



## Lesson Plan - Corals in a Changing Climate: A Dive into the Future of Coral Reefs

### Module Summary

This module invites students to embark on an eye-opening journey, exploring the impacts of climate change on Little Cayman's coral reefs. Join CCMI's educators as they delve into the important scientific research and monitoring conducted at CCMI, which informs our understanding of how corals are faring under a changing climate, and ways that we can address the challenges that they face. Participants engage through the interactive platform by asking questions, taking part in live polls, chatting with the CCMI team, and completing an in-class worksheet (provided). The lesson encourages students to reflect on the decisions and small changes we can make to our everyday lives to help support the preservation of coral reefs for future generations. All education materials align with the Cayman Islands and United Kingdom Science National Curriculums and the Ocean Literacy Principles.



Friday 7th June 2024 - 10am EST (UTC-5)



Duration: 40-45 minute broadcast, 1 hour lesson



Years 4, 5, and 6

### Learning Objectives

- Understand the fundamental characteristics of coral reefs and their importance as marine ecosystems
- Explain the process of climate change and its impacts on ocean environments, specifically focusing on coral reefs
- Describe the process of coral bleaching and its implications for coral health
- Recognise factors that can influence post-bleaching recovery in coral reefs, including localised pressures and the role of healthy fish populations and healthy reef ecosystems
- Explore CCMI's research initiatives and strategies, including the significance of long-term monitoring as well as the role of research in helping mitigate the impacts of climate change and helping corals adapt to the pressures they face
- Identify collective actions and small changes to our daily lives that can help reduce the impact of climate change on coral reefs



## The Cayman Islands and United Kingdom National Science Curriculum

- Recognise that environments can change and that this can sometimes pose dangers to living things (Living things and their habitats - Year 4)
- Recognise that living things have changed over time (Adaptation and Inheritance - Year 6)
- Identify how animals and plants are adapted to suit their environment in different ways, and that adaptation may lead to evolution (Adaptation and Inheritance - Year 6)

## Ocean Literacy Principles

- Ocean Literacy Principle #3: The ocean is a major influence on weather and climate
- Ocean Literacy Principle #6: The ocean and humans are inextricably interconnected

## Description of Live Lesson

This live lesson will take place on a coral reef ecosystem in Little Cayman, where the CCMI team will guide students through a series of learning objectives. A topside host will communicate in real time with the underwater educator and students who join in as our remote audience/virtual dive buddies.

Participants will develop an in-depth understanding of how climate change affects coral ecosystems, with a particular focus on coral bleaching. This will be illustrated through a compelling case study from Little Cayman following the 2023 marine heatwave. Students will learn that corals are able to recover from bleaching, and that there are factors that influence this ability to recover. Additionally, students will gain insight into CCMI's ongoing research initiatives to monitor and protect coral reefs in the face of changing environmental conditions.

By the end of the broadcast, students should feel empowered to take action to protect coral reefs and mitigate the impacts of climate change on these vital ecosystems. Through small lifestyle changes and advocacy efforts, they can recognise their role in preserving marine biodiversity for future generations.



These topics align with the Science National Curriculum of the Cayman Islands and the United Kingdom and the Ocean Literacy Principles. Students can complete the worksheet and supplemental booklet during the live lesson, and they are encouraged to ask questions about the materials 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 seen naturally during the live lesson.

### **Live broadcast outline (40 - 45 mins)**

00:00 - 03:00	Welcome back to Reefs Go Live, CCMI team introductions
03:00 - 06:00	Explanation of climate change and causes
06:00 - 08:00	Basic coral biology and the symbiotic relationship with zooxanthellae
08:00 - 09:00	Introduction to coral bleaching
09:00 - 13:00	How climate change impacts the ocean, specifically corals and bleaching
13:00 - 14:30	Key findings from CCMI's 2023/24 bleaching monitoring
14:30 - 18:00	Factors that influence post-bleaching recovery
18:00 - 20:00	CCMI's Healthy Reefs long-term coral monitoring
20:00 - 25:00	Questions
25:00 - 29:00	CCMI's research helping to mitigate the impacts of climate change
29:00 - 32:30	Mesophotic reefs - a beacon of hope?
32:30 - 35:00	Questions
35:00 - 40:00	Everyday changes to help fight the issues of climate change
40:00 - 42:00	Summary and goodbye

### **Necessary Materials**

- Internet connection
- Computer/phone
- Projector (optional)
- Speakers/headphones
- Scissors
- Notebook paper
- Pencils/pens
- CCMI worksheets and/or booklet (one copy per student)



## Useful additional resources

- [www.reefresearch.org/what-we-do/education/teacher-resources/](http://www.reefresearch.org/what-we-do/education/teacher-resources/)
- [www.reefresearch.org/what-we-do/education/reefs-go-live/](http://www.reefresearch.org/what-we-do/education/reefs-go-live/)
- <https://reefresearch.org/get-involved/healthy-reef/>
- <https://reefresearch.org/what-we-do/research/healthy-reefs/>
- <https://reefresearch.org/ccmi-resebid-project-reveals-the-crucial-role-of-diversity-in-coral-restoration-and-climate-change-resilience/>
- <https://reefresearch.org/what-we-do/research/blue-carbon/>
- <https://reefresearch.org/ccmi-begins-blue-carbon-research/>
- <https://www.youtube.com/watch?v=QUuV-FWS-CE>



## “Corals in a Changing Climate: A Dive into the Future of Coral Reefs” Key Terms

The CCMI educators may refer to the following key terms throughout the live lesson. Listen carefully to the broadcast to learn some new vocabulary about scientific investigation and researching on the reef!

**Adapt** - When a living being changes its shape or behavior to improve its ability to survive and passes these traits on to future generations through the organism’s genes

**AGRRA survey** - Atlantic Gulf Rapid Reef Assessment: a type of survey used for assessing coral health

**Blue carbon** - The carbon dioxide that is absorbed from the atmosphere and stored in the ocean by marine ecosystems

**Carbon sink** - Reservoir where excess atmospheric carbon is stored

**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 algae living inside them

**Coral mortality** - A measure of death of part or all of a coral colony

**Fossil fuels** - Natural materials like coal, oil, or natural gas that are formed from the remains of dead organisms known as fossils, which can be burned to create energy

**Global warming** - Significant increase in the “normal” temperature of Earth over the last century

**Greenhouse gas** - Gases in Earth’s atmosphere, such as carbon dioxide, that trap heat

**Marine heatwave** - Periods of abnormally high sea temperature above the seasonal average which can last days to months



**Symbiotic relationship** - Interaction between two organisms where at least one of the organisms benefits; however the other may suffer, be unaffected, or benefit as well

**Thermal performance** - How well an organism continues to function properly in response to increases in temperature

**Zooxanthellae** - Algae that live inside a host (e.g. coral) in a relationship where both the host and the algae benefit. The algae provide nutrients to the host through photosynthesis in return for protection and compounds that are essential for photosynthesis.