



Teaching Unit

Reef Rangers

Primary and Middle School

In this Reef HQ Education Program, students will take on the role of "Reef Rangers". They will investigate a range of the human impacts that effect marine ecosystems, and in particular the Great Barrier Reef Marine Park. Students will pursue investigations about the ways we all can try to minimise these human impacts on the Great Barrier Reef.

Curriculum links

Completing this Reef HQ Education Program will develop students' ability to:

- Create and undertake plans that aim to influence decisions about an element of the Great Barrier Reef;
- Cooperatively collect and analyse data;
- Describe the values underlying personal and other people's actions regarding the Great Barrier Reef;
- Make justifiable links between ecological and economic factors and the production and consumption of a familiar resource;
- Predict the impact of environmental change by comparing evidence;
- Draw conclusions about the relationship between features of living things and the environments in which they live;
- Describe some interactions between living things and between living and non-living parts of the environment; and
- Design and create a model environment, which meets the needs of living things within it.

The following unit includes suggestions for activities that can be completed before and after your Reef HQ visit.



Australian Government
Great Barrier Reef
Marine Park Authority



Reef HQ is the education centre for the Great Barrier Reef



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Reef HQ Visit

This teacher resource is linked to a class visit to Reef HQ. The Reef HQ visit will enable students to formulate answers to the following questions:

- What and where is the Great Barrier Reef Marine Park?
- How and why do humans use its resources?
- What are the major human impacts?
- How do these impacts effect the organisms that inhabit the reef ecosystem?
- What effects might these impacts have on humans? and
- What could or should be done to reduce the negative impacts of humans?

Theme Overview

The Great Barrier Reef is under pressure and everything we do on the reef, along the shore and even on the land, effects this diverse and fragile ecosystem. The plant and animal communities that make up the Great Barrier Reef need to be protected.

The Great Barrier Reef

Imagine a place so large, it can be seen from a spacecraft orbiting the earth! The Great Barrier Reef stretches for more than 2000km along the northeast coast of Australia. Comprising more than 2900 reefs, some 940 islands and surrounding waters, the Great Barrier Reef is the largest natural feature on the earth.

Pressure on the Great Barrier Reef

The Great Barrier Reef we see today is about 12,000 years old, and for most of that time, there has been minimal human presence. Around 1850, European settlers began populating and developing the Queensland coastal strip, along the inner boundary of the Great Barrier Reef. During that time, human settlement has impacted the Great Barrier Reef. Nowadays, the water isn't as clean, the coral isn't as healthy, there are fewer fish and some animals and birds aren't as common as they once were.

What are some of the things being done to help care for and protect the reef?

- All boats that use trawl nets within the World Heritage Area of the Great Barrier Reef must have electronic devices on board that reduce the amount of fish they catch that they don't want, and this prevents them from catching turtles in their nets;
- All boats in the commercial prawn fleet must be fitted with satellite tracking devices, to show their location on the Great Barrier Reef;
- Tourist tickets include an environmental management fee, so a portion of the money made from the tourist trade goes straight back into research for the Great Barrier Reef;
- Limits on permitted tourism have been introduced in some highly used areas;
- Agricultural 'Best practice' codes have been created to address environmental problems caused by industries such as sugar, dairy, horticulture, cotton and aquaculture.
- The agriculture industry is working with the Great Barrier Reef Marine Park Authority to encourage farmers to adopt sustainable farming practices;
- There are new policies for protecting particular animals, including: 16 dugong



protection areas; a comprehensive whale and dolphin policy for the entire Great Barrier Reef; and a turtle conservation policy is being implemented; and

- The *Representative Areas Program* aims to protect areas of the Great Barrier Reef that 'represent' different habitats and animal and plant communities.

Reef Rangers – Activity Ideas

Tuning In

Sharing fiction, non-fiction and maps

Students browse books, watch videos and surf Internet sites to find information about human impacts on marine ecosystems within the Great Barrier Reef.

Use brainstorming to generate ideas about how humans use the Great Barrier Reef and other marine ecosystems.

Create a concept map around the central question. "Why is the Reef important to our future?"

Create a wall mural showing human activities and their impact on the marine environment.

Display a map of the Great Barrier Reef World Heritage Area, showing areas considered as minor, moderate and major human impact areas.

Reflective Writing

- Ask students the question "What is the Great Barrier Reef Marine Park?"
- Complete the sentence "When I hear the phrase Great Barrier Reef Marine Park, I think of..." and
- What does "Let's Keep it Great" mean to you?

What Do We Already Know?

KWL (Know, Want to Know, Learning) Charts serve as a fabulous class shared resource. A KWL chart has three sections: prior knowledge (Know), curiosity knowledge (Want to Know) and acquiring knowledge (Learning). Use a KWL chart to organise and help the students categorise their thoughts.

What do we already know about human impacts on the Great Barrier Reef? Know	What do we want to know about human impacts on the Great Barrier Reef? Want to Know	Where will we find the information to help us learn about human impacts on the Great Barrier Reef? Learning



Use large poster sheets, which can be displayed in the classroom and added to as the unit of work progresses. As a class, fill in the KWL Chart at the beginning of the unit. During the unit and at the end of each session allow time to update the KWL Chart. When the unit is complete finalise the KWL Chart.

One way of adding to your chart and stimulating student's interest is to provide a range of texts on Food Webs and Interrelationships. Allow students a short period of time where they are to find an interesting fact to list in the **Learning** column of the KWL Chart. This could also be used as a time for confirming information and extending the vision of this unit of work.

Preparing to find out

Conduct a class survey

Focus Topic "The Great Barrier Reef".

The following are some suggested survey questions. Encourage to students to generate their own survey questions.

- How big do you think the Great Barrier Reef Marine Park is?
- Where is the Great Barrier Reef Marine Park?
- What do people use the Great Barrier Reef Marine Park for?
- Do you think humans have negative effects on the Great Barrier Reef Marine Park?
- What do you think is the biggest effect humans have had on the Great Barrier Reef?
- Why does the Great Barrier Reef Marine Park Authority use zoning plans, permits, protected areas and best environmental practices?
- What are some things humans could or should do to ensure that the Great Barrier Reef is available for future generations?

Preparing for culminating activity

Explain to the class that in pairs or small groups their task is to prepare either a play, multi-media presentation, report or brochure which conveys detailed information about the:

- Size and location of the Great Barrier Reef;
- Special characteristics of the Great Barrier Reef;
- Types of activities humans like to do on and around the Great Barrier Reef'
- Impacts that these activities are having on the Great Barrier Reef;
- Ways that humans can protect and conserve the Great Barrier Reef; and
- Cooperative programs that enable the Great Barrier Reef Marine Park Authority to work with other government agencies, researchers and industry groups.

Display these details as an ongoing reference for students to use. Use brainstorming and concept mapping to guide the investigation and suggestions as to where relevant information may be found. Students work as part of a team to prepare for their investigation.



Finding Out

Visit Reef HQ to learn more about human impacts on the Great Barrier Reef. Encourage students to develop a list of questions they want answered.

GBR Explorer

Use the Great Barrier Reef Marine Park Authority's reef education website

www.reefed.edu.au

The "GBR Explorer" is like an online encyclopaedia about the Great Barrier Reef.

Other useful websites have been listed in the **Websites** section of this unit.

Best Environmental Practices

Introduce the concept of 'Best Environmental Practices'. Obtain a full overview of the Great Barrier Reef Marine Park Authority's *Best Environmental Practices* at:

http://www.gbrmpa.gov.au/corp_site/key_issues/tourism/best_environmental_practice.html

Challenge students to develop some best environmental practices of their own for their home and school environments. Ask students to consider the following question:

- If we all try and use best environmental practices in and around our homes, in our local environment and within the Great Barrier Reef Marine Park, what might this mean for the future?

Groups report back and record their findings. Students compare ideas, identify similarities and differences and discuss differing opinions.

Media Investigation

Over a period of one to two weeks, students are asked to collect newspaper articles on human impacts on the environment and answer the following key questions with respect to each article:

- Who are the people involved?
- What environmental impacts are these humans causing?
- Where are these impacts occurring?
- Why are these humans causing these impacts? and
- How will these impacts effect the Great Barrier Reef?

Collate all the articles into a media folio. The following web addresses will provide students with access to articles about the Great Barrier Reef.

http://www.gbrmpa.gov.au/corp_site/info_services/media/recent_releases.html

http://www.gbrmpa.gov.au/corp_site/info_services/media/media_archive.html



Sorting Out

Media centre

Sort the media articles collected during the media investigation into subject/issue specific categories. Create a media centre in their classroom displaying the major human impacts on the environment, and how they effect the Great Barrier Reef.

Assess knowledge

Students record facts, feelings and opinions about the Great Barrier Reef, the impact humans have on the Great Barrier Reef, and ways that humans can reduce these impacts on paper strips.

The teacher places five interconnected hoops (interconnected hoops symbolise that all of these things are interrelated and effect one another) on the floor each containing one of the following statements:

- Things we know about the Great Barrier Reef;
- Things we like about the Great Barrier Reef;
- Things that concern us about the Great Barrier Reef;
- Things we can do to preserve and conserve the Great Barrier Reef; and
- Things we would like to find out more about the Great Barrier Reef.

Students sort their responses into categories, and discuss the results. Bundle the responses and paste them onto a class chart.

Going Further

Sharing Circle

Sitting in a circle, ask students to imagine they are one of the many user groups that want access to the Great Barrier Reef Marine Park:

- Recreational Fishers;
- Commercial Fishers;
- Tourism groups;
- Indigenous groups; and
- Scientist

Students consider why their group wants and needs to use the Great Barrier Reef and the positive and negative impacts they may have on the Great Barrier Reef Marine Park. Ask someone to speak for that user group and to sit in the middle of the circle, eg. "I speak for the Recreational Fishers". The other students represent the other user groups.

Students in the outer circle ask questions of the user group in the middle. For example:

- Why is the Great Barrier Reef important to you?
- What things do you take from the reef?
- Why do you need to take these things? and
- What are some Best Environmental Practices people in your group keep in mind when using the reef?



The following web addresses will provide information that is helpful for this activity:

http://www.gbrmpa.gov.au/corp_site/key_issues/conservation/

http://www.gbrmpa.gov.au/corp_site/key_issues/tourism/index.html

http://www.gbrmpa.gov.au/corp_site/key_issues/fisheries/

http://www.gbrmpa.gov.au/corp_site/key_issues/water_quality/

http://www.gbrmpa.gov.au/corp_site/management/indigenous_issues.html

Peer Tutoring

Students write and illustrate stories about the Great Barrier Reef and the best environmental practices they have learnt about and developed to ensure its protection and read them to other members of their class or preferably younger students in their school.

Students can create their own puzzles. For example, word finds, cross words etc... and share them with other members of the class to complete.

DiscoverySchool.com has a puzzle maker that can help both students and teachers to create their own puzzles:

<http://www.puzzlemaker.com/>

Making Connections

Writing Reports and creating portfolios

Have students participate in and complete the *Reef Rescue* or *Pollution Solution* web quests found on the Reef ED website.

These web quests and others can be found at the following link:

http://www.reefed.edu.au/students/reef_quest/index.html

Conflict Resolution

The Great Barrier Reef Marine Park is a multiple use resource. This means that there are many people wanting to use the Marine Park for different activities. Instead of fining people for doing the wrong thing the Great Barrier Reef Marine Park Authority would rather people understand why it's important to do the right thing while using the Marine Park.

Write a script for a short play that depicts people doing the wrong thing in the Marine Park. The script should include animals, plants and people. After acting out the first play rewrite the script so as to depict people doing the right thing within the Marine Park.

You may wish to choose a number of these scripts and act them out on school assembly to educate the school community about the dos and don'ts in the Marine Park.

Cause and Effect Wheels

Create cause and effect wheels through student-centred class discussion outlining how human impact will, in the long term, have effects on the environment and in particular the Great Barrier Reef. Display the cause and effect wheels in the classroom.



Culture Creation

Examine ways in which particular aspects of popular culture (eg. A television program, movie, video games or fashion items) have been marketed by advertising companies.

Ask students:

- What is the marketing attempting to do?
- What is the role of the advertising in this process? and
- Who or what benefits from this marketing?

As a class decide on how to market the best environmental practices for people using the Great Barrier Reef, to heighten community awareness and appreciation of threats to the Great Barrier Reef and what they can do to ensure its sustainable future.

In small groups, give students the task of marketing the Great Barrier Reef and best environmental practices. Some possible forms of expression are:

- Web-site;
- Brochure;
- Segment for Local News on either television or radio;
- Article for newspaper or letters to the editor;
- Screen print T-shirts, caps or bags with appropriate slogans;
- Piece of visual art, sculpture, wall murals etc; and
- Cartoon.

Sign Making

Students create signs to advertise best environmental practices and promote acceptable behaviour within the Great Barrier Reef Marine Park. These signs can be displayed on school noticeboards or in the School Library.

Taking Action

PNI brainstorm

As a class compile all the things individuals and groups can do to understand the Great Barrier Reef Marine Park so that we are better equipped to meet the challenges of the future.

Once a list has been compiled, do a PNI (Positive, Negative, Interesting) analysis on these actions to decide which ones are most appropriate.

Self Reflection

Ask students to reflect on the topic and all they have investigated and consider the questions:

- What does this have to do with me?
- Where do I fit into the picture?
- What is the most important thing I have learnt about the Great Barrier Reef?
- What can I do at home to protect places like the Great Barrier Reef?
- What other things would I like to find out about the Great Barrier Reef? and
- What piece of work am I most satisfied with? and why?



Communicate concerns/understandings

As a class, brainstorm ideas on how we can make sure other people in our community understand the importance of the Great Barrier Reef. Openly discuss ways in which we can try to teach other people best environmental practices.

Students could:

- Contribute a class article for the school newsletter;
- Prepare a display detailing human impacts on and best environmental practices for the Great Barrier Reef Marine Park;
- Organise to speak to other class groups and year levels about the use and care of the Great Barrier Reef Marine Park;
- Email the Great Barrier Reef Marine Park Authority to discuss your concerns and suggest some ideas for improvements. The email address is info@reefed.edu.au ; and
- Write letters to the Local Member of Parliament or the Federal Minister of the Environment outlining your concerns and suggestions for improvement.

Become a Reef Guardian School

This is an exciting, innovative program that encourages students, teachers, parents and friends to become involved in protecting our environment and the Great Barrier Reef. Reef Guardian Schools are environmentally active and participate in reef education through activities and environmentally friendly initiatives. Students and teachers promote best environmental practices and the importance of Reef protection to their communities. To find out more go to:

<http://www.reefed.edu.au/guardians/>

Websites

Queensland Studies Authority – Science Syllabus

<http://www.qsa.qld.edu.au/yrs1to10/kla/science/docs/syllabus/syllabus.pdf>

Queensland Studies Authority – SOSE Syllabus

<http://www.qsa.qld.edu.au/yrs1to10/kla/sose/docs/syllabus/syllabus.pdf>

Reef ED

www.reefed.edu.au

Great Barrier Reef Marine Park Authority

<http://www.gbrmpa.gov.au>

Reef HQ

<http://www.reefHQ.com.au>

Australian Institute of Marine Science

<http://www.aims.gov.au/>

CRC Reef

<http://www.reef.crc.org.au/>

Department of Environment and Heritage

<http://www.deh.gov.au/>

Department of Primary Industries

<http://www.dpi.qld.gov.au/home/default.html>

National Geographic - Virtual World "Great Barrier Reef"

http://www.nationalgeographic.com/earthpulse/reef/reef1_flash.html



References & Resources

Begon, L. Harper, J. & Townsend, C. (1990) *ECOLOGY Individuals, Populations and Communities 2nd Edition*. Melbourne: Blackwell Scientific Publications.

Great Barrier Reef Marine Park Authority. (2003) *Reef Manual 4th Edition*, GBRMPA, Townsville.

Roberts, M. Reiss, M. & Monger, G. (1993) *BIOLOGY Principles and Processes*. South Melbourne: Thomas Nelson Australia.

Tyler Miller, G. (1994) *Living in the Environment: Principles, Connections, and Solutions 8th Edition*. United States of America: International Thomson Publishing.

Webber, H. & Thurman, H. (1991) *Marine Biology 2nd Edition*. New York: Harper Collins Publishers.

