

Teaching Unit

Threatened Species

Middle School

In this Reef HQ Education program students will investigate and discover some of the threatened species that are under pressure with the Great Barrier Reef. Through participation in a series of activities requiring examination, identification, analysis, making predictions and reflection, students will gain a deeper appreciation for the issues related to threatened species in the Great Barrier Reef. Culminating in activities that promote active citizenship through community education.

Curriculum Links

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

- Make links between different features of the environment and the specific needs of living things;
- Make generalisations about the types of interaction which take place between living and non-living parts of the environment;
- Evaluate the consequences of interactions between humans and the reef environment;
- Examine and prepare scenarios that describe the potential long-term effects of changes in biodiversity caused by human action on ecosystems;
- Describe the values underlying personal and other people's actions regarding threatened species;
- Explain whether personal decisions about resource use and management are balanced;
- Organise data into a meaningful and useful forms; and
- Evaluate ideas concerning sustainability to identify costs and benefits of human use of marine resources.

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:

- Observe a highly diverse reef ecosystem;
- Observe threatened reef creatures and their peculiar behaviours;
- Observe reef creature interrelationships within the reef ecosystem;
- Investigate some of the interrelationships that exist between reef creatures;
- Appreciate the varying ecological levels within reef ecosystems;
- Develop an appreciation for the fact that all organisms (including humans) are competing for resources within the reef ecosystem;
- Understand that ecosystems and their inhabitants are put under pressure due to human impacts; and
- Create and justify proposals to minimise or resolve pressures on threatened species.

Theme Overview

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

The Great Barrier Reef is about 12 000 years old and for most of that time there has been minimal human impact. Around 1850, European settlers began populating and developing the coastal strip adjacent to the Great Barrier Reef. Since then, human settlement has impacted on the reef. Today, 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. As a result, the Great Barrier Reef is now under pressure – from fishing, from farming, from coastal development, from land-based pollution and simply from overuse. Some significant species are having difficulty adapting to these changing conditions and are now rare or threatened. These trends are worrying indications of what may happen to other species and habitats of the Great Barrier Reef.

Threatened species management in the Great Barrier Reef World Heritage Area derives from Australia's international obligation to ensure the World Heritage Area's protection, conservation and transmission to future generations. The long-term vision is that the World Heritage Area will maintain its diversity of species and habitats, and its ecological integrity and resilience. Management agencies are therefore committed to paying special attention to ensure the recovery and continuing persistence of species whose existence is threatened. A key indicator of the success of management of the World Heritage Area is the success in managing its threatened species.



The goal is to pay special attention to conserving rare and endangered species by:

- Identifying species which are endangered in the World Heritage Area and threats to their survival;
- Developing and implementing appropriate coordinated management actions; and
- Developing and implementing appropriate coordinated management actions in the World Heritage Area for species, which are globally endangered.

Whilst there has been significant progress in implementing measures for the protection of dugong, turtle and seabird populations, major issues remain in terms of identifying and managing other threatened marine species in the World Heritage Area.

A major issue is the lack of knowledge of the conservation status of the species, the threats to their survival and the management actions that should occur to ensure the survival and, if in decline, the recovery of species. Most information relevant to threatened species management has been acquired by relatively slow discovery and analysis, sometimes boosted by a particular study of a species or issue.

Because of large differences between the marine and terrestrial environment and species characteristics, it is not possible to establish the rarity of most marine species in a similar manner to terrestrial species that is according to the degree of threat to them. There is a need to develop new criteria for use in assessing the great majority of marine species in terms of their vulnerability to risk, and to develop and implement management strategies for identified species as a precautionary measure.

Information about some threatened species has been listed below:

Marine Turtles

- Six of the seven species of marine turtles in the world are found on the Great Barrier Reef. All six species are threatened.
- The Queensland population of loggerhead turtles is facing local extinction, with a 70-90% decline in population numbers over the last 30 years.
- The average size of nesting female green turtles has been reducing over the last 20 years.
- Analysis of 10 years nesting data of hawksbill turtles shows a downward trend in numbers of breeding females.

Dugong

- There has been a greater than 90% decline in dugong numbers south of Cooktown since the 1960's.
- High organo-chlorine pesticide residues have been found in dugong.
- The Great Barrier Reef remains one of the last areas in the world with significant populations of dugongs.

Seabirds

Michaelmas Cay as seen a:

- 25% decline in Crested Tern and Sooty Tern populations.
- 45% decline in the Common Noddy Tern population since the 1980's.



What does 'threatened' mean?

Native animals and plants that are presumed extinct, endangered and vulnerable are considered 'threatened'.

What is endangered?

To many people, 'endangered' means a plant or animal is likely to become extinct. While this is true, 'endangered' has specific meaning under Queensland's Nature Conservation Act. Under this Act, native wildlife is classed as presumed extinct, endangered, vulnerable, rare or common.

Endangered

In Queensland, a native plant or animal is '**endangered**' if the species is in danger of extinction or its survival in the wild is unlikely if threatening processes continue.

A native plant or animal is in danger of extinction if its:

- Number has been reduced to a critical level, or
- Habitat has been reduced so drastically that it might be in immediate danger of extinction, or
- Has not been sighted in the wild for a period critical to its life cycle although no thorough search has been made for it.

Vulnerable animals

Native wildlife in the wild is 'vulnerable' if threatening processes continue.

A species is vulnerable if its:

- Population is decreasing because of threatening processes, or
- Population has been seriously depleted and its protection is not secured, or
- Population, while abundant, is at risk because of threatening processes, or
- Population is low or localised or depends on limited habitat that is at risk because of threatening processes.



Threatened Species – Activity Ideas

Tuning In

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.

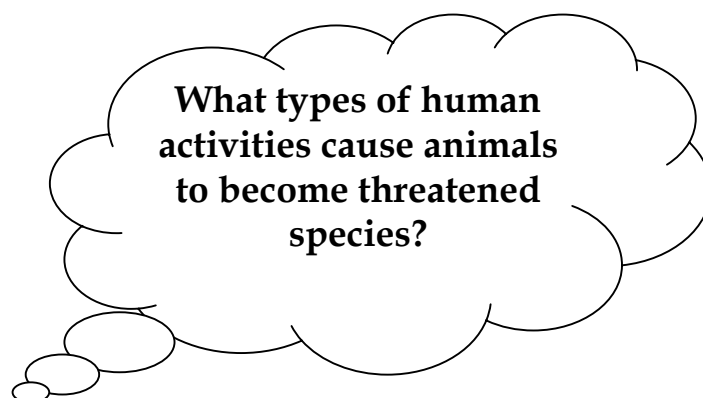
What do we already know about Threatened Species? <i>Know</i>	What do we want to know about Threatened Species? <i>Want to Know</i>	Where will we find the information to help us learn about Threatened Species? <i>Learning</i>

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.

Brainstorming

As a class brainstorm student responses to the following central question.



Preparing to Find Out

Use the following to websites and other information resources to investigate the different Threatened species found in the Great Barrier Reef and the broader potential threats to the Great Barrier Reef ecosystem.

Threatened Species in the Great Barrier Reef

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

Potential Threats to the Great Barrier Reef

http://www.reefed.edu.au/explorer/landscapes/reef_environment/threats/environment_threat.html

Use the *GBR Explorer* found on the Reef ED website

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

To find pictures of the various threatened species and paste them under the heading of ***Threatened Species in the Great Barrier Reef Marine Park*** on a display board. The reasons for each animal being threatened can be added after the animals have been sorted into their biological classification for example fish, bird, mammal or reptile. This will act as a resource for teachers and students to refer to throughout this unit.

Finding Out

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

Use the Great Barrier Reef Marine Park Authority's Reef ED website

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

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

Biodiversity and Threatened Species

Download the *Biodiversity and Threatened Species* PDF from the Reef ED website

(Insert link to Threatened species PDF)

Use the ideas from the ballad *We take so much for granted* to identify species that are threatened in the Great Barrier Reef. Discuss threats affecting them.

Deconstruct the ballad and determine its key messages. Write slogans or poems to further convey these messages.

Illustrate scenes from the ballad.



Become guardians of that species:

- Research the major characteristics of its habitat or environment
- Does it have any special interrelationships with other species?
- Do any non-living (abiotic) factors affect its survival?
- Does it have any special adaptations for survival?
- What is its major food source?
- How it is threatened?
- What could or should be done to better protect this threatened species? *Best Environmental Practices* can be found at:

http://www.reefed.edu.au/explorer/landscapes/reef_environment/best_environmental_practices/environment_best.html

Sorting Out

Flow charts

Students construct flow charts explaining how species become threatened and how individuals can conserve and protect them.

Masks

Students decorate the facemask of their favourite threatened species obtained from the *Biodiversity and Threatened Species* PDF. These facemasks can be used in drama activities and in the final, reflective sharing circle.

Plays, multi-media presentations, reports or brochures

Model the construction of the genres above. Students now use the information they have gathered to develop an information medium of their choice.

If they have been working in pairs, encourage students to conference with each other. If they are working individually, they can be encouraged to team up with others and to talk about their plans.

Information Chart

When plays, presentations, reports and brochures are finalised, a class retrieval chart could be developed on which to show collected data. This is excellent synthesising activity, as students will begin to see patterns emerging.



Going Further

Web Quests

Web Quests are inquiry-oriented activities in which some or all of the information that learners interact with comes from resources on the Internet.

Have students participate in and complete the following to Web Quests:

Reef Rescue

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

Pollution Solution

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

Note: In situations where Internet Technology is not readily available to all students. The Web Quests could be accessed by teachers, printed out and used as action research projects in the classroom. Specific resources can be obtained by contacting the Great Barrier Reef Marine Park Authority.

Making Connections

Cause and Effect Wheels

A cause and effect wheel is a diagram, which will prove helpful when organizing your ideas in preparation for writing reports. It will help you see the consequences that result from particular actions, thus enabling you to effectively analyse the data you have collected. A few moments spent constructing a cause and effect wheel will give unity to your reports and allow you to organize your sections (and their paragraphs) in a logical order. The inclusion of a cause and effect wheel in your final draft would be an interesting and effective way of presenting your analysis of the issue you have chosen.

The steps in creating a cause and effect wheel are:

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**.

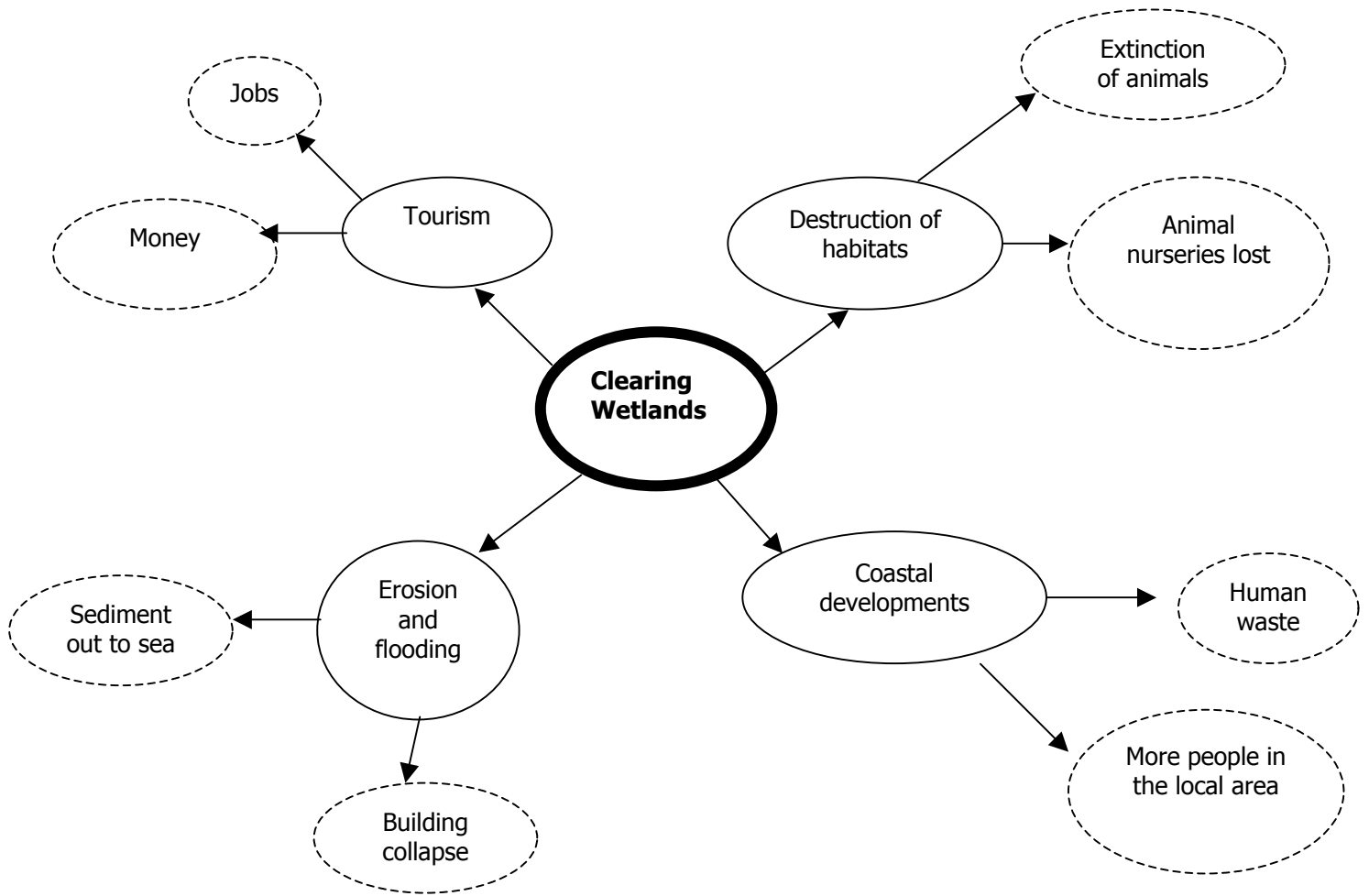
Step 2:

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.





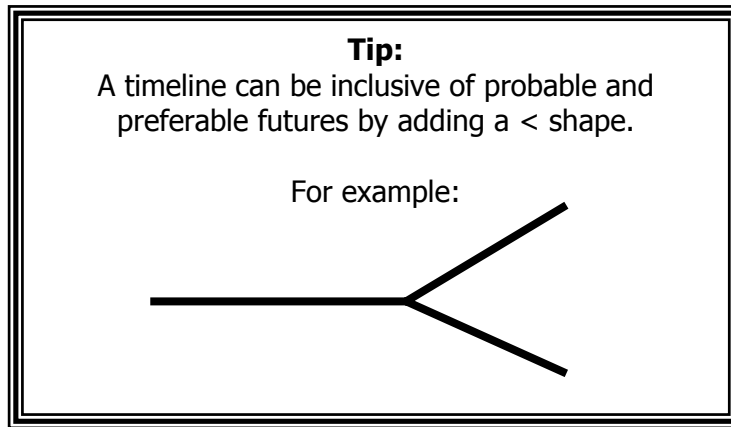
Construct a cause and effect wheel that examines and predicts what may happen to the reef if one or more of the threatened species were to become extinct. For example, what could possibly happen if all Coral Trouts were to die out?

Possible and Preferred Futures

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

Teachers model 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.

Taking Action

Threatened Species Exhibition

Students display or exhibit work created during their unit on threatened species in school or local library. Invite an audience to view student work. Encourage students to explain the nature of their various pieces of work and give a behind-the-scenes interview with the audience.

Community Education

Students can help increase others awareness of an endangered species by designing a poster, brochure or information sheet. This project should detail the species, why is it 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 species that is threatened or endangered.

Creating Popular Culture

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



Sharing Circle

A good prop for this activity is the facemasks students may have made. This will help students get into roles quickly and feel less inhibited about sharing.

Sitting in a circle, ask students to imagine they have become a plant or animal within the Great Barrier Reef that is threatened by the activities of humans. They should think about why they are an important part of the ecosystem and what makes them special.

Ask someone to speak for that species as it cannot speak for itself, and to sit inside the middle of the circle, eg. 'I speak for the Dugong'. The other students represent humankind.

Students on the outer circle ask questions of the species, eg. 'Tell us about yourself Dugong. Where do you live? Why are you special?' The student in the middle talks about the species it represents.

Ask additional questions, eg. 'What troubles you Dugong?' The dugong tells the humans of its plight and may ask them questions: 'Why have you impacted on things we like to eat?' The humans listen and respond if they wish.

Another student then enters the circle to speak on behalf of a threatened species and the process continues.

Afterwards, debrief by talking about the way the students felt as the threatened species and as the humans.

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/kl/science/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>

Environmental Protection Agency/Queensland Parks and Wildlife Service

<http://www.epa.qld.gov.au/>

Oceans & Coasts Marine Species Conservation

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

Marine Pest and Threat Education Program

<http://www.ausmepa.org.au/home/>

State of Environment – Townsville

<http://www.soe-townsville.org/marineandcoastal.html>

National Geographic - Virtual World "Great Barrier Reef"

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

References & Resources

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

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

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

