Marine Science and Marine and Aquatic Practices

Extended Investigations

For Year 11 and 12 action research projects

Learning area: Marine

Marine Debris

These assessment topics focus on the key threats to the Reef as identified by the Outlook Report (2014)

**Knowledge and Understanding**

* GBRMPA Outlook Report 2014 <http://www.gbrmpa.gov.au/managing-the-reef/great-barrier-reef-outlook-report>
* Tangaroa Blue resources and national marine debris initiative <http://www.tangaroablue.org/>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/strategic-assessment>
* ECO Barge Clean Seas <http://ecobargecleanseas.org.au/>
* Risks to the Great Barrier Reef identified in the Great Barrier Reef Marine Park Authority Outlook Report 2014 <http://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/2855/13/GBR_Outlook_2014_Chapter9_Risks_to_the_Regions_values.docx>
* GBRMPA webpage resource: <http://www.gbrmpa.gov.au/managing-the-reef/how-the-reefs-managed/tourism-on-the-great-barrier-reef>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/our-partners/reef-guardians/reef-guardian-fishers>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/threats-to-the-reef/extreme-weather>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/how-the-reefs-managed/reef-2050-marine-monitoring-program>

**Investigation and Analysis (or) Analysing and Applying**

* Primary data can be sourced by students by doing their own beach, island or waterway clean up.
* Secondary data can be sourced by the marine debris initiative database. <http://www.tangaroablue.org/database.html>
* Great Barrier Reef Biodiversity Conservation Strategy (2013) <http://elibrary.gbrmpa.gov.au/jspui/handle/11017/2787>
* **Marine Investigation:** Conduct an experiment to investigate the impacts of different activities on theGreat Barrier Reef.
* **The Great Barrier Reef Catchment Area Investigation** gather data about the local catchment area to assess its health and its impacts on the Great Barrier Reef.
* **Natural Disaster Rehabilitation** develop a public education program about how a chosen ecosystem will rehabilitate aftera severe natural disaster. Use a range of media strategies to develop your multimodal program including TV, newspapers or the web.
* **Sustainable Fishing Methods** design and conduct an experiment to investigate methods that will promote sustainablefishing in the Great Barrier Reef Marine Park.
* **Environmental Impact Assessment** investigate the social, cultural, economic and environmental impacts thatmight occur from a potential new development within the Great Barrier ReefMarine Park and propose how to reduce impacts at an effective cost.
* **Investigate the growth and survival of different fish species** and make links to human impacts and fish survival.
* Analyse and report on **data from fishing activities**. Fish research / Sustainable fishing investigation.
* **Research a marine protected area in Australia** - issues that impact use and effectiveness. Management and its implementation/ regulations.

**Evaluation and Communication (or) Planning and Evaluating**

* Using models to predict where marine debris will end up
* Developing/designing new marine debris collection tools or gross pollutant traps
* Determine which animals are most likely to be affected and why
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/reef-2050>

Climate Change

These assessment topics focus on the key threats to the Reef as identified by the Outlook Report (2014)

**Knowledge and Understanding**

* Outlook report 2014 <http://elibrary.gbrmpa.gov.au/jspui/handle/11017/2855>
* Eye on the Reef <http://www.gbrmpa.gov.au/visit-the-reef/eye-on-the-reef/report-sightings>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/threats-to-the-reef/climate-change>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/__data/assets/pdf_file/0020/28163/Year-10-Science-Climate-Change-Version-0.2.pdf>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/strategic-assessment>
* GBRMPA Eye on the Reef <http://www.gbrmpa.gov.au/visit-the-reef/eye-on-the-reef/report-sightings>
* How and why coral bleaching occurs / Impacts of coral bleaching.
* Risks to the Great Barrier Reef identified in the Great Barrier Reef Marine Park Authority Outlook Report 2014
* Video conference tools: “google hang out" with experts
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/how-the-reefs-managed/reef-2050-marine-monitoring-program>

**Investigation and Analysis (or) Analysing and Applying**

* **Climate Change Report** investigate and write a report on climate change using the Great Barrier ReefOutlook Report 2014.
* **The Great Barrier Reef Outlook Report 2009**, Section 5.2 Climate Change, states: “Increasing sea temperature is a significant risk factor for the Great Barrier Reef over the short term to medium term (decades) because of its effect on coral reef habitats, with flow-on effects throughout the entire ecosystem” (p93). Use the data presented in the Great Barrier Reef Outlook Report 2014, as well as other data gather from various sources, to investigate and write a report on climate change.
* **The Great Barrier Reef Catchment Area Investigation** gather data about local catchment area to assess its health and its impacts on the Great Barrier Reef.
* **Natural Disaster Rehabilitation** develop a public education program about how a chosen ecosystem will rehabilitate aftera severe natural disaster.
* **Environmental Impact Assessment** investigate the social, cultural, economic and environmental impacts thatmight occur from a potential new development within the Great Barrier ReefMarine Park and propose how to reduce impacts at an effective cost.
* Investigate how animals adapt their behaviour and structure to suit their Australian environment and adapt to change.
* Investigate how and why coral bleaching occurs (laboratory).
* **Sustainability:** Investigate and evaluate human impacts on the climate and the role we all play in creating a more sustainable future for the planet.
* Greenhouse Investigations. Investigate two different ways of demonstrating the impacts of increasing greenhouse gases. Record learning and reflections in a science journal.
* Warmer water absorbs less carbon dioxide thus disrupting the carbon cycle even further. Create your own experiment to demonstrate the fact that warm water absorbs less carbon dioxide than cool normal ocean temperatures.

**Climate Change – continued**

**Evaluation and Communication (or) Planning and Evaluating**

* Using models to predict change.
* Evaluate the impacts of coral bleaching.
* Potential effects on specific species (e.g. turtles, target fish species (e.g. coral trout) , birds etc)
* Write a persuasive text about climate change in the form of a magazine article, a newspaper editorial, an essay or a journal article.
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/reef-2050>

Land-based Runoff (Water Quality)

These assessment topics focus on the key threats to the Reef as identified by the Outlook Report (2014)

**Knowledge and Understanding**

* DERM - water quality objectives for each area in QLD [www.ehp.qld.gov.au/water/policy/schedule1/index.html](http://www.ehp.qld.gov.au/water/policy/schedule1/index.html)
* Video conference tool: “google hang out" with experts.
* Water flow through wetlands; diversity; what lives in the wetlands; food chains, webs and impacts on them; How it all links together.
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/our-partners/reef-guardians/reef-guardian-farmers-and-graziers>
* Risks to the Great Barrier Reef identified in the Great Barrier Reef Marine Park Authority Outlook Report 2014.
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/threats-to-the-reef/declining-water-quality>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/strategic-assessment>

**Investigation and Analysis (or) Analysing and Applying**

* **Marine Investigations** conduct an experiment to investigate the impacts of different activities on theGreat Barrier Reef.
* **The Great Barrier Reef Catchment Area Investigation** gather data about local catchment area to assess its health and its impacts on the Great Barrier Reef.
* **Environmental Impact Assessment** investigate the social, cultural, economic and environmental impacts thatmight occur from a potential new development within the Great Barrier ReefMarine Park and propose how to reduce impacts at an effective cost.
* Investigate how animals adapt their behaviour and structure to suit their Australian environment and adapt to water quality changes.
* Investigate the growth and survival of different fish species and make links to human impacts and fish survival.
* Investigate the properties of a range of wetlands including current environmental concerns affecting those wetlands.
* Investigate energy flows through ecosystems and how this can be affected by both nature and humans.

**Evaluation and Communication (or) Planning and Evaluating**

* Using models to predict change
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/reef-2050>

Coastal Development/Degradation of Coastal Ecosystems

These assessment topics focus on the key threats to the Reef as identified by the Outlook Report (2014)

**Knowledge and Understanding**

* Coastal development <http://www.gbrmpa.gov.au/about-the-reef/great-barrier-reef-coastal-ecosystems>
* Risks to the Great Barrier Reef identified in the Great Barrier Reef Marine Park Authority Outlook Report 2014
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/our-partners/reef-guardians/reef-guardian-farmers-and-graziers>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/threats-to-the-reef/coastal-development-and-protecting-the-great-barrier-reef>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/strategic-assessment>

**Investigation and Analysis (or) Analysing and Applying**

* **Marine Investigations** conduct an experiment to investigate the impacts of different activities on theGreat Barrier Reef.
* **The Great Barrier Reef Catchment Area Investigation** gather data about local catchment area to assess its health and its impacts on the Great Barrier Reef.
* **Natural Disaster Rehabilitation** develop a public education program about how a chosen ecosystem will rehabilitate aftera severe natural disaster.
* **Environmental Impact Assessment** investigate the social, cultural, economic and environmental impacts thatmight occur from a potential new development within the Great Barrier ReefMarine Park and propose how to reduce impacts at an effective cost.
* A new development is proposed to be built within the Great Barrier Reef Marine Park. As the project manager for the construction of the new development, you need to investigate the impacts that might occur during and after the development’s construction. You will need to propose how you will reduce those impacts at an effective cost. Focus on the social, cultural, economic and environmental impacts your new development may have. The development could be a marina, resort, wharf or pontoon. Choose a local bay, harbour, beach or island within the Great Barrier Reef Marine Park for your development.
* Investigate how animals adapt their behaviour and structure to suit their Australian environment and Adapt to habitat loss as a result of development / changes over time species (diurnal).
* Design and conduct an experiment to investigate how building a marina a town along the Queensland Coast marine environment will impact different substrates in the GBRMP. Consider the size of the marina and the population of boats using the marina. Identify any long term effects that may occur in the Marine Park due to the building of your marina.
* Investigate the impact of coastal development on a specific marine species and its habitat.
* Research a marine protected area in Australia - issues that impact use and effectiveness. Management and its implementation/ regulations.
* Use models to predict impacts to dune systems after a natural weather occurrence.
* Design and conduct an experiment to investigate how building a marina in a chosen marine environment will impact different substrates in the Great Barrier Reef Marine Park. Identify any long term effects that may occur in the Marine Park due to the building of your marina.

**Evaluation and Communication (or) Planning and Evaluating**

* Using models to predict change
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/reef-2050>

Responsible Reef Practices

These assessment topics focus on the key threats to the Reef as identified by the Outlook Report (2014)

**Knowledge and Understanding**

* GBRMPA Reef Guardian Farmers and Councils <http://www.gbrmpa.gov.au/our-partners/reef-guardians>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/our-partners/reef-guardians/reef-guardian-fishers>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/strategic-assessment>
* Risks to the Great Barrier Reef identified in the Great Barrier Reef Marine Park Authority Outlook Report 2014
* Assistance with writing an Extended Response Tasks <http://seniorbiology.com/ert.html>.
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/how-the-reefs-managed/tourism-on-the-great-barrier-reef>
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/how-the-reefs-managed/tourism-on-the-great-barrier-reef>

**Investigation and Analysis (or) Analysing and Applying**

* **Marine Investigations** conduct an experiment to investigate the impacts of different activities on theGreat Barrier Reef.
* **The Great Barrier Reef Catchment Area Investigation** gather data about local catchment area to assess its health and its impacts on the Great Barrier Reef.
* **Natural Disaster Rehabilitation** develop a public education program about how a chosen ecosystem will rehabilitate aftera severe natural disaster.
* **Sustainable Fishing Methods** design and conduct an experiment to investigate methods that will promote sustainablefishing in the Great Barrier Reef Marine Park.
* **Environmental Impact Assessment** investigate the social, cultural, economic and environmental impacts thatmight occur from a potential new development within the Great Barrier ReefMarine Park and propose how to reduce impacts at an effective cost.
* Investigate the growth and survival of different fish species and make links to human impacts and fish survival.
* Analyse and report on data from fishing activities. Fish research / Sustainable fishing investigation.
* Investigate how human activity is affecting the carbon cycle and the impact of some of those effects on biodiversity.
* Investigate energy flows through ecosystems and how this can be affected by both nature and humans.
* Design and conduct an experiment to investigate the impacts different types of anchors have on different substrates of the GBR. Identify any long term effects that may occur on the GBR due to anchor usage on certain substrates.(in laboratory)
* Investigate methods that will promote more sustainable fishing in the Great Barrier Reef Marine Park. Develop a new bycatch reduction device (an example of a successful bycatch reduction device is the Turtle Exclusion Device).

**Evaluation and Communication (or) Planning and Evaluating**

* Using models to predict change
* GBRMPA webpage resource <http://www.gbrmpa.gov.au/managing-the-reef/reef-2050>
* References to primary /secondary data / resources / information referenced properly / explicitly to data in the **discussion** to either support or refute their primary data findings.