Dive 1: Lesson Plan – Welcome Back to Reefs Go Live: A Review of Coral Reefs

Module Summary

This module is a review dive exploring the world of coral reefs and re-introducing the Reefs Go Live format. Students and teachers are familiarized once again with the Reefs Go Live team and how to interactively ask questions throughout the lesson. They are then taken on a guided dive with our CCMI underwater educator, where they will explore the vast diversity of organisms that each play an important role a coral reef ecosystem. Students will be given an in-class activity to assist with the discovery of many different corals, sponges, algae, fishes, and invertebrates. The dive will include another exciting visual demonstration of sponge pumping a non-toxic fluorescent dye to show the importance of filter feeding animals on the coral reef ecosystem.

Year 4, 5, 6

Learning Objectives

- List some of the organisms that make up the coral reef ecosystem
- Define a coral: animal, plant, and rock
- Explain what a sponge is and why are they important
- Summarize why coral reefs are important to humans
- Think about and plan an activity to help coral reefs in the future

Science National Curriculum Alignment

- Observe similarities and differences among animals and among plants (Year 4).
- Find out about other animals, including how they grow, feed, move, and use their senses (Year 4).
- Investigate a local habitat, including the relationship between the animals and plants found there, and develop skills in classifying animals and plants by observing external features (Year 4).
- Investigate the conditions necessary for the growth of familiar plants including light, heat and water. *For example, place plants in different environments, varying the light, water, and temperature and observe the results* (Year 5).
- Understand that some waste materials can be recycled and that this can be of benefit to the environment. *For example, discuss the recycling of bottles, cans and paper* (Year 6).

Description of the live dive

The dive will take place on a pristine coral reef that is rich with marine life. The underwater educator will communicate with the live lesson host (who will be on the boat) and with the engaged remote class. The educator will take the students through a series of reviewed fun facts and learning objectives regarding our complex coral reefs which we learned in our first Reefs Go Live lesson in 2018, all in alignment with the Science National Curriculum of the Cayman Islands. Students will have an in-class activity to complete during the live lesson, which they are welcome to ask questions about to our underwater educator at any time during the duration of the broadcast. Pre-recorded footage and images will be used to show the diversity and complexity of the coral reef, should these processes not be discovered naturally during the broadcast. The dive will include a visual demonstration on sponge pumping and the importance of this animal's abilities on our coral reef ecosystem.

Live broadcast outline (45 mins)

00:00 – 03:00	CCMI host welcomes students and outlines the lesson
03:00 – 05:00	CCMI host introduces the educator and the in-class activity
05:00 – 10:00	Educator describes a coral reef ecosystem and answers any questions
00:00 – 15:00	Educator explores the coral reef pointing out different organisms and important interactions
15:00 – 20:00	Questions
20:00 – 25:00	Educator explains the importance of coral reefs to humans
30:00 – 35:00	Educator explains threats to coral reefs and hopes for the future
35:00 – 40:00	Questions
40:00 – 45:00	CCMI host on the boat recaps the live dive and concludes the lesson

Materials

Internet connection, laptop, projector, speakers, paper, pencils/pens, CCMI activity sheet, and CCMI fun fact sheet.

Useful resources

- www.reefresearch.org/reefs-go-live
- www.projectaware.org
- www.doe.ky
- www.education.gov.ky/education/curriculum
- www.oceanservice.noaa.gov/kids/

Fun Fact Sheet – Welcome Back to Reefs Go Live: A Review of Coral Reefs

1. Coral reefs are important because they protect our coastlines from storm damage, provide habitat for many commercially important fishes, and are estimated to generate $375 billion USD in economic and environmental services worldwide annually (Costanza et al. 1997).
2. The average depth below the water's surface in the Caribbean Sea is about 2,200 m (Spaulding et al. 2001).
3. Coral reefs only make up less than 1% of the ocean floor, but they are home to 25% of all marine species (Worm et al. 2006).
4. Today's coral reefs are between 5,000 and 10,000 years old, but ancestors of these reefs formed almost 250 million years ago (Knowlton and Jackson 2008).
5. Coral reefs are the largest living organism in the world. The largest reef system is the Great Barrier Reef in Australia, which is just over 4,000 km long and can be seen from outer space (Belfield 2002).
6. Corals are an animal, a plant, and a rock all in one (Nothdurft 2009).
7. Coral reefs act as the world's carbonic sink, trapping carbon. Excessive carbon dioxide (CO_2) is being emitted into our atmosphere, and as the atmosphere becomes supersaturated, excess carbon is forced into our oceans resulting in ocean acidification. However, coral reefs are taking up this excess carbon in their nutrient cycle and helping to clean our oceans (Anthony et al. 2011).
8. It is estimated that over one billion people world-wide rely on coral reefs for food, income, and eco-tourism opportunities (WWF 2017).
9. Ninety-five per cent of nutrients that corals need to survive is obtained from the zooxanthellae living inside the coral polyps, undergoing photosynthesis. The other 5% comes from the coral polyps using their tentacles to reach out and grab food that floats by in the water column (Cheal et al. 2010).
10. Coral reefs are important to the development of new medicines linked to the treatment of cancer, Alzheimer's, bacterial infections, and other diseases (Reaka-Kudla 1997).
11. It is estimated that we have lost approximately half of the world's coral reefs over the last 30 years, and we could potentially lose more than 90% by the year 2050 if we don't take drastic measures (Gates 2016).
12. Coral reefs are the connecting ecosystem between nursery grounds (such as seagrass beds or mangrove forests) and the open sea. This is where most developing fishes spend a portion to the majority of their lives reaching sexual maturity before some apex predators move to open ocean (NOAA 2015).
13. Recently scientists have discovered deep sea "cold coral reefs" off the coast of Norway and deep in the Mediterranean Sea (Goodbody- Gringley et al. 2014).

In Class Activity Sheet - Welcome Back to Reefs Go Live: A Review of Coral Reefs

Our CCMI scientist needs your help! If you see one of the below creatures (left column) or interactions (right column) during the dive, make sure you label what you see next to it. If you see something during our dive that our underwater educator doesn't see, please raise your hand and let him/her know! Can you identify what it is? Describe or draw it in one of the empty boxes below. If you cannot identify it, describe it to your teacher, who will share with the CCMI scientist to help you identify it!

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2. _____

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3. _____

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4. _____

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5. _____

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6. _____

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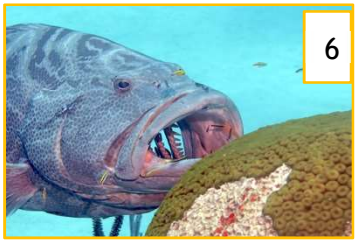

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