



# Exploring Cyclones

EARTH AND SPACE SCIENCES



**QGC**

**FUTUREMAKERS**



**QUEENSLAND  
MUSEUM NETWORK**



**Queensland  
Government**

# Introduction

At the Queensland Museum, we research a broad range of topics spanning biodiversity, geosciences, cultures and histories, and conservation practices. Often these research areas overlap; for example, Queensland Museum researchers and scientists may explore how the Earth's landscape shapes our biodiversity, and vice versa.

The Queensland Museum Network has one of the largest and most significant Geosciences Collections in the southern hemisphere. The Geosciences Collection consists of 55,000 geological samples and 27,000 mineral samples, as well as over 7 million fossil specimens! This includes nearly 10,000 primary type specimens (reference specimens used to identify, name and classify fossil plant and animal species).

The Biodiversity Collection at the Queensland Museum contains over 2.5 million specimens, and scientists from the Queensland Museum have played a role in discovering over 4000 new species since 1862!

This resource may be used individually or with the Queensland Museum online resource 'Volcanoes'. The Queensland Museum has many other resources online that cover our natural environment, including the [Queensland Museum Network Field Guide to Queensland Fauna](#) app for identifying local species.

---

Future Makers is an innovative partnership between Queensland Museum Network and Shell's QGC project aiming to increase awareness and understanding of the value of science, technology, engineering and maths (STEM) education and skills in Queensland.

This partnership aims to engage and inspire people with the wonder of science, and increase the participation and performance of students in STEM-related subjects and careers — creating a highly capable workforce for the future.

© Queensland Museum. The images included in this teaching resource may be used for non-commercial, educational and private study purposes. They may not be reproduced for any other purpose, in any other form, without the permission of the Queensland Museum.

Cover Image: The Great Barrier Reef (left) and coral rubble (right) which can be created due to wave action.

Images: QM, Gary Cranich

# Activity Overview

## Exploring Cyclones

Within the following activities you will work as a Queensland Museum scientist to:

- Investigate how cyclones can affect humans, living things and the landscape.
- Identify how natural environmental changes may impact living things, with a focus on coral reefs.
- Use data to predict future trends in cyclone activity.

### Teacher Tips

- Arrange students in groups of 3 – 4 to promote collaborative learning and communication.
- In Activity 1 print the map of Australia so students can label the paths of historical cyclones.
- This activity could include a facilitated discussion around personal experiences during cyclones.
- It may also be beneficial to have a class discussion about how to prepare and stay safe during a cyclone. Students may create posters to inform the community.

# Australian Curriculum Links for this Resource

## Year 6

### Science Understanding

Sudden geological changes and extreme weather events can affect Earth's surface (ACSSU096)

### Science as a Human Endeavour

Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE100)

Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions (ACSHE098)

### Science Inquiry Skills

With guidance, pose clarifying questions and make predictions about scientific investigations (AC SIS232)

Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate (AC SIS107)

Compare data with predictions and use as evidence in developing explanations (AC SIS221)

Communicate ideas, explanations and processes using scientific representations in a variety of ways, including multi-modal texts (AC SIS110)

## Numeracy

- Recognising and using patterns and relationships
- Interpreting statistical information

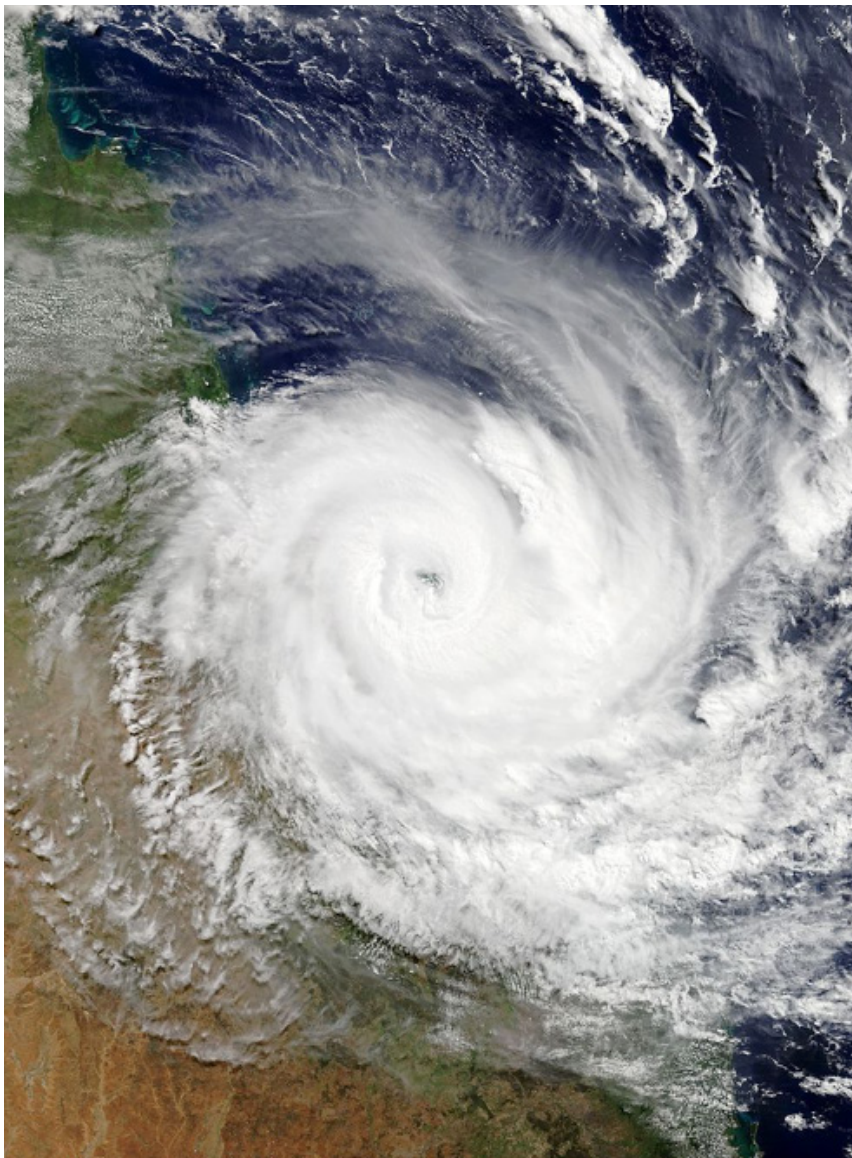
# Activity 1

## Natural Disasters – Cyclones

Cyclones are areas of very low pressure around which strong winds blow in a clockwise direction in the Southern Hemisphere. In the centre, sustained winds can reach speeds of 119 km/h with irregular gusts greater than 250 km/h. This means that objects being blown by a cyclone may move twice the speed of a car travelling on the highway!

Examples of devastating cyclones which have affected Queensland include: Cyclone Debbie (2017), Cyclone Yasi (2011), Cyclone Larry (2006), Cyclone Wanda (1974), and Cyclone Mahina (1899) during which over 400 people died.

*“Tropical cyclones are like giant engines that use warm, moist air as fuel. That is why they form over warm ocean waters near the equator. The warm, moist air over the ocean rises upward from near the surface. As this warm air rises cooler air takes its place, then as it warms and rises too, the air starts to swirl and the cyclone builds”.* [NASA 2017](#)



**Figure 1:** Tropical Cyclone Debbie about to make landfall over Queensland, 28 March 2017.

*Image: NASA, 2017*

1. Research the location of past Australian cyclones and draw them on the map below. Include a heading and a key, and label the States and Territories.



2. Hypothesise why cyclones are found in the locations highlighted on your map (Figure 2).

**3. Scientific evidence suggests that the climate is warming. Predict how a warming climate may affect cyclones in Australia.**

Cyclones can be a very destructive force. They bring with them strong winds, heavy rainfall, storm surges and large waves. In 2017, Queensland declared a State of Emergency after Cyclone Debbie made landfall near Airlie Beach and travelled south through Queensland and into New South Wales (Figure 3, page 8).

**4. Use your knowledge of cyclones to explain how they may impact humans and the environment.**

<b>Humans</b>	<b>Environment</b>

**5. How might cyclones affect the marine environment, including coral reefs?**

Watch Dr Paul Muir, Marine Biologist at the Queensland Museum talk about coral reefs in the clip [‘STEM Video: Year 9 Biology, Ecosystems, Dr Paul Muir’](#).

**6. How does Dr Paul Muir describe the effect of cyclones on the reef?**

**7. Compare the information from the video of Dr Paul Muir to your answer in question 5. Is there any anything you can add to your response that you did not know before?**

Cyclones are driven by warm, moist air. As a result, increased temperatures are predicted to increase the intensity and frequency of cyclones. A warmer climate may also allow cyclones to travel further south along the coast of Australia.

**8. How may the increased frequency and intensity of cyclones affect the Great Barrier Reef?**



# Activity 2

## Interpreting Cyclone Data

Use the map below to answer the following questions.

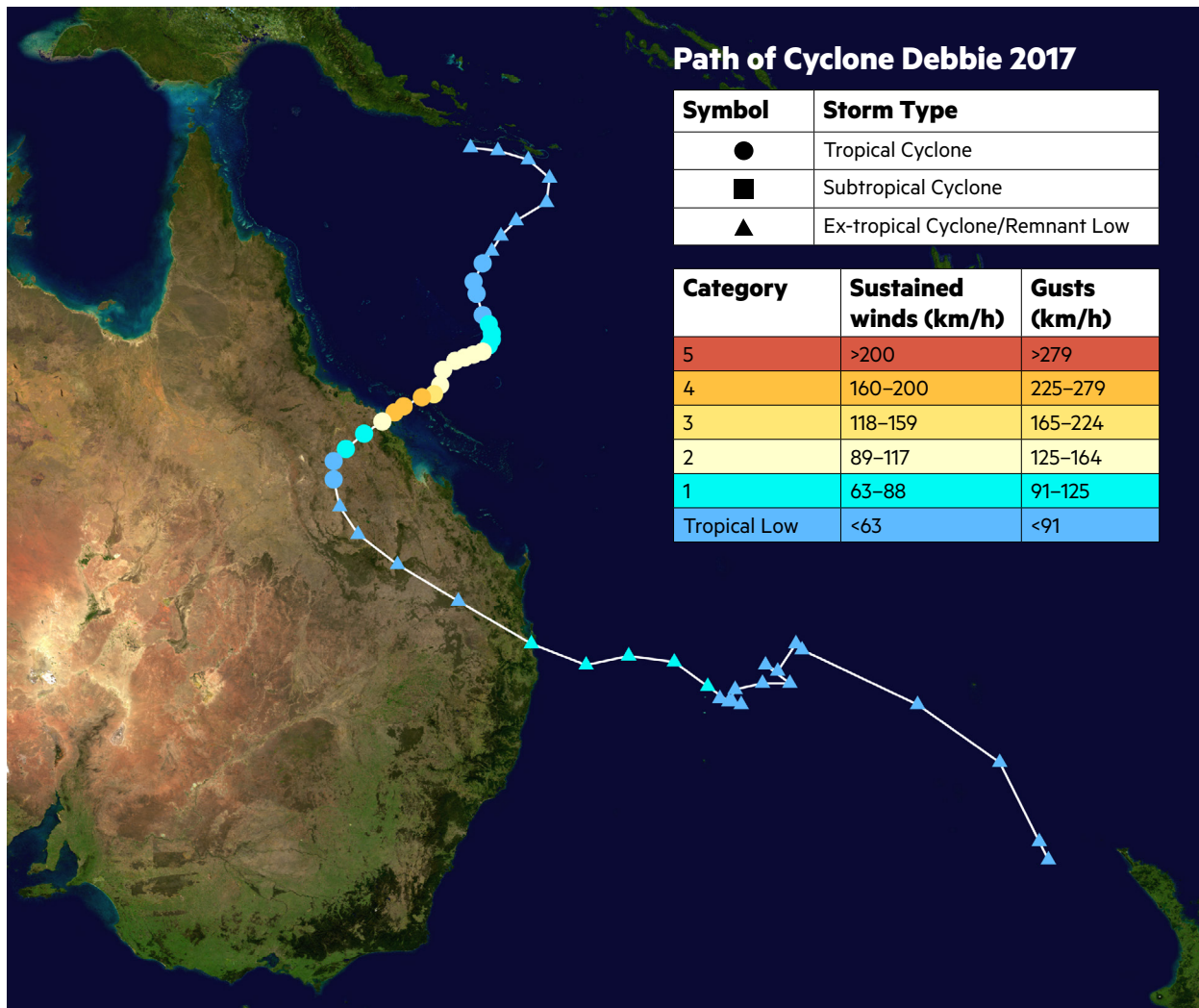


Figure 3: Tracking map of Cyclone Debbie in the Australian region, March – April 2017. Each point represents a 6 hour interval, and the colour and symbol determine the wind speeds and cyclone classification as shown in the legend above.

Map: [Wikimedia Commons](#), 2017.

1. a. What category was Cyclone Debbie when it made landfall along the Australian coast?

b. What were the speeds of the sustained winds when Cyclone Debbie made landfall?

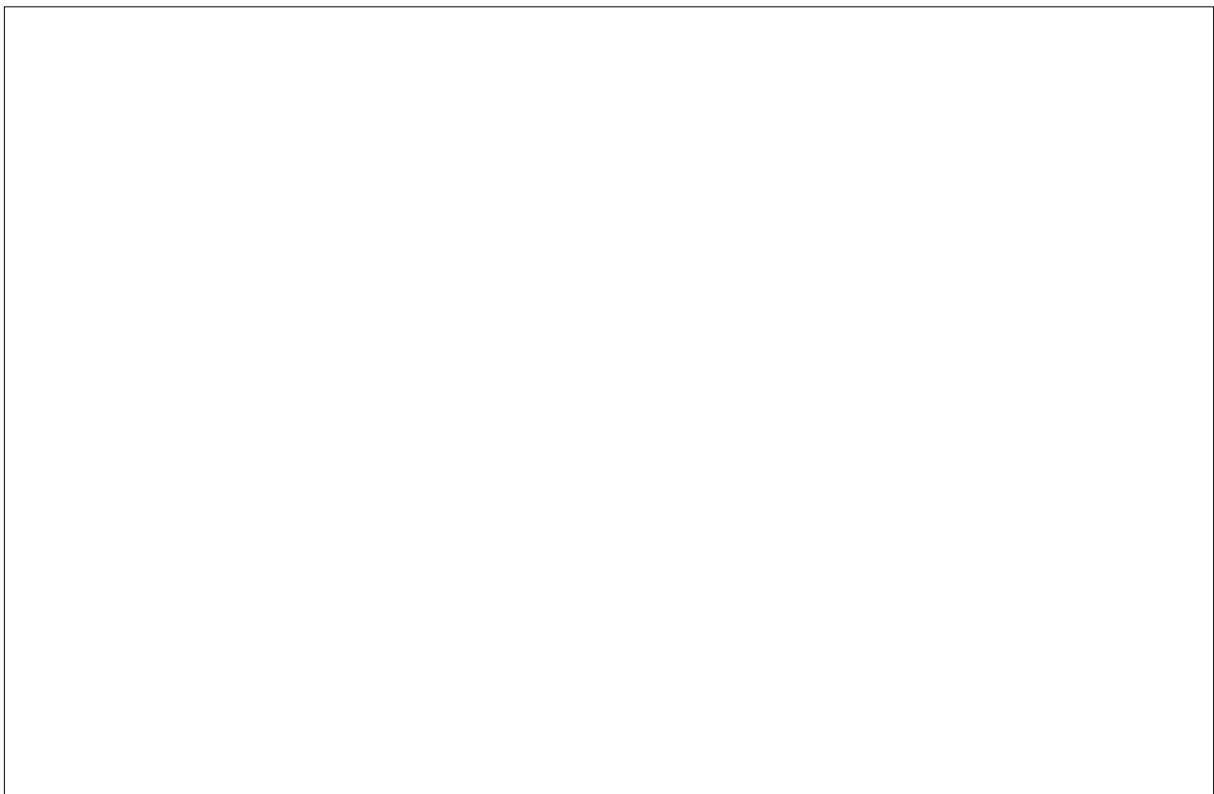
c. How long was Cyclone Debbie classified as a category 4 cyclone?

d. How many days was Debbie classified as a cyclone?

**2. Use the map to explain when Cyclone Debbie was downgraded to lower categories, and justify why this may have happened.**



**3. Meteorologists use technology to measure and predict cyclones and other weather events. Research one piece of technology that is used to predict the weather, and explain how it works.**



# Activity 3

## Cyclone in a Bottle

**This activity simulates the wind direction in a cyclone.**

### Objective

To model a cyclone, explain how they work, and describe some of the impacts of cyclones on our environment.

### Materials

- 2 × 1.25 L empty plastic bottles
- Duct tape
- Food colouring
- Water
- Stopwatch

### Method

1. Carefully pierce a hole in the two lids of the bottles. The holes need to be approximately 5 mm – 1 cm in diameter, depending on the size of your lids (a screwdriver works well).
2. Fill one bottle with water and add a little food colouring. Screw the lids down tightly on each of the bottles.
3. Stand the bottle with water upright and place the empty bottle over it, lid to lid.
4. Tape the two bottles together tightly and thoroughly.
5. Flip the bottles and swirl them in a circle. Record how long it takes all the water to drain out of the bottle on the top with the stopwatch. (Swirling in a clockwise direction represents the direction of cyclonic winds experienced in the southern hemisphere.)
6. Observe the water falling down from the top bottle to the bottom bottle. You have created a liquid cyclone! Record what happened and any observations.
7. Repeat the investigation but this time do not swirl the water.

# Questions

1. Compare a real cyclone to your cyclone in a bottle in the Venn diagram below.

