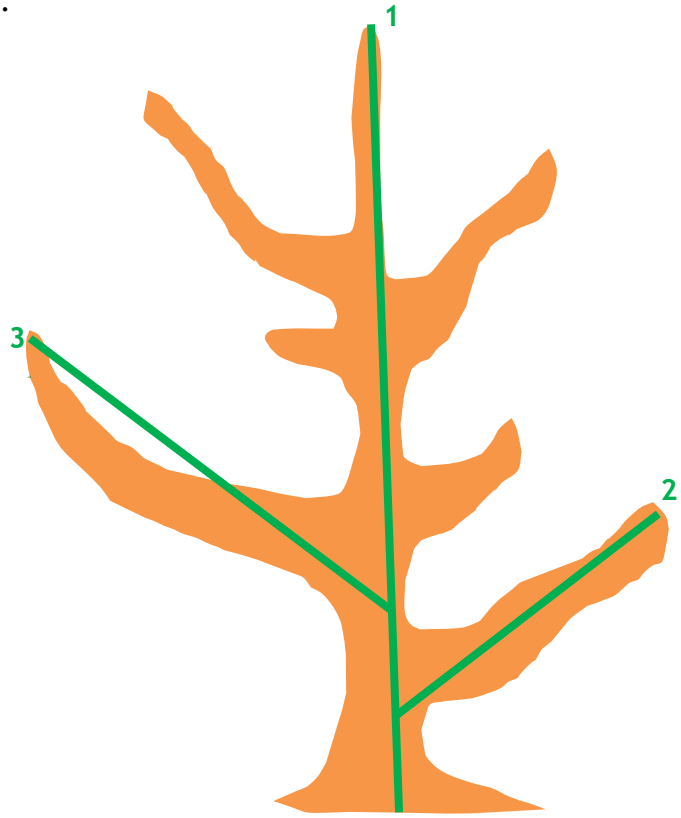
j) change in global weather patterns over time, much of which can be attributed to the effects of increased carbon dioxide in the atmosphere from human activities

Student Activity Sheet

Why Do We Need Coral Nurseries?- Measuring Coral

Today, you're the scientist! Help measure the coral below. Start by cutting out the ruler at the bottom of the page. Use the ruler to measure the length of branch one, as was demonstrated by the CCMI underwater educator. Green lines have been drawn on the first three branches. Use these lines to help you visualize how to properly measure the length of each branch. Record your results in centimeters in the appropriate box in your table below. Now continue by measuring each branch and recording your measurement in your table. Then, calculate the total linear extension (TLE) by adding up the measurements of ALL the branches. Once you have calculated the TLE, measure the coral's maximum width (how wide it is) and maximum height (how tall it is) and record your measurements below.

Branch 1:	
Branch 2:	
Branch 3:	
Branch 4:	
Branch 5:	
Branch 6:	
Branch 7:	
TOTAL:	

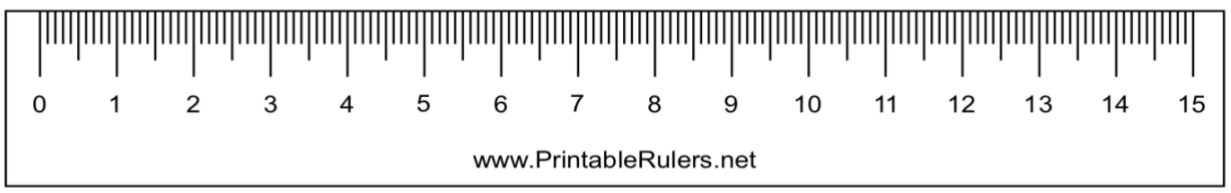


How many branches are there? _____

What is the coral's TLE (cm)? _____

What is the max width of this coral (cm)? _____

What is the max height (cm)? _____



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Student Activity Sheet

Why Do We Need Coral Nurseries?- Ocean Acidification Experiment

Today you're the scientist! You are going to perform an experiment to demonstrate the effects of increased ocean water acidity on corals. In our live lesson we learned that there has been an increase in the amount of carbon dioxide that is released into the atmosphere. This carbon dioxide can be absorbed by the ocean causing ocean water to become more acidic. This now acidic ocean water is able to dissolve the calcium carbonate skeletons of corals. In this experiment, we will demonstrate the effects of an acidic substance on calcium carbonate.

For this experiment you will need: two hard-boiled eggs, two cups, vinegar, and tap water

In this experiment the shell of the egg is made of calcium carbonate, just like the skeleton of corals! Vinegar is an acidic substance and tap water is a non-acidic substance. In this experiment the eggshell represents the coral skeleton, the tap water represents the non-acidic ocean water, and the vinegar represents the acidic ocean water.

Steps:

1. Place the first hard-boiled egg into one cup and place the second hard-boiled egg into another cup.
2. Pour enough tap water into the first cup to completely cover the egg. Pour enough vinegar into the second cup to completely cover the other egg.
3. Let both cups sit overnight. The next day, look at the shells of both eggs. The shell of the egg placed in vinegar should have completely dissolved. If the shell has not completely dissolved on the egg placed in vinegar, replace the old vinegar in the cup with new vinegar and leave the egg to sit for another 12-24 hours.

This experiment has demonstrated that an acidic substance, vinegar, is able to dissolve the calcium carbonate shell of an egg. This shows us that if the ocean continues to become more acidic, it can quickly dissolve the calcium carbonate skeletons of corals and the calcium carbonate skeletons and shells of other marine organisms. If these organisms are unable to form their shells and skeletons, they can become very ill and even die. It is important that we do our part to help stop the ocean from becoming more acidic! We can do this by decreasing the amount of carbon dioxide we release into the atmosphere by reducing our carbon footprint!

Student Activity Sheet

Why Do We Need Coral Nurseries? - Create a Coral Colony

Today you're the scientist! You are going to construct your own coral polyps to form a coral colony!

For this activity you will need: Empty egg carton (or paper cups), paper, scissors, and markers (ideally green)

Instructions:

1. Start by cutting the top half of your egg carton off, keeping just the section with the egg cups. Flip the egg cups upside down. Poke a hole in the middle of each egg cup using scissors. Be very careful when poking the holes. The egg carton will represent the calcium carbonate skeleton formed by the coral polyps. It will connect your polyps, linking them as a colony.
2. Cut a single piece of paper into three strips horizontally. Roll each strip into a tube. Roll the tube so it is about the width of your finger. Using a small piece of tape, near the bottom of the tube tape the tube shut around the side so it does not unroll. Where the tape is will be the bottom of your tube. Each tube will be one of your coral polyps.
3. Next, make several cuts from the top of your tube to approximately ¾ of the way down to the bottom of the tube. Make sure not to cut through the tape or your tube will unroll. Curl the paper back gently so it opens to resemble a flower. You can gently glide the strips along your scissors to give them a slight curl. The strips will be the tentacles of your polyp. These tentacles are able to use small stinging cells called nematocysts to stun and capture small food items.
4. Use your markers to add small dots on the tentacles and on the body of the polyp. These small dots represent the symbiotic algae that lives within the coral tissue called zooxanthellae. These zooxanthellae are photosynthetic and produce food for the coral.
5. Now, insert your coral polyp into the hole you have poked in the one of the egg cups. Make sure to have the tentacles sticking up out of the egg cup. Pull the polyp partway through the egg cup so it is nice and secure. The hole in the middle of your polyp will represent the mouth of your coral polyp.
6. Create enough coral polyps to fill each egg cup. Place all your completed coral polyps in the remaining empty egg cups. Now you have your coral polyps that form your coral colony!
7. You can pull your polyps father into the egg carton to represent the coral polyps at certain times of day when they do not have their tentacles extended. You can pull the coral polyps back out to represent other times of day when they have their tentacles extended to feed.

You can cut the individual egg cups out as well and tape them in different arrangements to represent different types of coral. If you have access to multiple empty egg cartons you can attach multiple colonies together to create a larger coral or a reef with different types of corals! Happy building!

Student Activity Sheet Example

Why Do We Need Coral Nurseries? - Create a Coral Colony