



## “Dive” 4: Lesson Plan - Magnificent Mangroves

### Module Summary

This module is not an underwater dive; instead, it is a “dive” into the heart of a mangrove forest on Little Cayman. Students are taken on a terrestrial tour of several mangrove “mangles” where they are encouraged to ask questions to our CCMI scientist in real time. Students will be given an in-class activity to assist with their learning about the specialized adaptations of the red, black, and white mangroves and what makes them so important. This RGL module will include a trip to either Tarpon Lake or Owen Island.

### Year 5

#### Learning Objectives

- Describe how mangroves adapted to their harsh environment
- Know the life cycle of a flowering mangrove tree
- Explain why mangroves so important to humans
- Demonstrate the impact of destruction to mangrove forests
- Prepare a letter of suggestion to the Department of Environment (DoE) on how to preserve mangroves

#### Science National Curriculum Alignment

- Learn about the life cycle of a flowering plant including how pollen is taken from the stamen into the stigma, fertilized in the ovule and a seed produced which is dispersed in a variety of ways (Year 5).

#### Description of the live lesson

This module will take place above water in front of a dense mangrove forest on Little Cayman. The educator will communicate with the live lesson host (who will be behind the camera) and with the engaged remote class. The educator will take the students through a series of fun facts and learning objectives regarding our magnificent mangrove mangles, 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 educator at any time during the duration of the broadcast. Pre-recorded footage and images will be used to show the diversity and connectivity of the mangrove forest, should these observations not be discovered naturally during the live broadcast. During this module students will learn the importance of the mangrove forests, why we should leave them intact, and what we can do to ensure they remain a part of our connectivity to coral reefs in our future. The module will include a trip to either Tarpon Lake or Owen Island.



### 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 Scientist and the in-class activity
05:00 - 10:00	Scientist introduces and describes a mangrove forest
00:00 - 15:00	Scientist explores the mangroves and points out their importance to humans
15:00 - 20:00	Questions
20:00 - 25:00	Scientist explains what could happen to the Cayman Islands without mangroves
25:00 - 30:00	Scientist demonstrates turbidity and water clarity in an environment with mangroves and an environment without
30:00 - 35:00	Scientist gives hopes for the future and how the students can help
35:00 - 40:00	Questions
40:00 - 45:00	CCMI host recaps the live lesson and concludes the module

### 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](http://www.reefresearch.org/reefs-go-live)
- [www.projectaware.org](http://www.projectaware.org)
- [www.doe.ky](http://www.doe.ky)
- [www.education.gov.ky/education/curriculum](http://www.education.gov.ky/education/curriculum)
- [www.oceanservice.noaa.gov/kids/](http://www.oceanservice.noaa.gov/kids/)



## Fun Fact Sheet - Magnificent Mangroves

1. Mangroves can be found in more than 100 countries around the world in tropical and sub-tropical locations! India has the most mangroves; they cover more than 32,000 km<sup>2</sup> (Hamilton and Casey 2016).
2. A group of mangrove trees are called a “mangle” (Hovenden and Allaway 1994).
3. In 2000, it was calculated that mangroves cover 137,800 km<sup>2</sup> worldwide (Giri et al. 2010).
4. Mangrove prop roots are an important nursery habitat for many different ornamental reef fishes and commercially important fishes such as groupers, snappers, and jacks (Nagelkerken et al. 2000).
5. Mangrove forests help to protect coastlines from erosion, storm surge, and even tsunamis (Danielsen et al. 2005).
6. Mangroves are specialized halophytes, meaning they can live and thrive in or near saltwater (Popp 1995).
7. Some types of mangroves secrete salt from salt glands at the base of their leaves while others secrete salt through the bottom of some “sacrificial” leaves called salt slaves (Atkinson et al. 1967).
8. Many mangrove species live in anoxic (no oxygen) soil conditions, so they have evolved to obtain oxygen in unique ways. Some mangrove species adapted roots to prop themselves above the water and others have special roots that stick up out of the soil like snorkels called pneumatophores (Hovenden and Allaway 1994).
9. Bacteria living on the roots of mangroves help them to absorb nutrients that are important to the growth and survival of the mangrove such as nitrogen and iron (Sasekumar et al. 1994).
10. Mangroves have special seeds called propagules that start growing as soon as they are produced. Once large enough, these propagules drop into the water below the mangle and travel great distances for up to a year. Even after all that time, the propagules are still able to grow a new tree as soon as they find the right environment (Rabinowitz 1978).
11. In the past two decades, at least 35% of mangroves worldwide have been destroyed to make way for agriculture, human development, industry, and aquaculture (Valiela, Bowen, and York 2001).

## In Class Activity Sheet – Magnificent Mangroves

Today, you're the scientist! Help our CCMI scientist to restore the below mangrove mangle into the intricate ecosystem that it can be. As the CCMI scientist guides you through a mangrove mangle on Little Cayman, illustrate the keystone species discussed in the below diagram. To help get your restored mangrove started, be sure to include a high tide water line, a low tide water line and a nearby seagrass bed. If you don't know what these things are, just ask our CCMI scientist! After you have drawn these three things, add in the creatures which may be attracted to your newly restored mangrove forest. Thanks for your help restoring this mangrove ecosystem, and enjoy your "dive" into the magnificent mangroves of Little Cayman!

