Lesson Plan – Researching on the Reef: The Importance of Science Investigation

Module Summary
This module encourages students to dive deeper into the captivating world of ocean exploration and scientific investigation as we embark on a journey with CCMI's underwater educators to understand the importance of scientific research in unravelling mysteries of the underwater realm. 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 promises an immersive learning experience, encouraging students to think about why we need scientific research to inform our efforts in preserving the oceans for generations to come. All education materials align with the Cayman Islands and United Kingdom Science National Curriculums and the Ocean Literacy Principles.

Friday 12th April 2024; 10am EST (UTC-5)

Duration: 40-minute broadcast, 1 hour lesson

Years 4, 5, and 6

Learning Objectives

- Understand the importance of scientific investigation in uncovering the mysteries about the world around us, emphasizing the concept that 'what you don't know *can* hurt you', particularly when it comes to protecting vulnerable ecosystems
- Understand the need for ongoing research to inform planning and effective protection of marine ecosystems and species
- Understand the impact of human interactions on marine populations, emphasising the responsibility we hold in preserving these environments for the benefit of us and our planet
- Explain the challenges and threats faced by coral reefs and how innovating research at CCMI is contributing to improvements in coral health

The Cayman Islands and United Kingdom National Science Curriculum

- Explore examples of human impacts on the environment (Living things and their habitats - Year 4)
- Construct and interpret a variety of food chains, identifying producers, predators, and prey (Living things and their habitats – Year 4)
- Planning different type of scientific enquiries to answer questions (Working scientifically – Years 5 and 6)
- Reporting and presenting findings from enquiries, including conclusions, casual relationships, and explanations (Working Scientifically – Years 5 and 6)

- Identifying scientific evidence that has been used to support or refute ideas or arguments (Working scientifically – Years 5 and 6).

Ocean Literacy Principles

- Ocean Literacy Principle #6: The ocean and humans are inextricably interconnected
- Ocean Literacy Principle #7: The ocean is largely unexplored

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. The topside host will communicate in real time with the students who join in as our remote audience/virtual dive buddies, and the underwater educator. Participants will gain an understanding of the significance of scientific research, touching on the vast expanses of the world's oceans that remain unexplored. During the lesson, we will spotlight the critical role of coral reefs in supporting our existence and their multifaceted contributions to human wellbeing. The hosts will run through the lessons learned from CCMI's own research projects working to reverse the declines of coral reefs, including CCMI's Darwin+ local sea cucumber project. 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 (35 mins)

00:00 – 03:00 Welcome and CCMI team introductions
03:00 – 06:30 The ocean is largely unexplored
06:30 – 07:00 Student answers - why scientific investigation is important
07:00 – 9:00 The importance of scientific investigation
09:00 – 11:00 Questions
11:00 – 14:30 Benefits of the ocean
14:30 – 15:30 Questions
15:30 – 22:30 Threats to the ocean
22:30 – 25:00 Scientific understanding and protecting coral reefs
25:00 – 27:00 Questions
27:00 – 31:00 CCMI's research including Darwin Plus sea cucumber project
31:00 – 35:00 Last questions and end of episode

Necessary materials

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

Useful additional resources

- www.reefresearch.org/what-we-do/education/teacher-resources/
- www.reefresearch.org/what-we-do/education/reefs-go-live/
- https://www.natgeokids.com/uk/discover/geography/general-geography/ocean-facts/
- https://www.youtube.com/watch?v=gJGS60c68HU
- What can I do to protect coral reefs? (noaa.gov)

“Researching on the Reef: The Importance of Scientific Investigation” 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!

Ammonia – a nutrient which plants use for growth

Anthropogenic stressor – human activities which cause harm to the environment

Calcium carbonate – a mineral that corals use to build their skeletons and form large reef structures

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

Climate regulation – the way in which earth keeps its temperature balanced so that living things such as plants, animals, and people can survive

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

Detritivore – an organism that feeds on and breaks down dead plant or animal matter, returning essential nutrients to the ecosystem

Food web - representation to show how energy moves from producers to consumers in an ecosystem while also showing how these interactions between organisms in an ecosystem can be multi-faceted

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

Overfishing - act of fishing too many fish out of a population leading to population collapse of that species or area

Phytoplankton - tiny plant-like organisms in the ocean

Pollution - introduction of contaminants into the environment which have negative effects

Storm surge - the rise in seawater during a storm

Threat - something likely to cause harm

Trophic level - the position of organisms in a food chain