

# REEF Beat

## Sustainability



**A Great Barrier Reef Marine Park Authority Initiative**

*our great barrier reef  
let's keep it great*



Australian Government  
Great Barrier Reef  
Marine Park Authority

**Reef Beat – Sustainability** is an education initiative of the Great Barrier Reef Marine Park Authority. It provides students and teachers with information about the biologically diverse nature of the Great Barrier Reef Marine Park and how we, as custodians of the Reef, can live more sustainably to ensure its protection and conservation for future generations.

The goal of the Great Barrier Reef Marine Park Authority is:

*To provide for the protection, wise use, understanding and enjoyment of the Great Barrier Reef in perpetuity through the care and development of the Great Barrier Reef Marine Park.*

In working towards this goal the Great Barrier Reef Marine Park Authority's Education Team has developed a range of reef education programmes and activities. These can all be found at **[www.reefED.edu.au](http://www.reefED.edu.au)**.

For enquiries about **Reef Beat – Sustainability**, please contact the Great Barrier Reef Marine Park Authority's Education Team.

Telephone: (07) 4750 0700

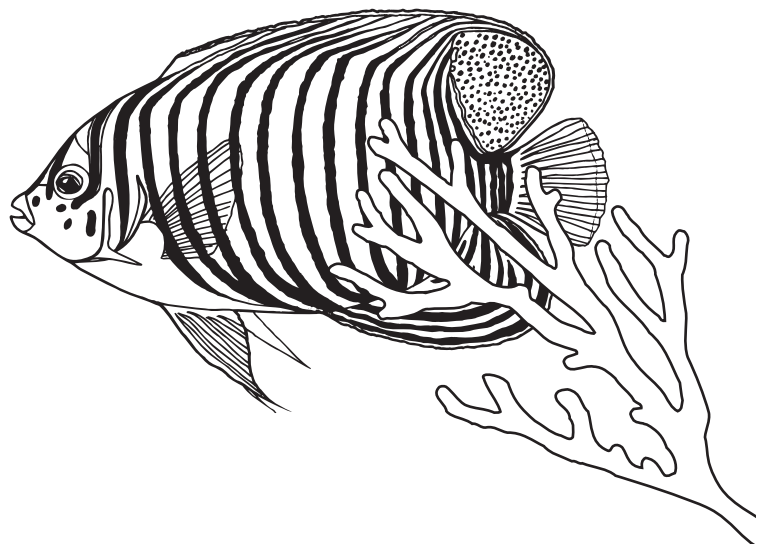
Fax: (07) 4772 6093

Email: [education@gbrmpa.gov.au](mailto:education@gbrmpa.gov.au)

### Keeping the Great Barrier Reef Great

Imagine a place that is so large that it can be seen from a spacecraft orbiting the earth! The Great Barrier Reef stretches more than 2300 kilometres along the northeast coast of Australia. Comprising of more than 3000 reefs and some 940 islands. It is the largest natural feature on Earth, covering more than 348 000 square kilometres. This World Heritage Area is internationally recognised as a unique area of outstanding value to humankind and a jewel in the crown of the world's natural wonders.

The Great Barrier Reef is about 12 000 years old and for most of that time there was little human impact on its environment. This began to change around 1850, when European settlers began populating and developing the coastal strip adjacent to the Great Barrier Reef.

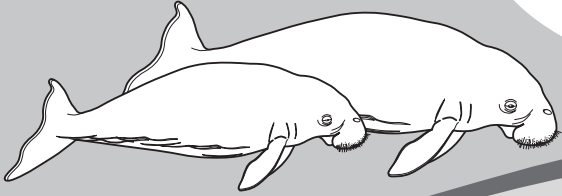


Today the Reef is under increasing pressure from fishing, farming, coastal development, land-based pollution and other human related activities. Some significant species are having difficulty adapting to these changing conditions and are now rare or threatened. These trends are worrying indications of what may happen to other species and habitats of the Great Barrier Reef.

Some of the major impacts on the Reef ecosystem have been:

- Increased pollution levels entering the Marine Park
- Depletion of fish stocks in localised areas
- The loss of coastal wetlands in most of the major river catchments adjacent to the Reef
- An increase in nutrients such as phosphate and nitrogen in river discharges
- Global climate change.

The Great Barrier Reef Marine Park Authority is working in partnership with communities, industry and other government agencies to protect the unique plants and animals that call the Great Barrier Reef home. Most importantly, as individuals we can all do our bit to help look after the Reef and ensure its sustainable future.



## Notes for Teachers

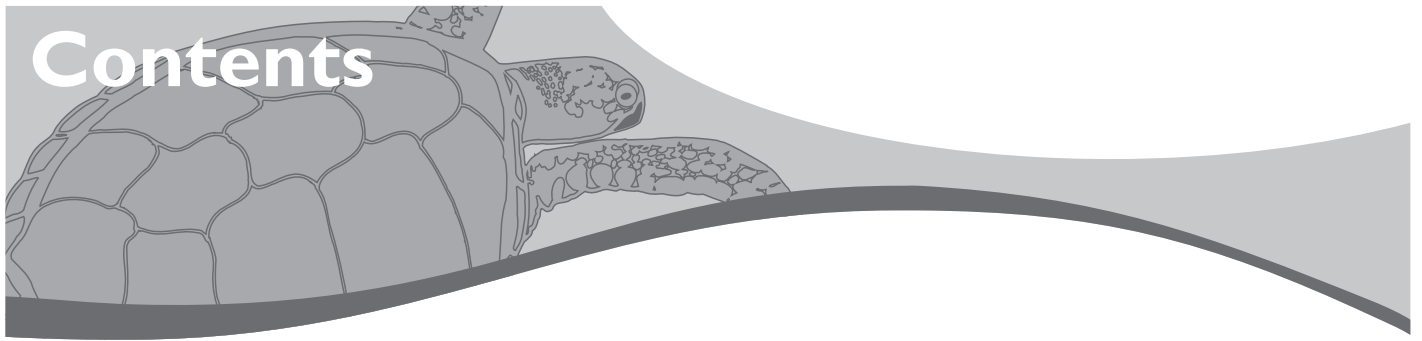
**Reef Beat – Sustainability** is an innovative and curriculum-centred teaching resource that includes activities and challenges that will stimulate inquiring minds to discover all they can about the Reef. The opportunities offered by these activities will enhance and extend student learning. **Reef Beat – Sustainability** is supported by the Reef ED web site [www.reefED.edu.au](http://www.reefED.edu.au).

The activities within this resource can support you to:

- Plan learning activities that focus on sustainable environments, communities and futures
- Provide students with opportunities to gain an appreciation for the biological diversity of the Great Barrier Reef Marine Park and the need for its protection through sustainable living
- Contribute to the responsible development of active and informed citizens with a better knowledge of ecological sustainability
- Empower students to take positive action for sustainable reef management, and to support the principles of ecological sustainability.

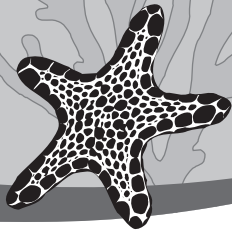
*The activities within this unit are targeted at Upper Primary and Middle School students. The activities cover a range of Key Learning Areas with an aim to engage students via multiple intelligences whilst addressing core-learning outcomes.*

# Contents



Activities for use with Poster 1 <i>'The Great Barrier Reef Marine Park – a valuable resource'</i>	1
Activities for use with Poster 2 <i>'A multiple use Marine Park'</i>	3
Activities for use with Poster 3 <i>'Protecting plants and animals in the Great Barrier Reef Marine Park'</i>	5
Activities for use with Poster 4 <i>'Sustainable fishing in the Great Barrier Reef Marine Park'</i>	7
Activities for use with Poster 5 <i>'Sustainable tourism in the Great Barrier Reef Marine Park'</i>	9
Activities for use with Poster 6 <i>'Sustainable development in the Great Barrier Reef Marine Park catchment'</i>	11
Activities for use with Poster 7 <i>'Sustainable farming in the Great Barrier Reef Marine Park catchment'</i>	13
Activities for use with Poster 8 <i>'Using Sea Country sustainability'</i>	15
Activities for use with Poster 9 <i>'Sustainable communities, sustainable living'</i>	17
Activities for use with Poster 10 <i>'Sustainable schools'</i>	20





### A Sense of Place

A sense of place comes from being aware of what makes a place significant and realising its special qualities.

Have students visit the **Animals, Plants** and **Landscapes** pages found in the GBR Explorer on the Reef ED website:

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

Using the information found on these pages have students develop a list of the characteristics they consider to be the most important in creating an **identity** of the Great Barrier Reef in the minds of other people.

### Picture Gallery

Using the GBR Explorer and Visual Library as stimulus sources. Print out images of the Great Barrier Reef from the Reef ED website:

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

Visual Library  
[www.reefed.edu.au/library/index.html](http://www.reefed.edu.au/library/index.html)

Ask students to bring in photographs or books with pictures of the Reef, its islands, animals, plants and human activities that take place on the Reef. Using this collection of images students can create a collage that addresses the title:

*"Our Great Barrier Reef – So special everybody wants to use it"*

### Showcasing the Great Barrier Reef

Explain to students that they have just met somebody that knows nothing about the Great Barrier Reef.

1. Have students write down how they would describe the Great Barrier Reef to them.
2. Students can then compare their descriptions with one another through role-play activities.
3. As a class, devise a description of the Great Barrier Reef that could be included in a travel brochure. The description should represent what the class thinks are the most important features and aspects of the Great Barrier Reef.
4. As a culminating activity students develop and design the brochure.

### How valuable is the Great Barrier Reef?

Ask students to write down a definition of the word **value**.

Ask the question *"Is the only value that something has a monetary (\$) one?"*

Have students consider the difference between economic, environmental and social/cultural values. Have students write a definition for each.

Students create and complete the following table.

Economic Values	Social/Cultural Values	Environmental Values

## The Great Barrier Reef World Heritage Area

Places with globally recognised significance may become World Heritage areas. The World Heritage Convention (1972) set up the World Heritage Commission to safeguard the world's 'irreplaceable heritage'.

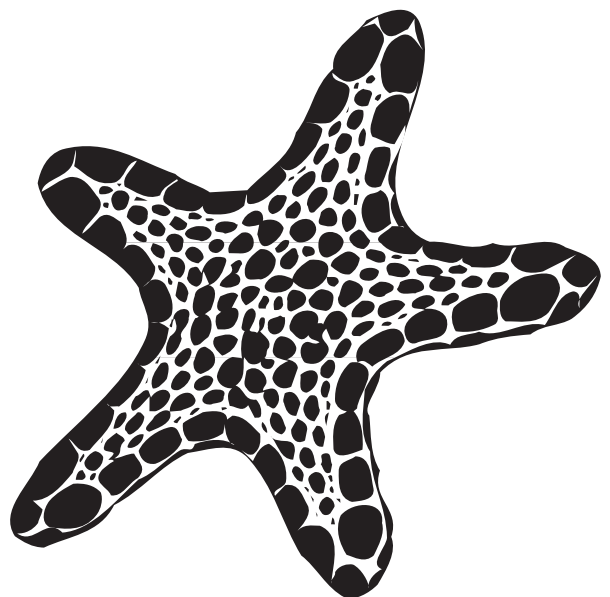
In 1981, the Great Barrier Reef was only one of a few World Heritage Areas on the globe that met all four natural criteria:

- An outstanding example representing the major stage in the earth's evolutionary history
- An outstanding example representing significant ongoing ecological and biological processes
- An example of unique rare and superlative natural phenomena
- Provides habitats where populations of rare and endangered species of animals or plants still survive.

The Great Barrier Reef World Heritage Area was declared in 1981.

Ask students to list examples of how the Great Barrier Reef meets the criteria above.

The following web pages will be very helpful  
[www.gbrmpa.gov.au/corp\\_site/key\\_issues/conservation/heritage/world\\_heritage](http://www.gbrmpa.gov.au/corp_site/key_issues/conservation/heritage/world_heritage)





# Poster 2



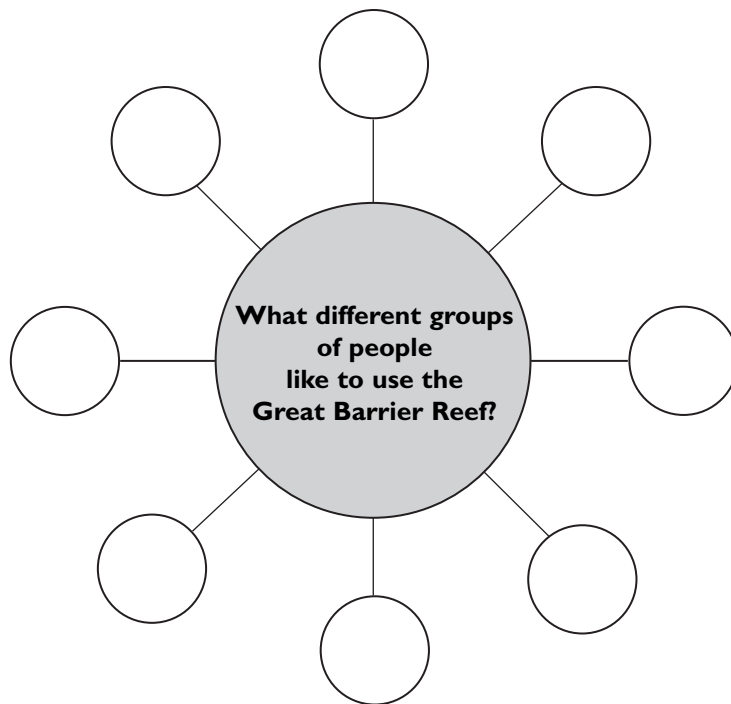
## A multiple use Marine Park

### Concept Mapping

The "spider" concept map is organised by placing the central theme or unifying factor in the centre of the map. Outwardly radiating sub-themes surround the central theme of the map.

Have students develop a concept map around the following central question.

*This activity may be made more effective by having small groups of students generate individual concept maps and then culminate by sharing concepts to create a class concept map.*



### Stakeholder Investigation

A **stakeholder** can be an individual, a group or some combination that has a vested interest in a natural resource like the Great Barrier Reef.

Students can use the following web links to gain an appreciation for the various stakeholder groups with a vested interest in the Great Barrier Reef Marine Park.

#### Scientific Researchers

[www.aims.gov.au/pages/research.html](http://www.aims.gov.au/pages/research.html)

#### Commercial Fishers

[www.gbrmpa.gov.au/corp\\_site/key\\_issues/fisheries/otter\\_trawl\\_fishery](http://www.gbrmpa.gov.au/corp_site/key_issues/fisheries/otter_trawl_fishery)

[www.gbrmpa.gov.au/corp\\_site/key\\_issues/fisheries/reef\\_line\\_fishery](http://www.gbrmpa.gov.au/corp_site/key_issues/fisheries/reef_line_fishery)

[www.gbrmpa.gov.au/corp\\_site/key\\_issues/fisheries/inshore\\_finfish\\_fishery](http://www.gbrmpa.gov.au/corp_site/key_issues/fisheries/inshore_finfish_fishery)

[www.gbrmpa.gov.au/corp\\_site/key\\_issues/fisheries/dive\\_based\\_fishery](http://www.gbrmpa.gov.au/corp_site/key_issues/fisheries/dive_based_fishery)

#### Recreational Users

[www.gbrmpa.gov.au/corp\\_site/key\\_issues/tourism/recreation](http://www.gbrmpa.gov.au/corp_site/key_issues/tourism/recreation)

#### Tourism Operators

[www.gbrmpa.gov.au/corp\\_site/key\\_issues/tourism/tourism\\_on\\_gbr](http://www.gbrmpa.gov.au/corp_site/key_issues/tourism/tourism_on_gbr)

#### Indigenous Groups

[www.reefed.edu.au/explorer/traditional\\_owners/index.html](http://www.reefed.edu.au/explorer/traditional_owners/index.html)

#### Shipping Industry

[www.gbrmpa.gov.au/corp\\_site/key\\_issues/water\\_quality/shipping](http://www.gbrmpa.gov.au/corp_site/key_issues/water_quality/shipping)

Have students write responses to the following focus questions for each of the stakeholders.

1. Why is the Great Barrier Reef Marine Park important to this stakeholder group?
2. In what way does this stakeholder group use the Great Barrier Reef?
3. How does this stakeholder group impact on the Great Barrier Reef?



## Managing Activities

The Great Barrier Reef Marine Park Authority uses many different tools to manage the various activities that occur in the Great Barrier Reef Marine Park. **Zoning** is one of these tools. The Great Barrier Reef Marine Park Zoning Plan uses a colour system to designate where and what types of activities can take place in all Marine Park areas. Zoning not only protects the plants and animals that call the Great Barrier Reef Marine Park home but it also separates activities that may conflict with each other.

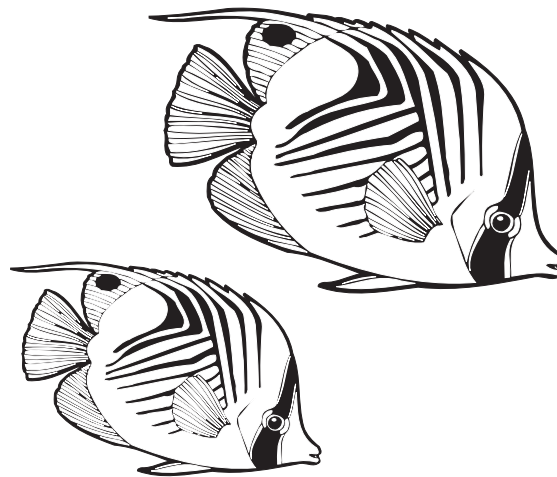
To find out more about Marine Park Zoning use the following website:

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

Have students visit the website above and download the information contained in the area *"User information about zoning"* in particular the information about *"What can you do in which zone?"*

Students can use this information to complete the following table.

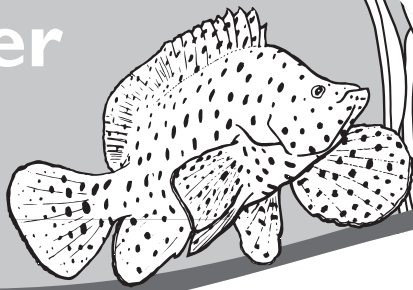
Once students have completed the table an interesting culminating activity is to have them develop a *School Yard Zoning Plan* that uses a colour system to designate where and what types of activities can take place in all school areas. Have students present and justify the benefits of their proposed zoning plan to the rest of the class.



Marine Park Zone	Zone Colour	Description of Zone	Benefits of this Zone
Preservation Zone			
Marine National Park Zone			
Scientific Research Zone			
Buffer Zone			
Conservation Park Zone			
Habitat Protection Zone			
General Use Zone			

# Poster 3

## Protecting plants and animals in the Great Barrier Reef Marine Park



### Biodiversity and Threatened Species

Download the *Biodiversity and Threatened Species Mask Kit* found at the following web address.

[www.reefed.edu.au/reefhq/downloads/End.SpeciesMaskKit.pdf](http://www.reefed.edu.au/reefhq/downloads/End.SpeciesMaskKit.pdf)

Use the ideas from the ballad "**We take so much for granted**" to identify some of the 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.

Have students choose a protected species and research the major characteristics of its habitat or environment using the following focus questions:

1. Does it have any special interrelationships with other species?
2. Do any non-living (abiotic) factors affect its survival?
3. Does it have any special adaptations for survival?
4. What is its major food source?
5. How is it threatened?
6. What could or should be done to better protect this protected species?

### Sharing Circle

A good prop for this activity is the facemasks students may have made from the previous activity. 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.

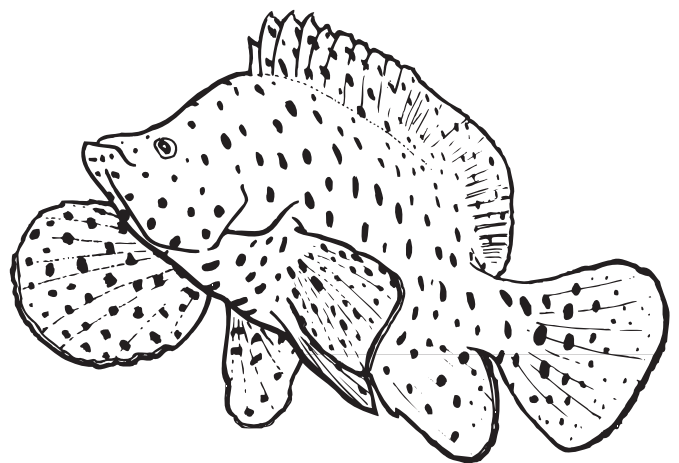
Ask someone to speak for that species as it cannot speak for itself, and to sit inside the middle of the circle, eg. 'I speak for the Dugong'. The other students represent humankind.

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 protected species and the process continues.

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



## Best Environmental Practices

Have students visit the "*GBR Explorer*" on the Reef ED website [www.reefED.edu.au](http://www.reefED.edu.au).

Students navigate through the site using the following pathway:

GBR Explorer (*click*) Landscapes (*click*)

Reef Environment (*click*) Best Environmental Practices

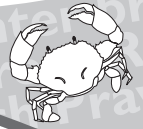
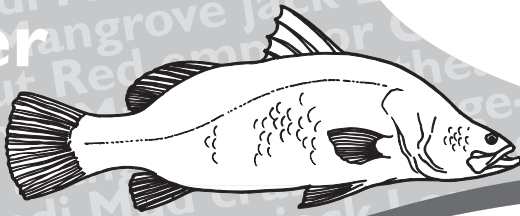
Students use the information they have gathered to develop one of the following information mediums (**multi-media presentation, report or brochure**)

The purpose of their chosen information medium is to educate others on the importance of abiding by best environmental practices when visiting and using the Great Barrier Reef Marine Park. Students showcase their information medium to the rest of the class and also use it to peer tutor other members of the school community.



# Poster 4

## Sustainable Fishing in the Great Barrier Reef Marine Park

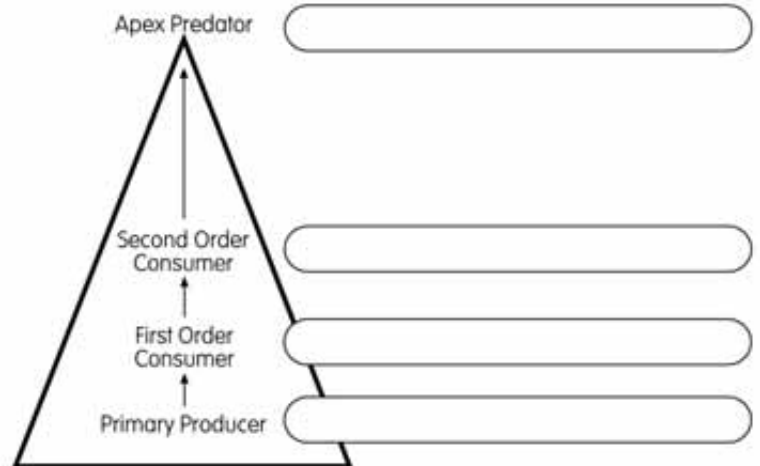


### Interconnection challenge

Biological Magnification is a term used by scientists to describe how very small effects in an ecosystem can lead to very dramatic changes within that ecosystem. Animals and plants within any ecosystem will interact with one another. Consider the following trophic pyramid. Write examples of the animals and or plants that would make up each level in the pyramid in the space provided.

Once they have completed the pyramid have students write answers to the following questions.

1. What might happen if all the apex predators were to become extinct?
2. What might happen if all second order consumers were to become extinct?
3. What might happen if all primary producers were to become extinct?



### Fishing Fun

Queenslanders are keen anglers. Each year, more than 700 000 people fish for recreation, with anglers taking home around 8500 tonnes of finfish, crabs and prawns. Queensland's fisheries resources are also important for tourism, attracting anglers from around Australia and the world.

Have students visit the *Department of Primary Industries and Fisheries* website:  
[www.dpi.qld.gov.au](http://www.dpi.qld.gov.au)

Students navigate through the site using the following pathway:

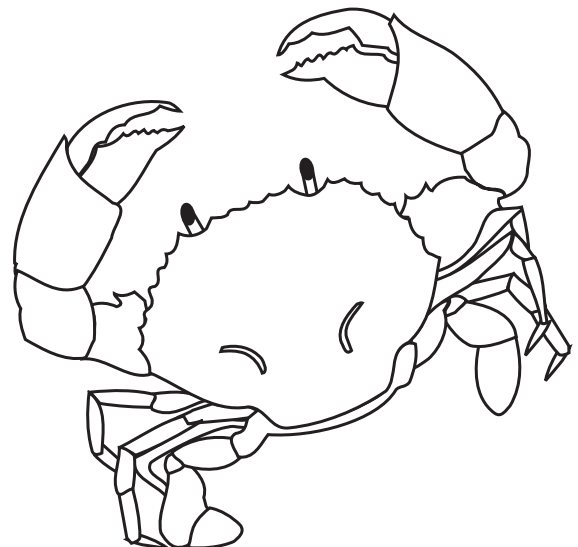
Fisheries (click) Recreational fishing (click)

Rules and regulations for fishing in Queensland

Using the size, take and possession limits for **tidal waters** students are to complete the table on the following page.

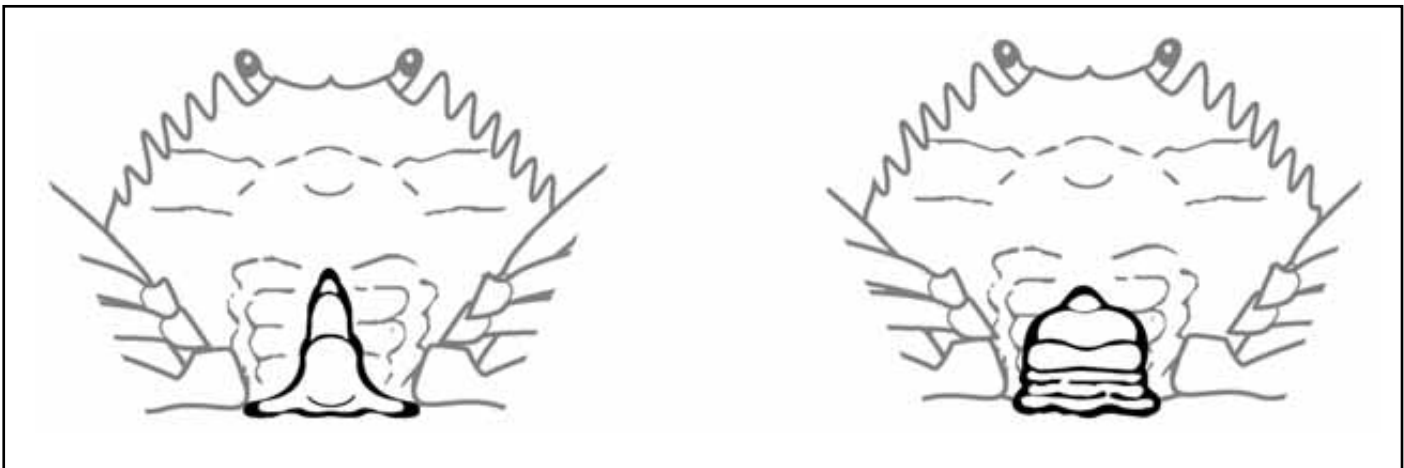
Using the information contained on this webpage, have students write responses to the following questions:

1. Why do we have size limits?
2. Why do we have bag limits?

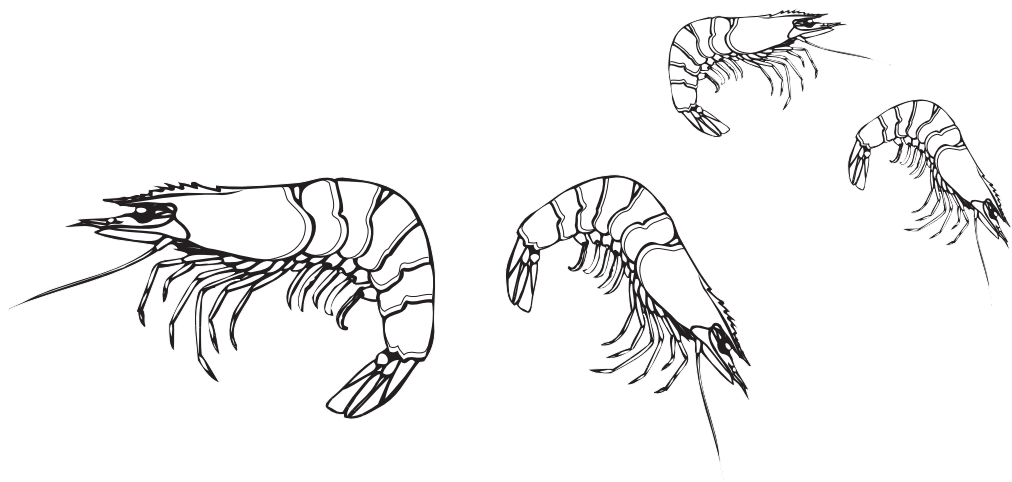


<b>Species</b>	<b>Legal Size (cm)</b>	<b>Take and possession limit</b>
Coral trout		
Red emperor		
Barramundi (east coast)		
Mud crab		
Flathead (sand)		
Giant trevally (east coast)		
Grunter bream (east coast)		
Mackerel (Spanish/narrow-barred)		
Mangrove jack (east coast)		
Large-scale sea perch (fingermark)		
Prawns		
Whiting (golden lined and sand)		

The two pictures below show the undersides of two different Mud crabs.  
Label which one is male and which one is female?



Why is it so important that all female mud crabs are released?



# Poster 5

## Sustainable tourism in the Great Barrier Reef Marine Park

### Responsible Reef Practices

Have students visit "*Onboard – The Tourism Operators Handbook*" located on the Great Barrier Reef Marine Park Authority's website [www.gbrmpa.gov.au](http://www.gbrmpa.gov.au).

Students navigate through the site using the following pathway:  
High Standards (click) Responsible Reef Practices

Show students examples of the educational products below and then have them use the information from the website above to create a "*Responsible Reef Practices Education Kit*".  
The following are examples of different educational products that could be developed as part of the education kit:

#### *A logo, slogan for the kit's front cover*

This needs to capture the ideals of Responsible Reef Practices.

#### *A power-point presentation or webpage*

This will highlight the different Responsible Reef Practices and why they are important.

#### *Children's Illustrated Storybook*

A storybook for 4 – 6 year olds about Responsible Reef Practices.

#### *Sustainability Song*

The song should encourage people to use Responsible Reef Practices when visiting the Great Barrier Reef. Encourage students to use a music style of their choice to create their song (for example, rap, hip-hop, R&B, classical, country etc...)

#### *Advertisement – Community Service*

*Announcement or TV commercial, billboard and newspaper*

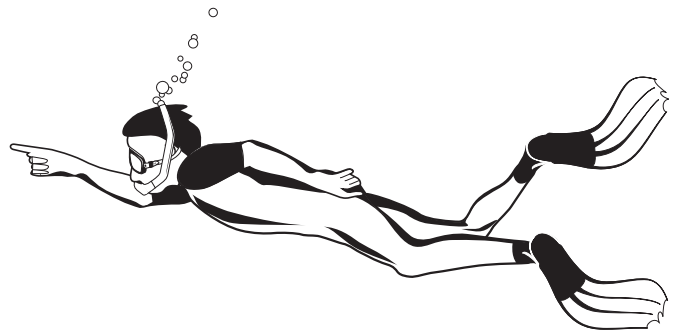
Focusing on one Responsible Reef Practice.

### *Community Information Poster/Display*

This display is to showcase five Responsible Reef Practices. The poster or display should also encourage people to use these Responsible Reef Practices.

### *Responsible Reef Practice Brochure*

A brochure or flyer for distribution within the local community about Responsible Reef Practices and what they can do to protect the reef.



## Tourism Web Search

Tourism operators do more than just take visitors to the Great Barrier Reef each day. They support or participate in many programmes/initiatives that are focused on a sustainable future for the Great Barrier Reef Marine Park.

Have students create the table on the next page as a word document or in hard copy and conduct a web search on the programmes/initiatives listed. Students may wish to use the web sites listed as initial starting points.

<b>Tourism operators support or are involved in the following programmes/initiatives:</b>	<b>What is it?</b>	<b>How will this ensure a sustainable future for the Reef</b>
<b>Eye on the Reef</b> <a href="http://www.eyeonthereef.com.au">www.eyeonthereef.com.au</a>		
<b>Eyes and Ears</b> <a href="http://www.tourismoperators.reefhq.com.au/tourism/marinepark/toolkit/reporting.html">www.tourismoperators.reefhq.com.au/tourism/marinepark/toolkit/reporting.html</a>		
<b>Bleach Watch</b> <a href="http://www.reefed.edu.au/explorer/bleaching/bleach_watch.html">www.reefed.edu.au/explorer/bleaching/bleach_watch.html</a>		
<b>Reef Water Quality Monitoring</b> <a href="http://www.gbrmpa.gov.au/corp_site/key_issues/water_quality/marine_monitoring">www.gbrmpa.gov.au/corp_site/key_issues/water_quality/marine_monitoring</a>		
<b>Environmental Management Charge (EMC)</b> <a href="http://www.gbrmpa.gov.au/corp_site/permits/emc">www.gbrmpa.gov.au/corp_site/permits/emc</a>		



# Poster 6

## Sustainable development in the Great Barrier Reef Marine Park catchment

### Cause and Effect Wheels

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

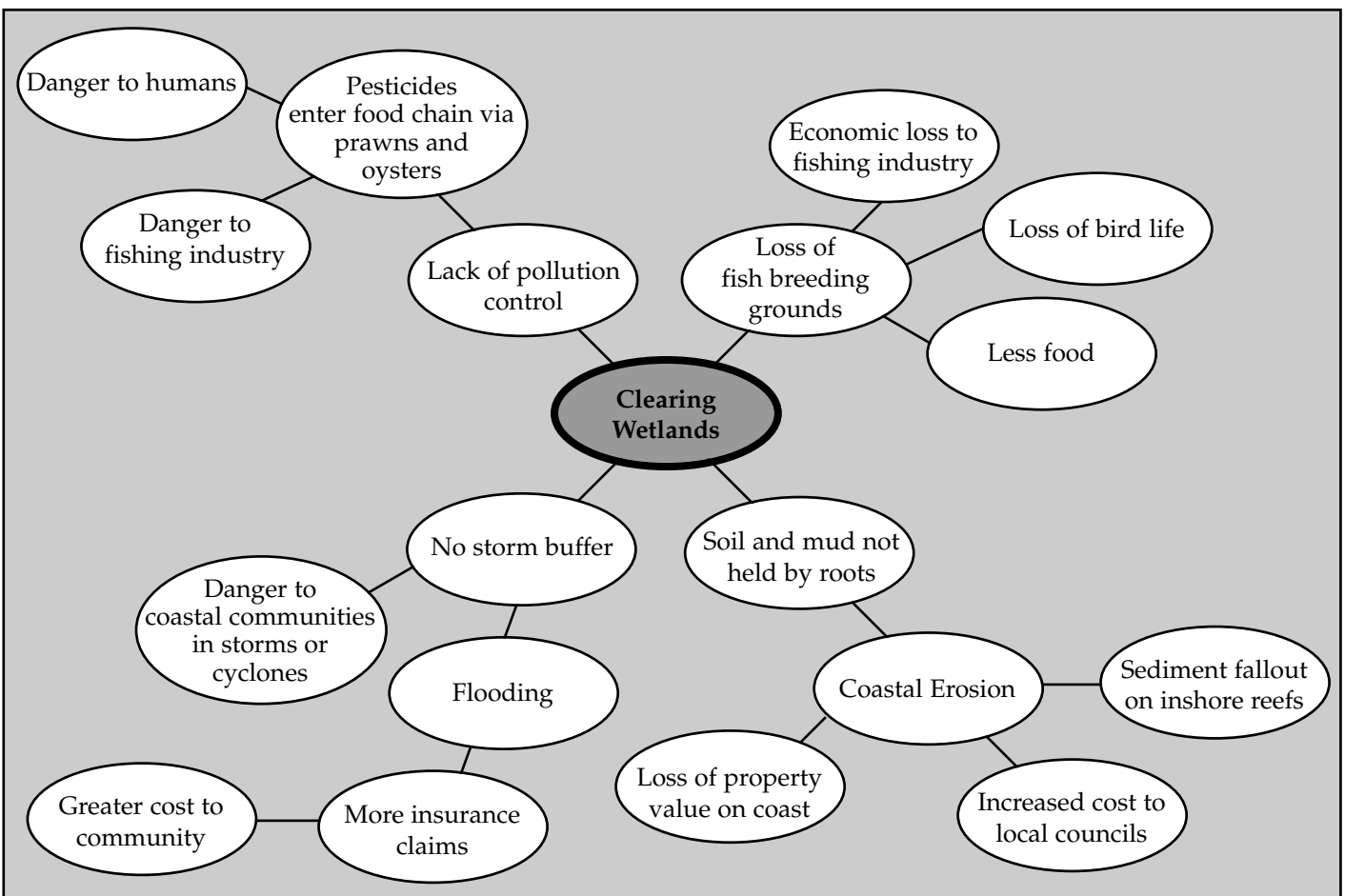
These consequences or implications (real or potential) are called **effects**.

**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.

In groups, construct cause and effect wheels that examine and predict what may happen if:

- All new houses built in Queensland have to have solar panels installed on their roofs
- Water quality entering the Reef does not improve.



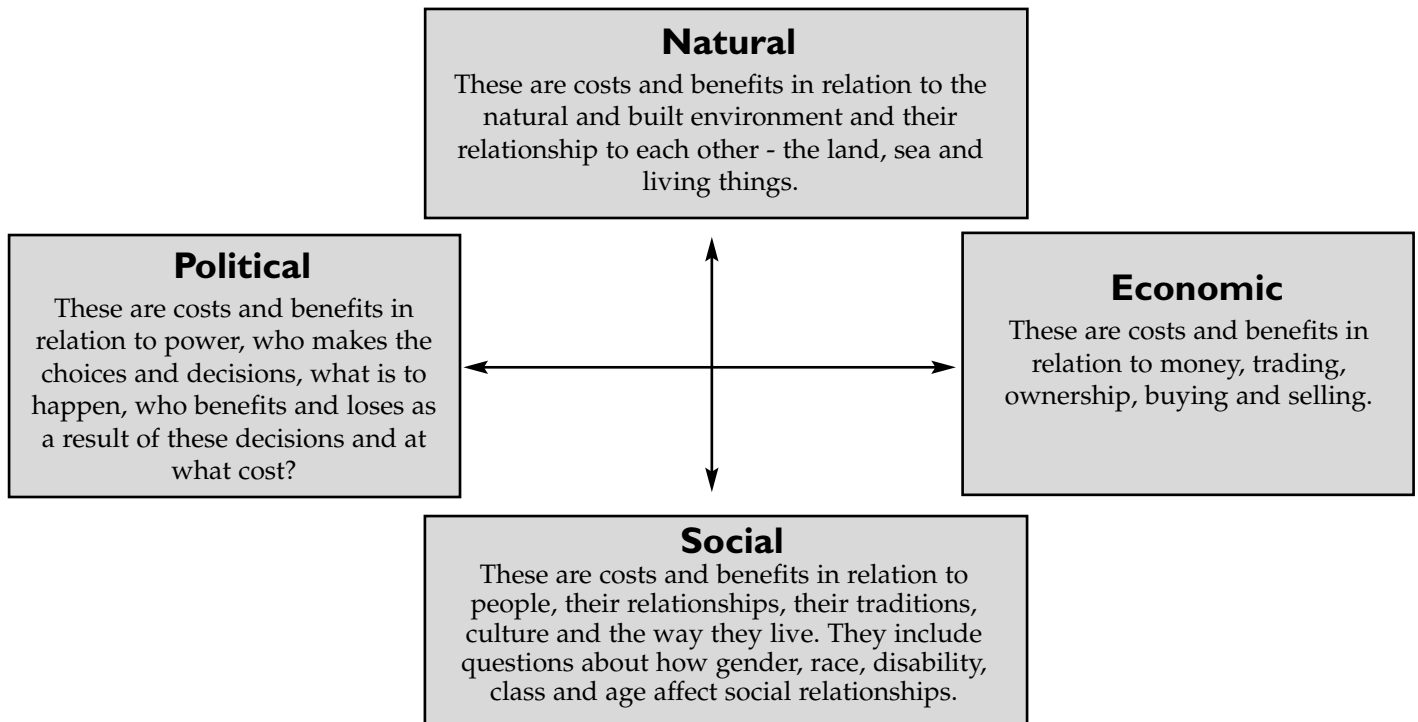
## Cost Benefit Analysis

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 issue areas as the focal points for the cost-benefit analysis:

Have students conduct a cost-benefit analysis on approving more unit developments in coastal communities.



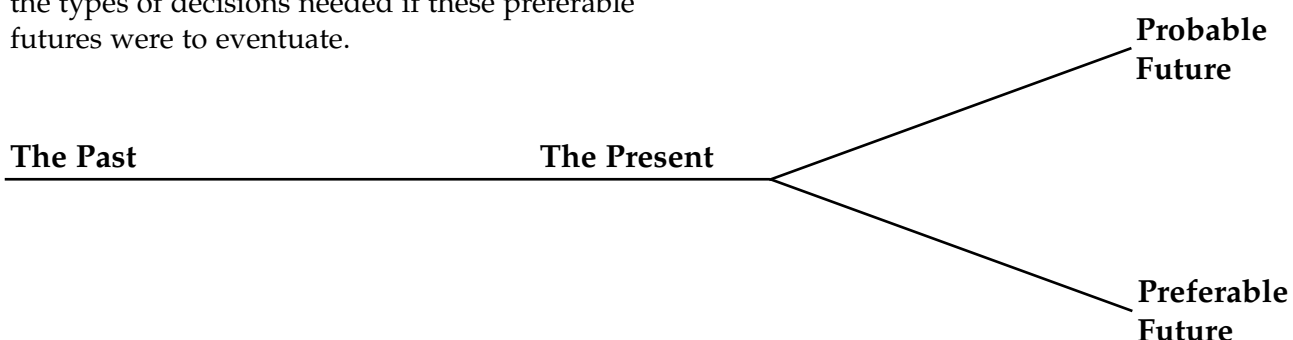
## What does the future hold?

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.

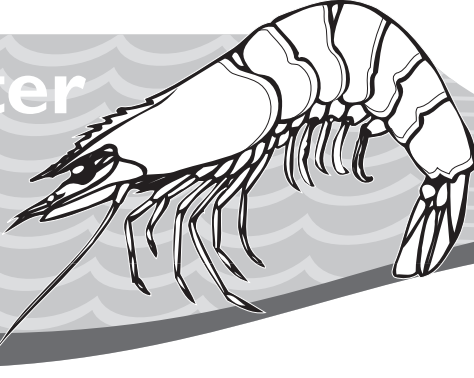
Teachers demonstrate the continuation of the futures timeline, encouraging students to consider the probable and preferable futures of the Great Barrier Reef. In groups, students discuss the types of decisions needed if these preferable futures were to eventuate.

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 issue for consideration is global climate change and coral bleaching.



# Poster 7

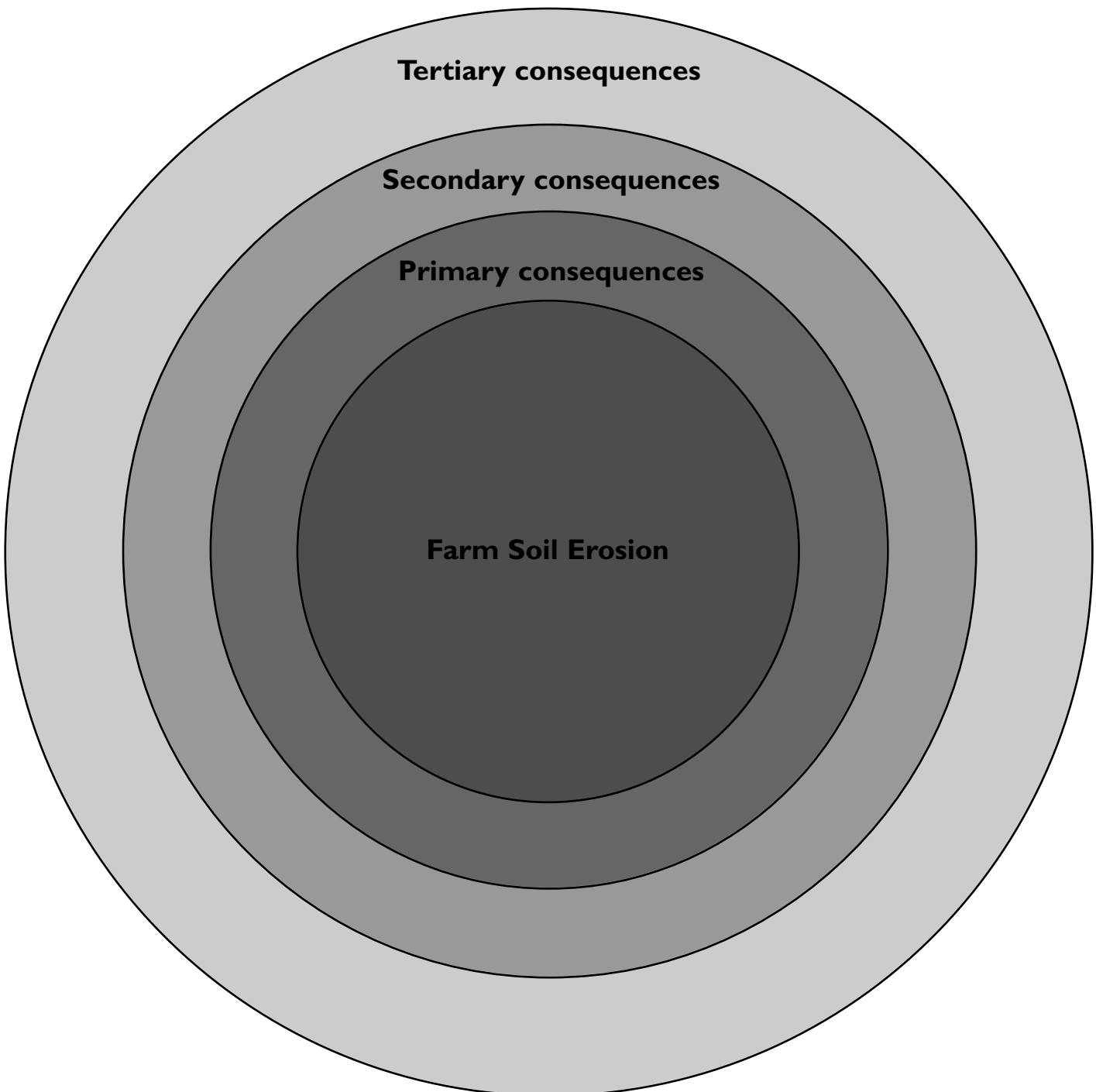
## Sustainable farming in the Great Barrier Reef Marine Park catchment



### Farming Futures Wheel

A *Futures Wheel* is a graphic organiser that places a future event in a circle in the centre of a document. Consequences from this first event are placed in a second ring of circles, then a third, and so on. The futures wheel identifies expanding consequences.

Using a large piece of butchers paper and a set of coloured pens students can create a futures wheel that outlines some of the future consequences of farm soil erosion. The different coloured pens can be used for identifying primary, secondary and tertiary consequences on the futures wheel.



## Farm Management Solutions

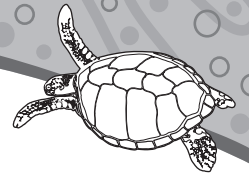
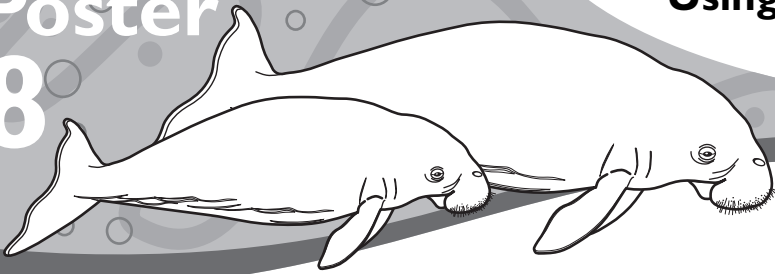
Today 80% of the land adjacent to the Great Barrier Reef World Heritage Area supports agricultural production, primarily beef cattle grazing and intensive cropping agriculture. Poor farming practice results in soil erosion and the discharge of sediments, nutrients and pesticides into rivers, estuaries and eventually the Great Barrier Reef World Heritage Area.

The table below contains examples of sustainable farming practices that are currently being used. Have students type them into a web based search engine of their choice and write a definition for each. Students can also conduct an image search on each of the terms and insert an image in their table beside the definition.

<b><i>Sustainable Farming Practice</i></b>	<b><i>Benefits</i></b>	<b><i>Image</i></b>
Stock Rotation		
Gully Reclamation		
Riparian Revegetation		
Crop Rotation		
Contour Ploughing		
Fallow Legumes		
Trash Blanketing		
Strip Cropping		
Minimum Tillage		

# Poster 8

## Using Sea Country sustainably



### Traditional Use

Have students visit the *"GBR Explorer"* on the Reef ED website [www.reefed.edu.au](http://www.reefed.edu.au)

Students navigate through the site using the following pathway:

GBR Explorer (click) Hot Topics (click)

GBR Traditional Owners (click) Traditional Use

Using the links on the **Traditional Use** page students read each of the sections and summarise four key pieces of information about each traditional use in the text boxes surrounding the traditional artwork below.

*Image by Terry Platt of Lockhart River Art centre.*

#### Art, Music and Dance

- 1.
- 2.
- 3.
- 4.

#### Language

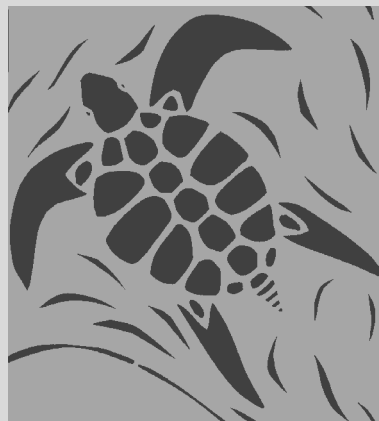
- 1.
- 2.
- 3.
- 4.

#### Societies

- 1.
- 2.
- 3.
- 4.

#### Story-telling

- 1.
- 2.
- 3.
- 4.



#### Subsistence and Food

- 1.
- 2.
- 3.
- 4.

#### Tools

- 1.
- 2.
- 3.
- 4.

#### Totems

- 1.
- 2.
- 3.
- 4.

#### Travel and Trade

- 1.
- 2.
- 3.
- 4.

## Indigenous Art

Have students view paintings from local indigenous coastal communities. From this, the students can design and paint their own x-ray or skeleton paintings.

The following websites may be useful sources of information and inspiration:

[www.dreamtime.net.au/index.cfm](http://www.dreamtime.net.au/index.cfm)

[www.aboriginalartprints.com.au/default.cfm](http://www.aboriginalartprints.com.au/default.cfm)

[www.wildplaces.net.au/artgallery/gallery/](http://www.wildplaces.net.au/artgallery/gallery/)

Encourage students to choose a marine animal that is considered important to Aboriginal or Torres Strait Islander people and have them create a message to support their artwork. The message should tell people why the animal is important and what can be done to make sure these animals are around for future generations to enjoy.

## Dreamtime Story Telling

### 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..."

*What does "Lets Keep it Great" mean to you?*

### Creative Writing

Choose a reef related Dreamtime Story. After students have either listened to or read the story conduct the following creative writing activities.

The following websites may be useful sources of information and inspiration:

[www.dreamtime.net.au/dreaming/index.htm](http://www.dreamtime.net.au/dreaming/index.htm)

[www.reefed.edu.au/students/reef\\_quest/cultural\\_connections.html](http://www.reefed.edu.au/students/reef_quest/cultural_connections.html)

## Story maps

Students create a story map of their selected reef story:

- Think about where the story started. Draw this.
- Think about where the story ended. Draw this too. Write a few words beside start and finish.
- Think of the events that happened between the start and the finish. Mark these in too.
- Draw the main characters in the places on the map where you think they fit best.
- Add scenery, then any comments that you wish.

## Retelling the story

Student groups can create murals of different sections of the story and then display them in order.

### Rewriting the story

Have students consider a key moment in the story. If the actions of the characters were different at that moment how would the story have played out? Students can rewrite the new story.

### Predicting/Hypothesising

How would the story have changed if key events within the story were different?

Allow time for shared discussion to foster ideas, before the children write their predictions in a few sentences. As a whole group, classify these predictions into probables, possibles, unlikelies and impossibles.

### Deconstructing the story

Have students create and complete a table with the following headings

<b>Character</b>	<b>Events in the story involving this character</b>	<b>Outcomes for this character</b>



### My Town 2050 – A Future Problem Solving Approach

In groups, students use the *Future Problem Solving Process* to devise and implement a solution to an issue of importance in their local community.

Some ideas for geographical issues for consideration could be:

- The condition and operation of your local railway station.
- System of waste disposal on local council area or school
- Litter in the school/local district/suburb
- The availability of recreational activities for young people in your local region
- Waste disposal in your street/school/residential community
- Future of your local wetlands
- Pollution by local industry
- Access to community services in your local area
- Land degradation in local area
- Congestion of local traffic networks
- Condition of school facilities, including buildings and grounds
- Availability of water resources in your local area
- Traffic flow/congestion in the area around the school

There are six main steps in the Future Problem Solving Process. However, researching and learning about the topic before problem solving is absolutely essential.

#### Research

Collect as much information about the issue as you can by undertaking fieldwork and other primary and secondary sources.

#### Step 1: Brainstorm

For the issue that you have chosen brainstorm as a group to uncover answers to the following questions:

- What is the issue?
- Why is it an issue?
- Whom or what is affected by this issue?
- How will it affect your town in the future?

#### Step 2: Identifying the underlying problem

After researching and brainstorming the selected issue, student groups may be able to identify a key underlying problem in relation to the major issue. By solving this underlying issue, students may also solve many of the other related issues.

Firstly create a focus question/condition, which is a statement about the underlying problem the group has identified.

Example:

How might we **(do something)** so that **(the purpose or goal of the group in relation to the underlying problem)** in **(name the area/location of the issue)**?

#### Step 3: Brainstorming solutions

Think of as many solutions to your underlying problem as possible. For each solution write a paragraph that says:

- Who will carry it out?
- How the action will achieve the group goal or purpose in relation to the underlying problem?

#### Step 4: Selecting criteria

Write five criteria that your group will use to evaluate your five most promising solutions. Use ideas that are as close to the issue as possible.

Examples:

This solution will help most of the people that live in my town/school.

This solution will be the least expensive.

This solution is environmentally friendly.

#### Step 5: Evaluating solutions

Create the evaluation matrix over page. For each solution give it a rating out of 10 under each criteria (10 Strongly meets the criteria, 1 Does not meet the criteria).

The solution that gets the highest **Total Score** is the best solution.



<i>Evaluation Criteria</i>						
Solution	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Total Score
1.						
2.						
3.						
4.						
5.						

### *Step 6: Describing the best solution*

Describe the chosen solution in detail:

What the solution is.

Who will be responsible for carrying out the solution?

How well does the solution meet each of the evaluation criteria?

How the solution will achieve your group purpose or goal in relation to the underlying problem.

## **Environmental Impact Assessments & Management Plans**

Students identify a human activity that may be causing one of the geographical issues in the previous activity. Engage students to complete an **Environment Impact Assessment**. Once they have completed their Environment Impact Assessment, they can follow up and design a **Management Plan** for the activity.

### *Environmental Impact Assessment*

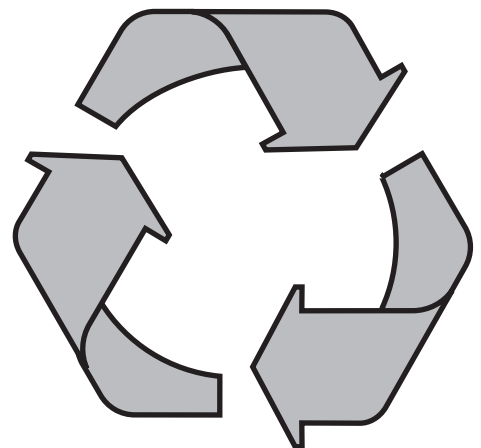
1. **Title:** Your activity needs a title so people will recognise the area you are assessing.
2. **Description of activity:** Briefly outline the activity and when the activity will take place. (Include diagrams of facilities/structures and their location).
3. **Need:** Why is the activity necessary?
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 on the opposite page 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
- Justify your management plan using the criteria you initially developed.





### **Ecological Sustainable Development (ESD) formulating an opinion**

The purpose of this culminating activity is for students to formulate a statement that they consider best conveys the meaning of the term ESD.

### **Sustainability & Development Background Information**

#### **Aspects of Sustainability**

Although a complete definition of sustainability would include all of the following aspects, some definitions may only include one or two.

#### **1. Economic sustainability**

Means that development is economically efficient and that the benefits of such development are distributed between generations. Economic efficiency means that processes and projects undertaken must give the greatest output per unit of input.

#### **2. Social sustainability**

Requires that development does not cause social conflict. In practice this means that development should increase people's control over their lives – which means all social groups should have the opportunity to participate in decision-making.

#### **3. Cultural sustainability**

Requires that any development should take into account the values of the people affected by it. In addition, the range of cultural groups should be maintained and encouraged and the value of their heritage and traditions recognised.

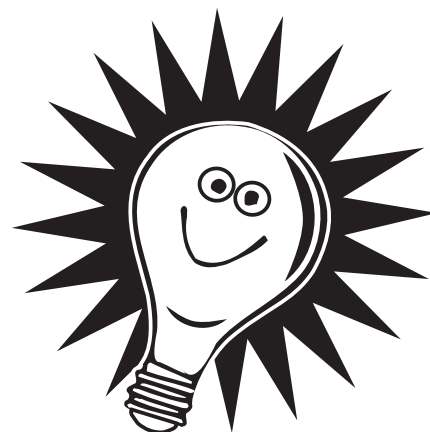
#### **4. Ecological sustainability**

Means that development should take into account the maintenance of ecological processes, biological diversity and biological resources. To achieve this, our society needs to recognise that the survival and wellbeing of other species are also important.

### **Aspects of Development**

The word 'development' literally means a process of change. But what exactly is it we are trying to change? Here are some ideas:

- Development is helping others to help themselves.
- Development is the process by which all humanity moves to live with dignity and a just share in the world's resources.
- Development is progress towards a higher standard of living for every person in a region or nation.
- Development is a process whereby rich nations exploit poor nations.
- Development is the attempt to ensure that as a nation changes and increase its production per person, there is a better distribution of wealth so that every person has their basic needs met and as many of their wants satisfied.
- Development is the growing capacity of a society to incorporate change.
- Development is sharing the world's wealth more equitably. It is sharing our world.
- Development is economic growth measured in terms of the improvement in national product.
- Development is the satisfaction of mass needs by packaged solutions.



## Sustainable Development Statement Cards

<p><b>1</b></p> <p>Sustainable development is development that is consistent with the natural functioning of the biosphere.</p>	<p><b>2</b></p> <p>Sustainable development is development that takes into account the impacts of projects on the environment and natural resources.</p>
<p><b>3</b></p> <p>The simplest definition of sustainable activity is that it can be continued for the foreseeable future. This has at least three dimensions – it means: not unreasonably depleting natural resources; not producing waste products that significantly change natural systems; and not undermining social stability.</p>	<p><b>4</b></p> <p>Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their needs.</p>
<p><b>5</b></p> <p>The main idea of sustainability is that current decisions should not damage the prospects of maintaining or improving future living standards</p>	<p><b>6</b></p> <p>The primary goal of sustainable development is to achieve a reasonable level of fairly distributed economic wellbeing that can be maintained for many human generations.</p>
<p><b>7</b></p> <p>Sustainable development is development that is likely to achieve lasting satisfaction of human needs and improve the quality of human life.</p>	<p><b>8</b></p> <p>The sustainable society is one that lives within the limits of its environment. Society is not a 'no – growth' society. It is rather, a society that recognises the limits of growth and looks for alternative ways of growing.</p>
<p><b>9</b></p> <p>The government supports the concept of sustainable economic development. Stable prosperity can be achieved throughout the world provided the environment is nurtured and safeguarded.</p>	<p><b>10</b></p> <p>A strategy of development aims to increase the fulfilment of human wants, however defined. For such a strategy to be sustainable, it must not threaten the health or the productive capacity of future generations.</p>
<p><b>11</b></p> <p>The main principle of sustainable development is the creation of a society that is designed as if we planned to stay – that is, it meets human needs without destroying the environmental, social or economic bases upon which we depend.</p>	<p><b>12</b></p> <p>For development to be sustainable it must take account of social and ecological factors, as well as economic ones; of the living and non-living resources; and of the long and short term advantages and disadvantages of alternative solutions.</p>
<p><b>13</b></p> <p>Sustainable development is about marrying the twin objectives of producing more and enhancing our environment at the same time.</p>	<p><b>14</b></p> <p>Sustainable development is using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased.</p>
<p><b>15</b></p> <p>The common use of the word 'sustainable' suggests an ability to maintain an activity in the face of stress. Therefore agricultural sustainability is the ability to maintain productivity, whether of a field or farm or nation, in the face of stress or shock.</p>	<p><b>16</b></p> <p>Defining ecological sustainability is by no means an easy task. Optimal resource and environmental management is only one aspect of sustainability – social equity and cultural issues are also very important.</p>

## Values Continuums

Supports the  
preservation of the  
natural  
environment


Encourages the  
exploitation of the  
natural environment  
for human needs

Supports zero  
economic growth


Supports high  
economic growth

Considers all  
elements of the  
environment including  
species other than  
humans


Considers only the  
human element of the  
environment

Considers the future as  
well as the present


Considers the present  
only

Have students read the *Sustainability & Development Background Information and Sustainable Development Statement Cards*.

Students can then refer to the sustainability and development background information after reading each of the statement cards and consider the following questions.

**Note:** Depending on the age and learning ability of the students this process may be better as a teacher centred and lead activity.

- Which *Aspects of Sustainability* does the author of each card favour?
- Which *Aspects of Development* are favoured in each card?
- Who do think made the statement? (For example: A politician? A scientist? An economist? An environmentalist? A member from an industry group?)

Ask students to look again at the *Sustainable Development Statement Cards* numbered 3, 6, 10 and 13. Using the *Values Continuums*, they are to mark on each of the continuums where they think each of the statements above lie. Students should put the number of the statement at the appropriate spot on each continuum.

Students then join each of the numbers with a line of a different colour and discuss any patterns that emerge. What could be said about the different values that underlie these four statements?

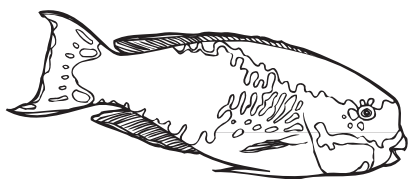
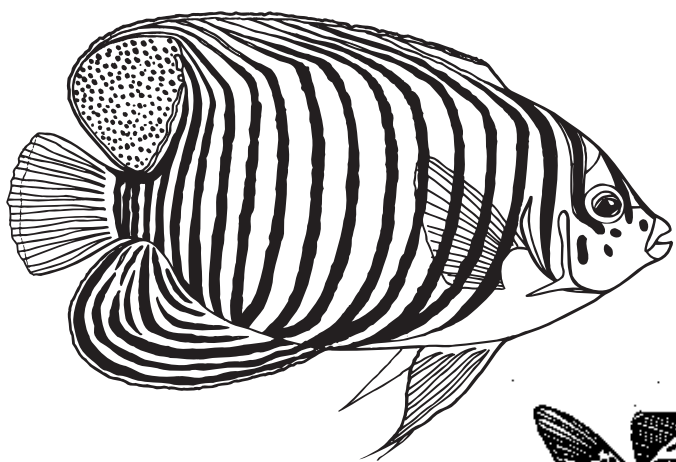
Once students have successfully completed the above process they should have formulated some idea of what ecologically sustainable development means. Ask students to write their own Sustainable Development Statement Card. The student-generated cards can be swapped with peers and plotted on the Values Continuums.

## Sustainability Exhibition

Students display or exhibit work created during Reef Beat – Sustainability activities 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.

## Creating Popular Culture

Students can develop slogans that encourage people to adopt sustainable behaviours. Screen print T-shirts or calico bags and sell them to raise money for field trip or school environment group.





***our great barrier reef  
let's keep it great***

