Lesson Plan – Adaptation on Coral Reefs

Module Summary

This RGL module encourages students to dive deeper into the impacts of human-induced climate change and the effects that climate change has on our oceans and coral reefs. Participants engage through our interactive platform by asking questions, taking part in live polls, chatting with our team, and completing a provided in-class worksheet. Students are taken on a guided dive, alongside an underwater educator, where they will learn how CCMI's research efforts are attempting to understand how coral reefs are changing in response to climate change, so that we may help them survive in the future. All education materials are in alignment with the Cayman Islands and United Kingdom Science National Curricula and the Ocean Literacy Principles.

Year 4 & 6

Learning Objectives

- Comprehend the concept of human-induced climate change
- Describe the impacts of climate change on humans and on our oceans
- Define adaptation and give examples, both terrestrial and marine
- Record findings and practice working scientifically skills
- Pledge at least three actions you can do to fight climate change

The Cayman Islands and United Kingdom National Science Curriculum

- Recognize that environments can change and that this can sometimes pose dangers to living things (Year 4 – Animals, including humans)
- Make systematic and careful observations and where appropriate; Using results to draw simple conclusions, make predictions, suggest improvements to raise further questions (Year 4 – Animals, including Humans: Working Scientifically Skills)
- Recognize that living things have changed over time; Recognize that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents; Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution (Year 6 – Adaptation and inheritance)
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar, and line graphs. (Year 6 – Living things and their habitats: Working Scientifically Skills)
- Use test results to make predictions to set up further comparative and fair tests (Year 6 – Living things and their habitats: Working Scientifically Skills)

Ocean Literacy Principles

- Ocean Literacy Principle #3: The ocean is a major influence on weather and climate.
- Ocean Literacy Principle #5: The ocean supports a great diversity of life and ecosystems.
- Ocean Literacy Principle #6: The ocean and humans are inextricably interconnected.

Description of Live Lesson

This module will take place on a coral reef ecosystem along the coast of Little Cayman in the Cayman Islands, where the CCMI team will guide students through a series of learning objectives. A topside host will communicate in real time between the students joining in as our remote audience/virtual dive buddies and an underwater educator. CCMI's current NSF-BSF coral reef monitoring research project will be shared, with students being shown examples of study species. Key messages will be delivered, highlighting information on adaptations and evolution, all in alignment with the Science National Curriculum of the Cayman Islands and the United Kingdom and the Ocean Literacy Principles. Students will have a worksheet and supplemental booklet to complete during the live lesson which they are encouraged to ask questions about to the host or educator at any time during the broadcast. Pre-recorded footage may be used to show key concepts, should these observations not be discovered naturally during the live lesson.

Live broadcast outline (40 mins)

00:00 – 02:00 Welcome and CCMI team introductions
02:00 – 07:00 Understanding human-induced climate change and global warming
07:00 – 12:00 Climate change is affecting our oceans and impacting marine life
12:00 – 17:00 Adaptation: all living things change according to their environment
17:00 – 19:00 Questions
19:00 – 24:00 Research may show that some adaptations are hereditary
24:00 – 29:00 Scientists want to understand adaptations to help coral reefs survive
29:00 – 31:00 Questions
31:00 – 35:00 How to fight climate change and help coral reefs
35:00 – 40:00 Live lesson recap and conclude the dive

Necessary Materials

- internet connection
- computer/phone
- projector (optional)
- speakers/headphones
- scissors
- notebook paper
- pencils/pens
- CCMI worksheets and/or booklet

Useful additional resources

- www.reefresearch.org/what-we-do/education/teacher-resources/
- www.reefresearch.org/what-we-do/education/reefs-go-live/
- www.reefresearch.org/healthy-reef-report-card-2021-results/
- https://kids.frontiersin.org/articles/10.3389/frym.2022.712528
- https://coral.org/wp-content/uploads/2022/10/Coral-Reefs-For-Kids-V4.pdf
- https://study.com/academy/lesson/what-are-adaptations-lesson-for-kids.html

“Adaptation on Coral Reefs” Key Terms

The CCMI educators may refer to the following key terms throughout the live lesson. Listen up for your chance to learn some new vocabulary about our coral reef ecosystems!

Adaptation - changes in a living being's shape or behavior which improves its ability to survive, these changes are passed on to future generations through the organism's genes

Climate Change - change in global weather patterns over time, largely due to increased carbon dioxide in the atmosphere as the result of human activities

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

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

Evolutionary Adaptation – genetic alteration in body shape or behaviour, by which a species or individual improves its ability to survive and passes this on in its genes to future generations

Global Warming – significant increase in the “normal” temperature of Earth over the last century

Hereditary – characteristics determined by genes passed from parents to offspring

Morphology – the study of forms and structures that make up different organisms

Ocean Acidification – 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

Symbiosis – close associations between two or more different organisms of different species that may, but does not necessarily, benefit each member

Zooxanthellae - symbiotic algae that live in the tissues of coral polyps (and several other marine animals) that provide the coral with 90-95% of its needed energy and nutrients