QUESTION 19.

Two ecosystems that have been put at risk due to human induced modifications have been the Great Barrier Reef (GBR) in Northern Queensland and Antarctica. An ecosystem can be defined as the interactions of both plants and animals through not only physical processes but also through chemical means. Humans have placed stress on ecosystems for thousands of years, for 50 000 years Australian Aboriginals have been firestick farming. Through our input into the ecosphere we have gradually simplified ecosystems resulting in a lack of resilience. We have managed to change the dynamic equilibrium of many ecosystems, and not until very recently have we decided that ecosystems are a scarce resource that needs to be protected. The GBR and Antarctica have been exploited by humans for many years, but are now getting the recognition that they deserve, as truly natural wonders.

The GBR is the largest living marine park in the world and stretches for more than 2,300km up Queenslands east coast, from just north of Bundaberg

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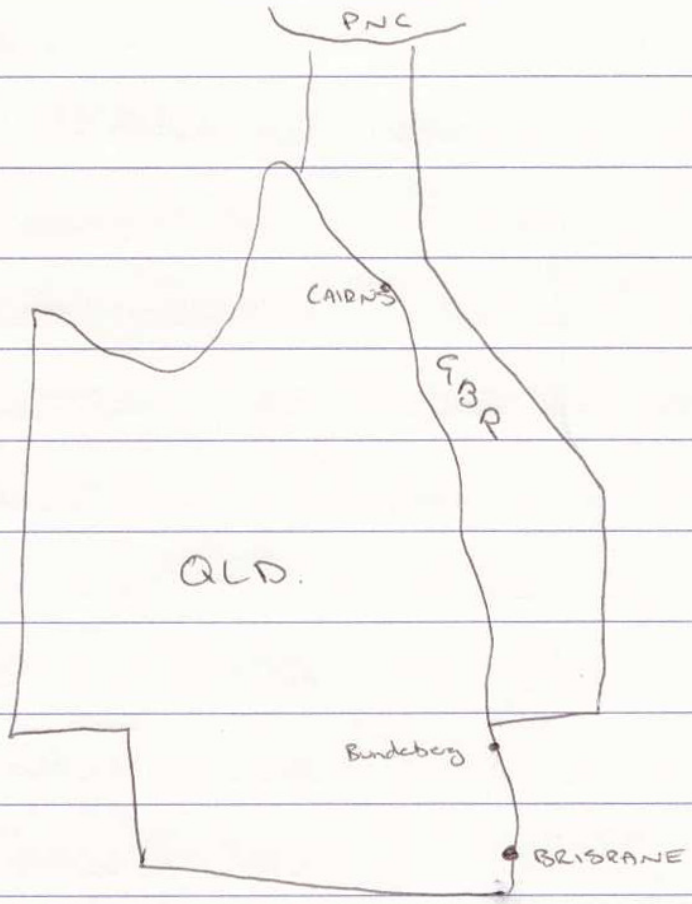
to the tip of Cape York. It covers an area of 350 000 km² and is one of the most diverse life forms on earth, with

- 1500 fish species
- 4000 species of molluscs
- 400 coral species.



Being a marine environment, ~~we have~~ humans have disrupted the energy cycles, and hydrological cycles.

Energy cycling refers to the transfer of energy from one trophic level to the next.

ie Sun → plants → herbivore → secondary consumers → top consumers → decomposers

Through overfishing on the GBR we have reduced the number of natural predators and now species such as the Crown of Thorns starfish are becoming an ever increasing problem. Usually outbreaks only happen, once every 15 years but now due to eutrophication of the waters and overfishing, they are becoming more common.

Humans have been able to modify the GBR through, chemical disruption, replacement of natural systems and by increasing water temperature. However, the most damage has been caused by chemical disruption and ~~and~~ by land based activities. The main problem that faces any coral reef ecosystem is nutrient rich waters that creates massive algae blooms, thus smothering the coral and resulting in coral bleaching. Over the last 150 years, due to intensive farming up and down the east coast, especially sugar cane farming, river discharge contains 40% phosphorus and 55% nitrogen, both dyer to the GBR.

This has increased 4 fold since the 18th century resulting in coral bleaching, crown of thorns starfish outbreaks and algae blooms. The increased level of nutrients has been caused by the fertilizers and pesticides that farmers use. These, placed on the land, leach into the soils and eventually into the river systems. Another human induced modification that causes eutrophication has been deforestation. By cutting down the tropical rainforests, this leaves the nutrient rich soil exposed to erosion. Runoff from the land flows straight into the lagoons and onto the reefs. This whole process is sped each summer by cyclones.

Climate change not only effects the GBR but the entire ecosphere as ecosystems either die out or evolve to the new conditions. While ecosystems are constantly evolving, due to humans burning fossil fuels and breaking down the ozone layer, the process has been greatly accelerated. This has been one inadvertent human modification that will eventually results in the death of the GBR. It is predicted that in 50

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years Greenhouse gases will have reached high enough levels to halt calcification within the oceans. Therefore the GBR reefs corals will become brittle and ~~subject to~~ vulnerable to change. A single storm could wipe out an entire reef.

However, while global warming can't be ceased anytime soon, the Great Barrier Reef Marine Park Authority has produced a document to help aid manage the GBR. The main focal point has been on zoning the reef into different sections and eliminating activities that conflict with one another, such as commercial fishing and scientific research. Broadly, there are 8 different zones.

- General Use A, B
- Marine Park A, B
- Habitate Protection Zone
- Estuarine Conservation Zone
- Conservation Park Zone
- Scientific Research Zone
- National Park Zone

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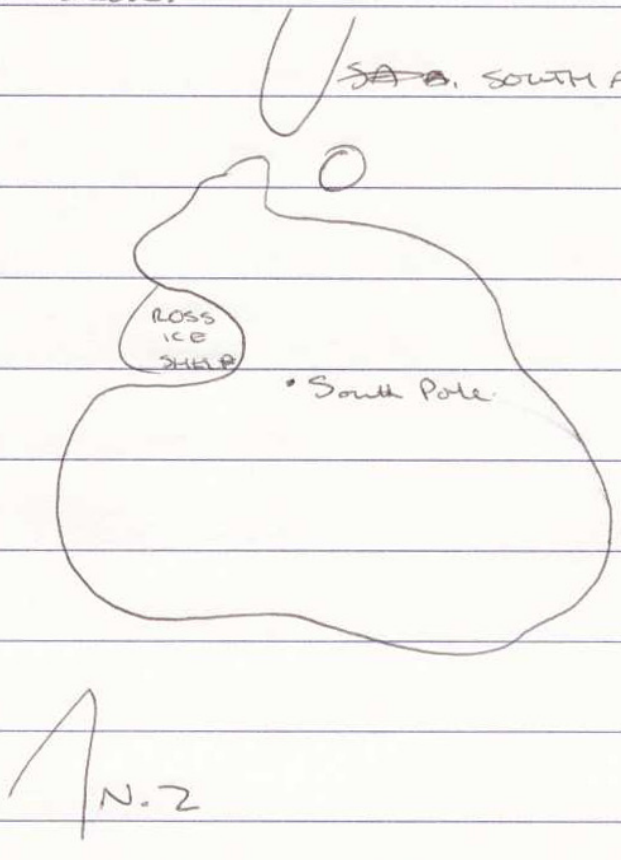
• Preservation Zone.

Antarctica, while being considered the last great wilderness area left in the world, it too has been subject to drastic human induced modifications. ~~The three main human~~

Antarctica is 14 million square kilometres in size and an ice sheet covers all but 3% of it. 90% of the worlds ice is trapped in Antarctica's ice sheet with 70% of the worlds fresh water. At some spots the ice can reach 5 km thick.



Generally speaking Antarctica is plagued by three human activities, they have been:

- Climatic Change
- Exploitation of the Southern Ocean, and
- Pollution - Scientific research

Like the GBR, Antarctica has experienced a prolonged period of climatic change. Millions of years ago it was part of the great 'supercontinent' Pangea and was covered with temperate rainforest. Today it is the driest continent on Earth, receiving less the 2 inches of rain. The greenhouse gases, caused by the emission of CFC's and heavy industry has broken down the ozone layer over Antarctica, resulting in more Ultra Violet (UV) radiation coming in. With a high rate of Albedo, much of this is reflected away but as the whole begins to increase, it could lead to global warming. This is the major long term threat to Antarctica and if all the ice were to melt, it could raise sea levels by 200 feet globally.

For centuries Antarctica's rich waters have been exploited for fish, krill, seals and whales. While sealing was stopped with the introduction of the Antarctic treaty, whaling still occurs with minimal capacity. Also limits are placed on trawlers for fish and krill numbers which is especially important as krill is the staple diet for 90% of the marine animals.

Antarctica's sea ice is the engine room for most of the world's ocean currents, therefore most of the worlds maritime pollution ends up there. Antarctica islands such as Macquarie Island are have some of the worst pollution in the world with all plastics and oil dumped in the ocean ending up there, both of which are not biodegradable. Also throughout Antarctica's scientific history, massive amounts of oil and toxins have been left there, only now are they being removed. Australia being at the forefront of the revolution removing 5000 tonnes worth of waste from the Casey Base in the next ten years.

Throughout the history of mankinds interaction with the ecosphere, we have managed to change the environment drastically, and often for the worse. The rate of change is going to increase as the worlds population increases placing greater strain on the natural resources. While both the Great Barrier Reef and Antarctica seem to be relatively pristine, thanks to humkinds love affair with ~~road~~ the destruction of natural resources they have both been inadvertently damaged. However, through correct management strategies and conservation most of the damage can be eased, so that future generations can enjoy these ~~to~~ two great ecosystems.