




## Lesson Plan: Episode 3 - From Ridge to Reef

### Module Summary


From land to sea, everything is connected. This episode explores how mangroves, seagrass, and coral reefs work together as nurseries, feeding grounds, and carbon stores, making coastal ecosystems stronger together than on their own.

We examine how the ocean and land are linked through the water cycle, and how human actions like pollution and overfishing can impact reef health. Featuring CCMI's Blue Carbon Offset and Biodiversity programme with Butterfield, the episode highlights three years of research into how Cayman's nearshore ecosystems store carbon and support climate resilience.

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). All educational material aligns with Cayman Islands and United Kingdom Science National Curriculums and Ocean Literacy Principles.

 **Friday 8th May 2026; 10 am EST (UTC -5)**

 **Duration:** 40-minute broadcast, 1 hour lesson

 **Years:** 2, 4, 5, and 6

### Learning Objectives

- Understand the role of different ecosystems in food webs
- Understand that coastal ecosystems rely on each other for health (roles of mangroves, seagrass, and reefs)
- Recognise that when combined, these ecosystems are more powerful than on their own
- Understand that the ocean is impacted by life on land, but life on land is impacted by the ocean (the water cycle)
- Understand how actions on land can impact these ecosystems (coastal pollution, overfishing, and climate change).



- Understand how water moves from land to sea and why this journey matters for coastal ecosystems
- Identify actions people can take on land to protect coastal and reef ecosystems

## **The Cayman Islands and United Kingdom National Science Curriculum**

- Identify that most living things live in habitats to which they are suited (Year 2)
- Describe how different habitats provide for the basic needs of different kinds of animals and plants (Year 2)
- Recognise that environments can change and that this can sometimes pose dangers to living things (Year 4)
- Describe the life processes of reproduction in some plants and animals (Year 5/6)
- Identify how animals and plants are adapted to suit their environment in different ways (Years 5 and 6)
- Describe how living things are classified according to common observable characteristics (Year 6)

## **Ocean Literacy Principles**

- Principle #1: Earth has one big ocean with many features
- Principle #3: The ocean is a major influence on weather and climate
- Principle #5: The ocean supports a great diversity of life and ecosystems
- Principle #6: The ocean and humans are inextricably interconnected
- Principle #7: The ocean is largely unexplored

## **Description of Live Lesson**

This episode takes place along the coastline of Little Cayman in the Cayman Islands where CCMI's topside and underwater hosts guide students through the journey of water from land to sea, or 'from Ridge to Reef.'

Through the live underwater broadcast, participants will follow a drop of rainwater as it travels from land, through mangrove forests, across seagrass meadows, and out to the coral reef. At each stop, students will discover how these ecosystems work, what animals depend on them, and how they filter, feed, and protect everything downstream.

A hands-on topside demonstration with a jar of muddy water and a sponge will show students how mangrove roots trap sediment before it reaches the reef. Students will explore the special adaptations of mangrove trees, the unique properties of seagrass as a flowering plant and carbon store, and the biology of coral polyps as the architects of the reef.

The broadcast also connects to current CCMI research project, the Blue Carbon Offset and Biodiversity Programme (sponsored by Butterfield). Students will learn how CCMI's 2025 data

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showed that Little Cayman's seagrass is a highly effective and thermotolerant carbon sink and how restoring coral reefs nearby actually reinforces the seagrass's carbon storage capacity. This discovery illustrates the concept that these ecosystems are 'stronger together.'

By the end of the broadcast, students will understand the Ridge to Reef connection as a connected system, appreciate the threats it faces from coastal development, anchoring, and climate change, and feel empowered to take action in their own lives to protect it.

This lesson is in alignment with the Science National Curriculum of the Cayman Islands and the United Kingdom, as well as the Ocean Literacy Principles. Students can complete the worksheet during the live lesson and are encouraged to submit questions to the hosts at any time. 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 mins)**

**00:00 - 03:00** Welcome back to Reefs Go Live; host introductions; introduce the episode

**03:00 - 07:00** How do we stop land-water from smothering coral reefs? Jar demonstration.

**07:00 - 12:00** Mangrove segment: root adaptations, sediment filtering, nursery habitat; sponge demonstration topside

**12:00 - 18:00** Seagrass segment: angiosperms; feeding grounds; blue carbon storage

**18:00 - 23:00** Live reef segment: coral polyps; the algae vs coral competition; nutrient imbalance explained

**23:00 - 27:00** Reef crests as coastal shield; coral sand and beach replenishment; the full Ridge to Reef cycle

**27:00 - 32:00** CCMI blue carbon research: thermotolerant seagrass findings; how reef restoration enhances carbon storage; Carbon Credit Certification Tool

**32:00 - 35:00** Live Q&A from student chat

**35:00 - 40:00** Summary and goodbye: mangroves, seagrass, reefs, all stronger together

### **Necessary Materials**

- Internet connection
- Computer, tablet, or phone
- Projector (optional, recommended for group viewing)
- Speakers or headphones
- Jar of water mixed with soil and leaves (optional for teacher to recreate the topside demonstration)
- A sponge or piece of cloth (to represent mangrove roots in the filtering demo)
- Two clear glasses or containers
- Notebook paper
- Pencils or pens
- CCMI worksheets (one copy per student)



## Useful additional resources

- [www.reefresearch.org](http://www.reefresearch.org)
- [www.reefresearch.org/our-work/education/teacher-resources/](http://www.reefresearch.org/our-work/education/teacher-resources/)
- [www.reefresearch.org/reefs-go-live/](http://www.reefresearch.org/reefs-go-live/)
- [www.reefresearch.org/our-work/research/blue-carbon/](http://www.reefresearch.org/our-work/research/blue-carbon/)
- [www.natgeokids.com/uk/discover/geography/general-geography/coral-reef-facts/](http://www.natgeokids.com/uk/discover/geography/general-geography/coral-reef-facts/)
- [oceanservice.noaa.gov/facts/mangroves.html](http://oceanservice.noaa.gov/facts/mangroves.html)

## Teacher's notes and preparation

### Before the broadcast

- Prepare the muddy water demonstration: mix soil, a few leaves, and water in a jar so students can see it alongside the topside host
- Print one student worksheet per student
- Display the key terms (see below) on the board ahead of the lesson, and encourage students to listen for them during the broadcast
- Prompt students to think about: 'What happens to rainwater after it falls?' before starting the broadcast

### During the broadcast

- Encourage class discussion during interactive moments (e.g. the muddy jar demo, the Team Algae / Team Coral vote)
- Encourage students to note down animals they see at each stop on their worksheet
- Prompt students to submit questions to the live chat

### After the broadcast

- Use the worksheet activities to consolidate learning, particularly the flow diagram and the Blue Carbon data task
- Discuss: What can students do on land to protect the reef?
- Extension: Ask students to design a poster showing the Ridge to Reef journey



## “From Ridge to Reef” Key Terms

The CCMI educators may refer to the following key terms throughout the live lesson. Display these on the board before the broadcast and/or encourage students to listen carefully for them during the broadcast.

**Angiosperm** - a flowering plant with true roots, stems, leaves, and seeds. Seagrass is an angiosperm.

**Biogeochemical cycle** - the movement of chemical elements such as carbon and nitrogen through living creatures and the environment

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

**Carbon sink** - an ecosystem that absorbs more carbon dioxide from the atmosphere than it releases

**Coral polyp** - a tiny animal related to sea anemones and jellies that builds the hard structures of coral reefs. Inside the bodies of coral polyps live microscopic algae called zooxanthellae, which provide the coral with food in exchange for a place to live. These coral polyps live together in large, connected colonies, and this is what forms the structure of colourful coral reefs.

**Ecosystem** - a community of living things (such as plants and animals) and the non-living parts (such as water, sunlight, and soil) all interacting in one place

**Mangrove** - type of tropical tree or shrub that grows (in brackish or salt water) in thick clusters and send out prop roots, which help to stabilise shorelines by keeping sediment in place; the root structures create a unique ecosystem where many marine and aquatic animals live

**Rhizome** - the underground stem of seagrass that anchors it to the seafloor and stores nutrients

**Ridge to Reef** - concept describing how land-based activities are connected to the health of the coral reef through the flow of water

**Run-off** - water that flows across the ground surface after rain that collects soil, nutrients, and pollutants on its way to the sea

**Seagrass** - a grass-like flowering plant that lives in marine environments

**Sediment** - solid materials such as particles of soil, sand, or other material that can move across land or through water through erosion and settle in a new place

**Thermotolerant** - able to function and survive at higher-than-normal temperatures