

# Teaching Unit

## Managing the Great Barrier Reef Marine Park

### Middle School & Senior Secondary

*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. In this Reef HQ Education Program students initiate investigations into the challenges and tools of natural resource management within the Great Barrier Reef Marine Park. Students will be empowered to understand the need for sustainable management practices and take actions to ensure adherence to best environmental practices.*

### Curriculum Links

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

- Ability to recall learned factual material in text and spatial forms. For example facts, concepts, key ideas, theories and explanations;
- Ability to break material into its component parts, thus identifying trends, similarities, differences and patterns;
- Understand the meaning of information by transforming, interpreting or extrapolating;
- Establishing the validity and reliability of information;
- Identify anomalies in the information;
- Evaluating alternative proposals, strategies, solutions or plans;
- Applying appropriate criteria for evaluation;
- Making judgements/decisions about alternatives;
- Justifying the decision with reasoned and logical arguments.
- Design a research plan relevant to the purpose;
- Gather and record information from a variety of sources and settings;
- Organise information prior to analysis and decision making;
- Use appropriate formats when presenting the results of learning experiences; and
- Integrate, where appropriate, the use of maps, diagrams, statistics and referencing adhering to set conventions.

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:

- Gain an appreciation for the complexity and fragility of the Great Barrier Reef;
- Investigate the effects of humans on the Great Barrier Reef;
- Explore sustainable reef use options; and
- Propose alternative management solutions and justify decisions with examples.

## Theme Overview

The study of physical systems is fundamental to all interactions within the natural environment, particularly on a local, regional or global scale. Natural resource management requires an understanding of the nature of an ecosystem or resource system and the patterns of human activities, values and decision-making processes. Natural resource management agencies must assess and monitor the short-term and long-term implications for people and the environment.

When most people think of the Great Barrier Reef they only think of the coral and the beautiful fish. The Great Barrier Reef World Heritage Area includes the reef, the ocean surrounding it, sea grass beds and the ocean that reaches our coastline and connects to our estuaries and rivers. It belongs to a very complex and sensitive ecosystem that all humans can affect, no matter where they are in the world.

## Key Understandings

- The Great Barrier Reef World Heritage Area consists of the world's largest system of coral reefs, together with lagoons, seagrass meadows, mangroves and estuarine communities. Stretching over 2000km along Australia's northeast coastline, the Great Barrier Reef World Heritage Area covers more than 38 million hectares (equivalent to approximately 38 million football fields). It represents one of the most complex and biologically diverse systems on earth and contains critical habitats for a number of rare, threatened and endangered species.
- In 1981, the Great Barrier Reef Marine Park and adjacent coastal areas and islands were inscribed on the World Heritage List, on the basis of their outstanding natural features and ecological integrity.
- The Great Barrier Reef World Heritage Area approach to management is perhaps best reflected in the development of the 25-year Strategic Plan for the Area. Coordinated by the Great Barrier Reef Marine Park Authority, the Strategic Plan was developed by more than 60 user and interest groups, indigenous peoples and government agencies. The Plan sets out a 25-year vision for the Area and details long-term and short-term objectives to achieve that vision. The vision, which focuses on a healthy environment, multiple use and maintenance of values, together with strategies outlined in the plan, provides direction for the managing of the Great Barrier Reef World Heritage Area.
- To minimise impacts on the marine park, the Great Barrier Reef Marine Park Authority works closely with adjoining management agencies to ensure the integrated development and implementation of management strategies to protect natural and cultural values.



- The main tool used in managing the Great Barrier Reef Marine Park is zoning. Zoning provides protection for areas, which is critical for maintaining a healthy environment, and sets a broad framework for the management of human use by designating where specific types of activities may take place.

## **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 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; prevent 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 was used to develop zones that will protect areas of the Great Barrier Reef that 'represent' different habitats and animal and plant communities.



# Managing the Great Barrier Reef Marine Park - Activity Ideas

## Tuning In

### Focus Questions

*What and where are the issues or patterns being studied?*

- What and where is the Great Barrier Reef Marine Park?
- What is a resource?
- What is a multiple-use resource?
- What is the pattern and distribution of resources within the Great Barrier Reef Marine Park?
- What are the natural and cultural elements of the Great Barrier Reef system?
- What patterns are associated with the Great Barrier Reef system?

*How and why are they there?*

- What processes are associated with patterns within the Great Barrier Reef system?
- What processes cause change within the Great Barrier Reef system?
- Why do some resource issues develop into conflict?

*What are their impacts or consequences?*

- What are some social, economic, political and physical impacts of change within the Great Barrier Reef system?
- What are the social, economic, political and physical impacts of current and possible future uses of the Great Barrier Reef?
- What consequences might arise as a result of these changes?

*What is being done and could be done?*

- What is being done and could be done by individuals, groups and governments regarding the sustainable management of Great Barrier Reef Marine Park resources?

### Prior knowledge investigation

Provide students with time to respond to each of the following questions:

- Where is the Great Barrier Reef?
- How large is it?
- Is the Great Barrier Reef a biologically diverse ecosystem? Why or why not?
- What resources does the Great Barrier Reef provide?
- How do people use the Great Barrier Reef?
- List the different specific groups of people that use the Great Barrier Reef.
- What are the benefits that come from using Great Barrier Reef resources?
- Outline the negative impacts that can and have occurred from using the resources of the Great Barrier Reef
- Why is the Great Barrier Reef important?
- Why is the Great Barrier Reef "under pressure"?



## Setting the task

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

- Great Barrier Reef Marine Park;
- Current uses of the Great Barrier Reef Marine Park;
- Distribution of resources;
- Biodiversity of the Great Barrier Reef Marine Park;
- Future uses of the Great Barrier Reef Marine Park; and
- Management of the Great Barrier Reef Marine Park.

Display these details as an on-going reference for students to use. Use brainstorming to guide the investigation and suggestions as to where relevant information might be found. Students work in groups for their investigation.

## Where to from here?

Ask students what they think are the most important things we need to know if we are going to ensure we have a Great Barrier Reef Marine Park for recreational and commercial fishing purposes, tourism opportunities, shipping activities and for the habitat requirements of reef animals. Visit the Great Barrier Reef Marine Park Authority's web-site

[www.gbrmpa.gov.au](http://www.gbrmpa.gov.au)

Students consider issues affecting the Great Barrier Reef Marine Park and find information about the need for user groups to use the Great Barrier Reef Marine Park's resources in a sustainable way.

## Viewing and reading area

Set up an area where students can browse through such resources as atlases, zoning maps, Great Barrier Reef Marine Park Authority information and books or articles about the Great Barrier Reef Marine Park. Contact the Great Barrier Reef Marine Park Authority's *Public Information Unit* and ask for a teacher resource pack to be sent to you:

Phone: (07) 4750 0800

Fax: (07) 4772 6093

Email: [info@reefed.edu.au](mailto:info@reefed.edu.au)

Use texts provided to gain information about the uses and processes used within and affecting the Great Barrier Reef Marine Park.



## Preparing to find out

### Media Investigation

Ask students to collect newspaper articles on human impacts on the Great Barrier Reef and answer the following key questions with respect to each article:

- Who are the people involved?
- What impacts (environmental, economical, social/cultural and political) have resulted?
- Where are these impacts occurring?
- Why are these humans causing these impacts? and
- How will these affect the Great Barrier Reef?

Encourage students to review local and national newspapers the following web addresses contains a media archive of reef related stories:

[http://www.gbrmpa.gov.au/corp\\_site/info\\_services/media/media\\_archive.html](http://www.gbrmpa.gov.au/corp_site/info_services/media/media_archive.html)

### 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 Marine Park Management? <b>Know</b>	What do we want to know about Marine Park Management? <b>Want to Know</b>	Where will we find the information to help us learn about Marine Park Management? <b>Learning</b>

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.

## Finding Out

Visit Reef HQ and explore the reef up close. Encourage students to develop a list of questions they want answered about the Great Barrier Reef.



## GBR Explorer

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

[www.reefed.edu.au](http://www.reefed.edu.au)

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

## Sorting Out

### Multiple-use resource

Encourage students to explore the meaning of "multiple-use management" and the range of uses and values that are managed within the Great Barrier Reef Marine Park.

Review the major user groups within the Great Barrier Reef Marine Park. Source information to complete the table below. The following web addresses will be helpful:

[http://www.gbrmpa.gov.au/corp\\_site/key\\_issues/conservation/](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/tourism/index.html)

[http://www.gbrmpa.gov.au/corp\\_site/key\\_issues/fisheries/](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/key_issues/water_quality/)

[http://www.gbrmpa.gov.au/corp\\_site/management/indigenous\\_issues.html](http://www.gbrmpa.gov.au/corp_site/management/indigenous_issues.html)

<b>User Group</b>	<b>Area Affected</b>	<b>Nature of effects</b>	<b>Time of year</b>	<b>Spatial distribution</b>	<b>Degree of impact</b>
Scientists	Small	Collecting animals and plants, use of chemicals and interaction with animals	All year	All areas and habitats	Usually slight but could be large if working with endangered animals.
Commercial Fishers					
Recreational Fishers					
Tourism					
Indigenous Groups					
Shipping & Energy					

### Sustainable Management

Students consider the following questions:

- How can we find a balance between meeting our present needs for resources from the Great Barrier Reef, and conserving and protecting its natural resources for the benefit of future generations?
- Why is finding this balance so important?



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

### Who manages the Great Barrier Reef Marine Park?

Talk with students about who makes Great Barrier Reef Marine Park management decisions and encourage students to find out how it is managed and how decisions are made. Ask students to construct a flow chart showing how decisions are made. The following web address will provide helpful information:

[http://www.gbrmpa.gov.au/corp\\_site/management/](http://www.gbrmpa.gov.au/corp_site/management/)

### The contribution the Great Barrier Reef Marine Park makes to biological diversity, Australia’s economy, society and environment.

Talk with students about biodiversity being the variety of species, populations, habitats and ecosystems. Encourage them to find out about the biodiversity within the Great Barrier Reef Marine Park. Similarly discuss Australia’s economy and explore how the Great Barrier Reef Marine Park contributes to it. Find out about how the Great Barrier Reef Marine Park is of value to Australia’s society and to traditions and cultural values.

The following web addresses will provide helpful information:

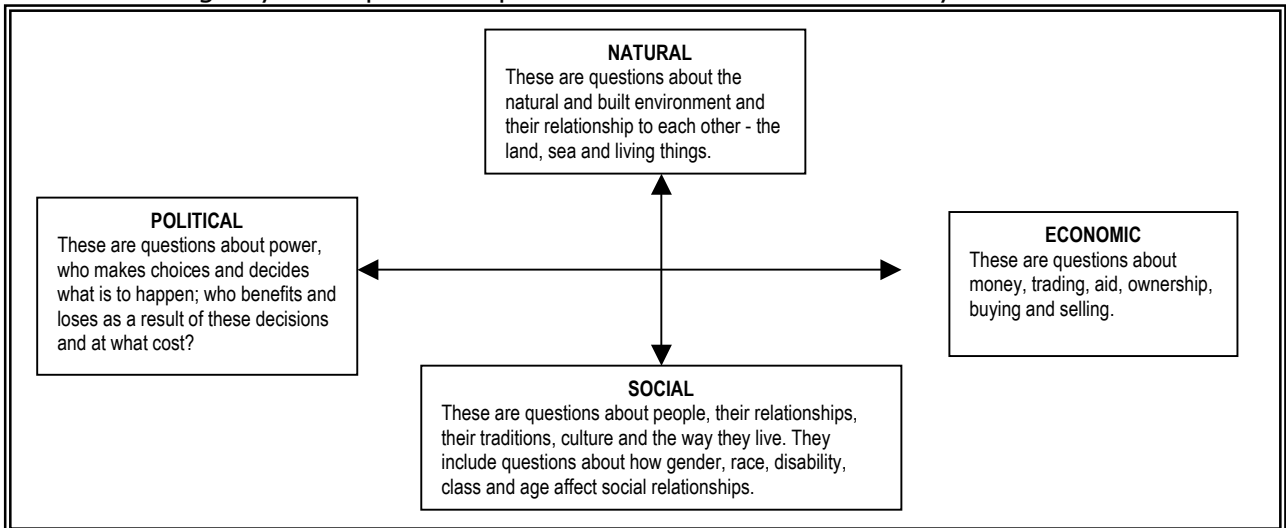
<http://www.reefed.edu.au/explorer/>

[http://www.gbrmpa.gov.au/corp\\_site/management/zoning/rap/rap/pdf/PDP\\_Report\\_23-12-03.pdf](http://www.gbrmpa.gov.au/corp_site/management/zoning/rap/rap/pdf/PDP_Report_23-12-03.pdf)

### Cost Benefit Analysis

Undertake a cost-benefit analysis to identify all the costs and benefits the Great Barrier Reef Marine Park makes to our society, environment or economy. If the benefits exceed the costs, the cost-benefit analysis is said to indicate an overall gain to society, or vice versa. Choose an issue related to the Great Barrier Reef Marine Park and complete a cost-benefit analysis on it. Present your findings to the class for discussion.

Use the following key concepts to help conduct the cost-benefit analysis.



## Going Further

### Class Debate

Students debate topics such as:

- Oceans are for everybody. People should be able to take as much as they want from the ocean;
- Humans need energy to survive. We should mine the Great Barrier Reef for oil and natural gas; and
- Tourism makes money. More tourism operations should be allowed should be allowed within the Great Barrier Reef Marine Park.

### Environmental Impact Assessments & Management Plans

Using one of the debate topics or a current issue relating to the Great Barrier Reef, complete an Environment Impact Assessment. Once you have completed your Environment Impact Assessment, follow up and design a Management Plan for the activity.

#### *Environmental Impact Assessment*

1. **Title:** Your activity needs a title so people will recognise the area you are assessing.
2. **Description of activity:** Briefly outline the activity and when the activity will take place. (Include diagrams of facilities/structures and their location).
3. **Need:** Why is the activity necessary?
4. **Impacts:** What are the likely impacts on the flora, fauna and ecological processes?  
What will be the impacts on water, air or surface quality?  
What are the likely impacts on the heritage, wilderness and/or aesthetic value of the area?  
What wastes will be generated, how will they be handled and what are the impacts of handling them this way?  
What cumulative impacts could arise from this activity given other existing or planned activities?  
What is likely to be the most significant negative impact of this activity?  
Are there any impacts not addressed above and/or are there any other comments you wish to make?
5. **Mitigation measures:** What action, if any, will be taken to mitigate the impacts of the activity?
6. **Alternatives:** What alternatives to the activity would involve less environmental impact?
7. **Conformity with management plan:** How does the activity accord with any management plan prescriptions applicable to the location?
8. **Possible public concerns:** What public concerns could be expressed about this activity?
9. The Environment Impact Assessment must then be signed and dated.
10. The Assessment will receive a negative or positive recommendation.
11. Finally, the Assessment will receive a Determination stating whether or not the activity will be allowed.



### Management Plan

- **Develop** a set of criteria, which could be used to evaluate a management plan;
- **Formulate** a management plan, that is, decide how and by whom the issue should be managed; and
- **Justify** your management plan using the criteria you initially developed.

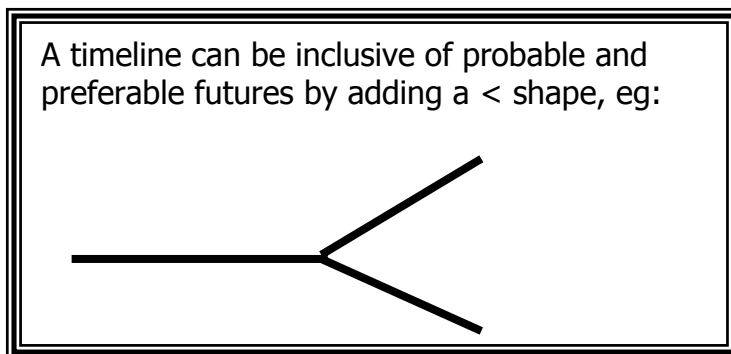
## Making Connections

### Futures

What are possible, probable and preferable futures for the Great Barrier Reef?

Working in small groups students plot the significant events for the Great Barrier Reef on a timeline. Students distinguish between those, they think local societies had some control over and those over which they had little control.

Teachers demonstrate the continuation of the futures timeline, encouraging students to consider the probable and preferable futures of the Great Barrier Reef. In groups, students discuss the types of decisions needed if these preferable futures were to eventuate.



Students plot probable futures along the upper axis and preferable futures along the lower axis. Probable futures refer to how students expect the future to be, both in their own lives and in the wider world. Preferable futures refer to how students would like the future to be, both in their own lives and in the wider world. Suggested issues for consideration are global climate change and coral bleaching.

### Cause and Effect Wheels

Create cause and effect wheels outlining how the impacts humans have created will, in the long term, have effects on the Great Barrier Reef. Students select an issue they consider is affecting the Great Barrier Reef and identify first, second and third order effects of the issue. Encourage students to exchange information about the issues and their effects.

A cause and effect wheel is a diagram, which will prove helpful when organizing your ideas in preparation for writing reports. Naturally, it will help you see the consequences that result from particular actions, thus enabling you to analyse effectively the data you have collected.



The steps in creating a cause and effect wheel are given below:

**Step 1**

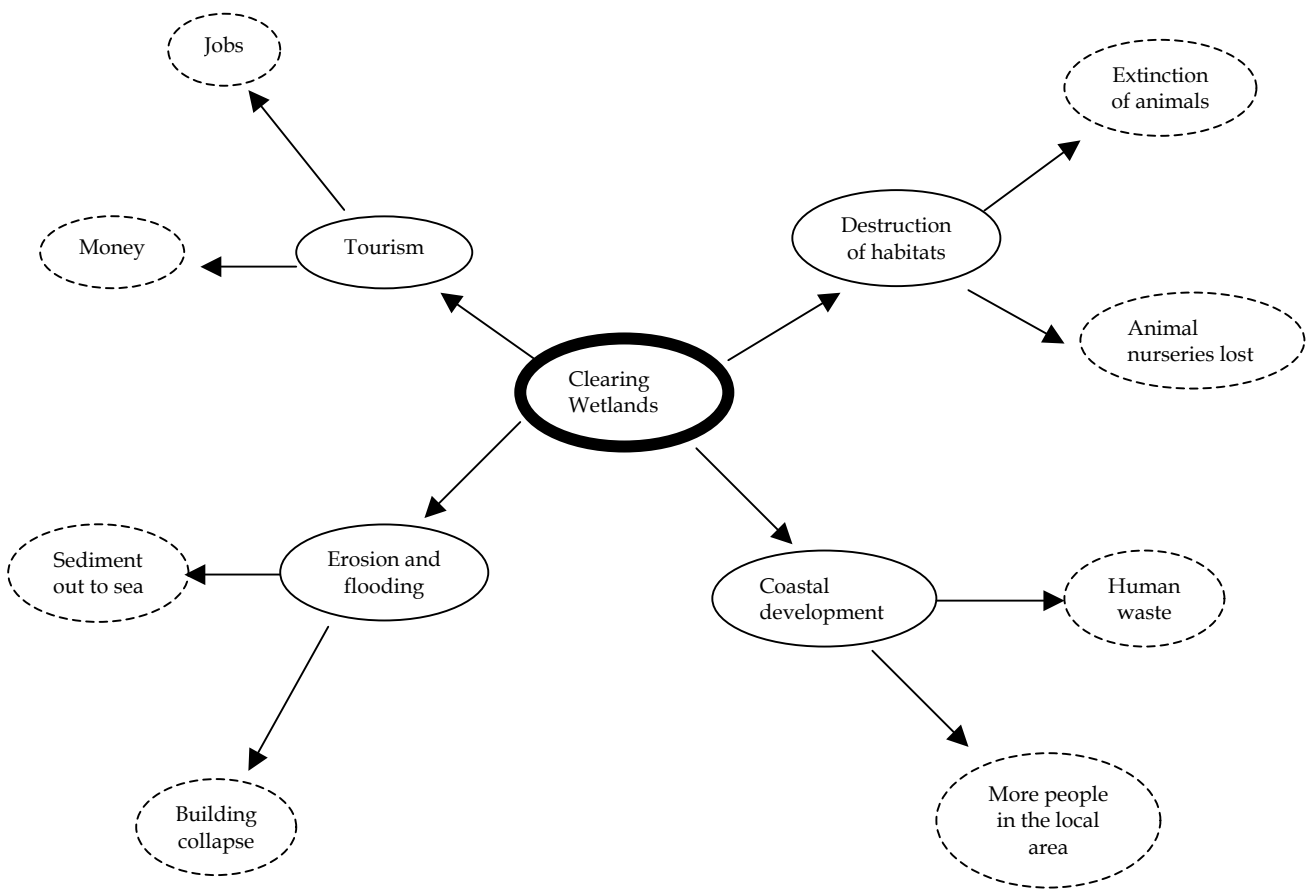
A key concept (problem or issue) is placed in the centre of the diagram – as the hub of a wheel. This is called the **cause**.

**Step 2**

A number of possible consequences or implications, arising from the cause given on the hub, form a ring (as in a wheel) around the initial cause. These consequences or implications (real or potential) are called **effects**.

**Step 3**

The wheel created in **Step 2** can be further extended, because each effect can be looked on as a new cause, with more consequences (effects) flowing from it. Thus, an extra ring is added to the wheel.



## Taking Action

### Natural Resource Management Exhibition

Students display or exhibit examples of their multi-media presentation, reports or brochures in school or local library. Invite an audience to view student work. Encourage students to explain their work and how resources are managed within the Great Barrier Reef Marine Park.

### Community Education

Students can help increase their local communities' awareness of an endangered species by designing a poster, brochure or information sheet. This project should detail the species, why it is endangered and what people can do to help. Display these posters on school notice boards, during school assemblies or in the school library.

### Submission/Proposal

Take the information gathered during the completion of this unit and develop a formal submission or proposal to be sent to local, state or federal members with regard to a human induced impact.

### Creating Popular Culture

Students can develop slogans that encourage protection of the Great Barrier Reef. Screen print T-shirts or calico bags and sell them to raise money for field trip or school environment group.

### 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/>

### Reflecting

Ask the students about some of the things they have learnt during the unit. Ask them about other art forms they may wish to experiment with.



## 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/syllabus.html>

Queensland Studies Authority – Geography Syllabus

[http://www.qsa.qld.edu.au/yrs11\\_12/subjects/geog/syllabus.pdf](http://www.qsa.qld.edu.au/yrs11_12/subjects/geog/syllabus.pdf)

Queensland Studies Authority – Multi Strand Science Syllabus

[http://www.qsa.qld.edu.au/yrs11\\_12/subjects/multi\\_science/syllabus.pdf](http://www.qsa.qld.edu.au/yrs11_12/subjects/multi_science/syllabus.pdf)

Reef ED

[www.reefed.edu.au](http://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](http://www.nationalgeographic.com/earthpulse/reef/reef1_flash.html)

## References & Resources

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

Dodd, B. and Dodd, J. (1994) *SECTRUM Geographical Perspectives of People and their Environment*. Milton: The Jacaranda Press.

Great Barrier Reef Marine Park Authority. (2003) *Reef Manual 4<sup>th</sup> 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 8<sup>th</sup> Edition*. United States of America: International Thomson Publishing.

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

