

Great Barrier Reef

Cairns to Lizard Island



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Great Barrier Reef Marine Park Authority



South Island from Northwest.



Great Barrier Reef

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Reef

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Flying over the Great Barrier Reef one has a breathtaking aerial view of an intricate underwater world, whose present form has resulted from 15,000 years of growth — all started by tiny coral polyps, thriving in an often harsh environment of extreme weather conditions.

The Cairns/Lizard Island area includes only a small part of the Great Barrier Reef, which is some 2,000km in length and stretches from north of Cape York to just south of Tropic of Capricorn.

The Great Barrier Reef is not a single reef. It is composed of about 2,000 individual reefs, some almost 250km offshore, others comparatively close to the coast.

Surrounding the reefs the water is 10 to 40 metres deep. This area of the continental shelf was part of Australia's mainland; with hills, forests, rivers and grassy plains. About 15,000 years ago, at the end of the last Ice Age this area was gradually submerged as the polar ice caps melted. As the sea level rose over a period of 10,000 years, coral settled and grew on the hills of this now submerged continental landscape, to form the individual reefs which we see today.

The northern part of the Cairns/Lizard Island area is characterised by the almost solid barrier formed by the sequence of "ribbon reefs" growing on the edge of the steeply sloping continental shelf.

The chain of ribbon reefs acts as a natural breakwater protecting the inner reefs and the coastline. On the landward side of these reefs, the water is relatively shallow being no more than 45 metres deep. But immediately seaward, the depth drops sharply to about 180 metres and within 8 kilometres it is as much as 2,000 metres deep. Ribbon reefs form a breakwater for about 400 kilometres of the Great Barrier Reef. These individual reefs are separated from each other by narrow channels usually several hundred metres or so across. On most days, particularly at low tide, the line of white breakers contrasts with the calm water behind the reefs.

The southern part of the Cairns/Lizard Island area is part of the central section of the Great Barrier Reef. Here at the outer edge, the continental shelf has a shallower slope. The reefs are large isolated "patch reefs" with wide gaps between them.

Blue Lagoon

Most of the patch and ribbon reefs of the Great Barrier Reef Region have grown on hills of the submerged continental shelf. The reef around Lizard Island is a "fringing reef". That is, Lizard Island was once a mountain on the coastal plain but when the sea level began to rise after the Ice Age the mountain was gradually surrounded by water. The island slopes became the settling area for corals and other reef animals. In time fringing reefs built up around Lizard, Palfrey, South and Bird Islands and met to form the Blue Lagoon.

The other types of reef islands are "coral islands" which are called cays. These are formed on the tops of reefs, as a result of the accumulation of coral skeletons and other reef debris thrown up by waves and then pounded into tiny pieces, forming rubble and sand. As the sand builds up, a cay forms and if it becomes relatively stable, it will attract roosting birds. With nutrient build up, plants may appear and a small vegetated coral island will result. An example of this is Eagle Island just west of Lizard Island.

Reef islands teem with life, for they are the nesting sites of sea birds and turtles. Reef animals which need land for their breeding, are attracted to these marine havens.

Like a large number of the islands of the Great Barrier Reef, Lizard Island is a Queensland National Park. Set in the Park is a tourist resort — Lizard Island Lodge — and a research station, which is owned and operated by the Australian Museum in Sydney.

The Blue Lagoon is a favourite site for many of the experiments carried out from the research station. You may see, in some areas of the lagoon, lines of experimental plots. These have been set up to study the behaviour of fish or the sequence of colonisation of areas of coral reefs.

For much of the year the waters around Lizard Island are choppy or rough with waves stirred by the prevailing south east trade winds. In contrast the waters of the Blue Lagoon are generally calm, making it home for many species of corals and fish which need calm water for survival and growth.



No. 2 & No. 3 Ribbon Reefs.



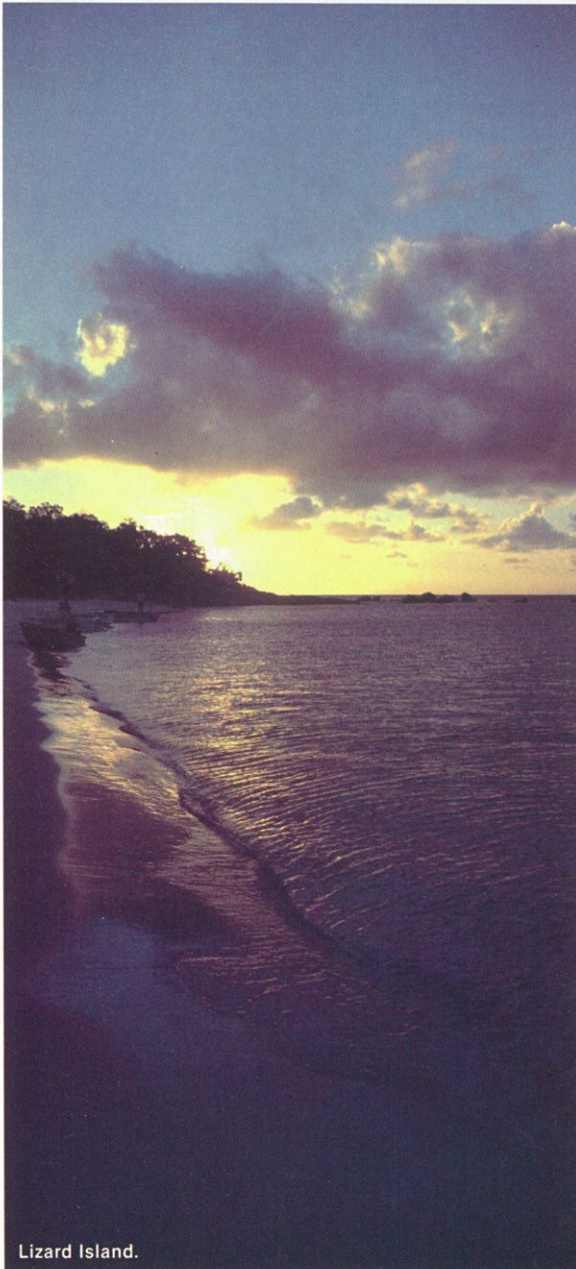
Fringing Reef.



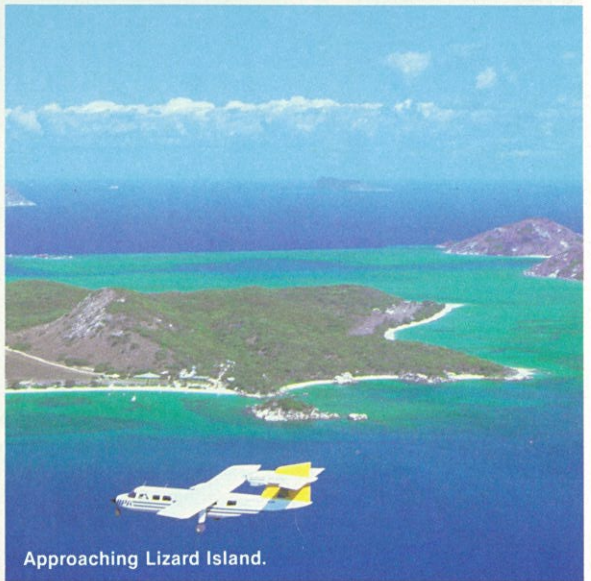
Michaelmas Cay.



Low Isles.



Lizard Island.



Approaching Lizard Island.



Ruby Reef.

Architects of the Reef

The main reef builders are tiny animals known as coral polyps. They resemble sea anemones and have tentacles with which they catch food. During the day most of the coral polyps are hidden, contracted within the limestone skeleton which they have built. Most corals have tiny plant cells in their tissues, and the relationship between the coral animals and the plant cells is of mutual benefit. The plant cells gain a comfortable environment and the vital element of nitrogen, which comes from the waste products of the coral's digestive processes. The coral polyp gains oxygen and probably food made by the plant. The combination of plant and animal cells found in corals, provides a good partnership for making calcium carbonate — the limestone skeleton of the coral.

Corals are usually colonial with many animals living within one common skeleton, each within its own tiny cup. This white skeleton is the major building material of the reef.

The colours of the living coral come from the animal and plant tissue. They fade rapidly when the coral is taken out of water. When the coral dies the white skeleton is exposed.

There are more than 350 varieties of hard coral, varying in shape and size from thin branching delicate forms through to solid massive spherical colonies which may be as big as a house. There are in addition the closely related soft corals. They are soft, leathery or slimy to the touch and do not have hard limestone skeletons. When soft corals die their remains dissolve and they leave only small spines which contribute minutely to the sands of the reef.

Coral reefs grow best in relatively shallow warm tropical waters, and provide a home for an enormous range of marine animals and plants. Each living organism is part of an intricate ecosystem, with the survival of one often dependant upon the survival of another, perhaps a considerable distance away. Coral reefs on the Great Barrier Reef are separated from each other by deep channels. The tide flows through these channels bringing and taking away in the changing water mass the plankton, which is the food source and the nursery of many of the reef animals.

In cross section, the living coral is a thin veneer on a reef, like the icing on a cake, over the limestone remains of previous coral growth. The size and shape of a reef is not only



Michaelmas Cay from west.



Turret coral.



Reef clam and coral.

determined by the growth of corals but also by the sea and weather. Coral growth stops when a reef reaches the water's surface. The living corals die when exposed for too long to air and sun at low tide. This is why reef tops are quite flat.

On the top of a reef there is little living coral. A few small flattened colonies may be able to survive. Generally the reef top is very smooth as a result of continual wave action grinding coral debris across the top of the reef. This part of the reef is held together by coralline or cementing algae.

Corals have two basic ways of reproducing themselves. All of them have a form of sexual reproduction which consists of discharging male and female cells into the water. Fertilization results in a larva called a planula, which is barrel shaped and lives free in the water as plankton, until it reaches a stage where it seeks a suitable spot to settle.

When it settles, the planula turns into a single coral polyp. The polyp then divides into two, each of these may in turn divide into two and so on, to produce a colony which may eventually consist of many thousands of polyps.

Most of the corals which have been studied have a breeding season normally of only a few weeks each year. For those species there are thus only a few critical weeks in a year when there are larvae available, to find a space for the establishment of a new colony.

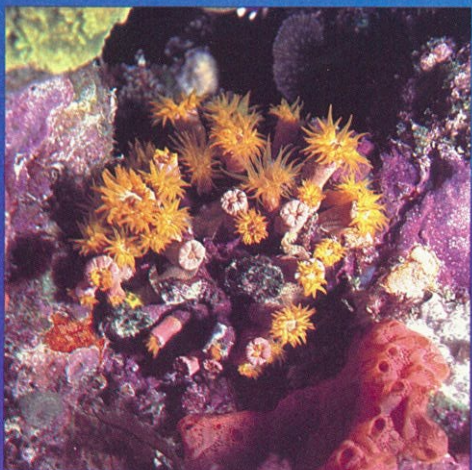
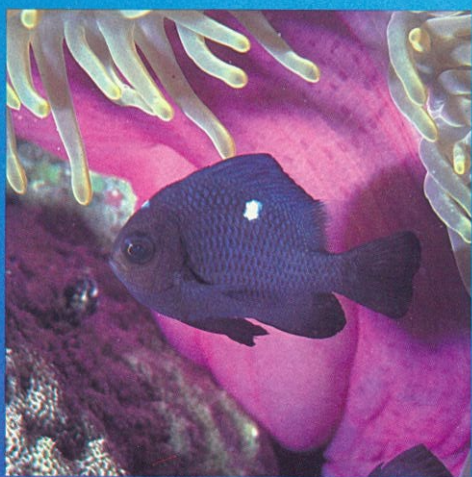
Some corals have developed a method of asexual reproduction for distribution. Fragments of coral colonies broken off and carried away during a storm may attach themselves to a suitable area and grow upwards. This appears to be very important, particularly for some of the fragile branching corals which normally live on the reef face and top.

Any bare area on a coral reef is rapidly colonised. First within the space of a day or so, come small plant cells called diatoms. These are rapidly succeeded by other algae. Next there is widespread competition with seaweeds, sponges and a range of animals, including coral larvae competing for living space. Corals are very competitive animals. Studies show that over a period of five to seven years one square metre of bare reef face may be settled by as many as two hundred coral colonies. At the end of that period there may be only five or so colonies surviving. After ten years if there is no disaster, such as a major storm, only one may survive.

As competitors some corals have the sinister tactic of digesting the competition. When another colony grows too close some corals can put out digestive filaments towards the invading colony. This kills areas within reach by literally digesting them away.



Living together.





Man's Curiosity

To man the land dweller, the Great Barrier Reef is a strange, fascinating, beautiful and delicate world of immense interest and curiosity. The urge to know more about it has driven naturalists and investigators, probably since Aboriginal people first came across fringing reefs on the edge of the continental shelf some 40,000 years ago.

Aboriginal people and Torres Strait Islanders have lived on or near the Reef for many thousands of years. They have built up a profound knowledge of many aspects of reef life.

It is possible that Chinese navigators visited the Great Barrier Reef more than a thousand years ago. There is some evidence that they were followed in the sixteenth and seventeenth centuries by Portuguese, Spanish and Dutch navigators.

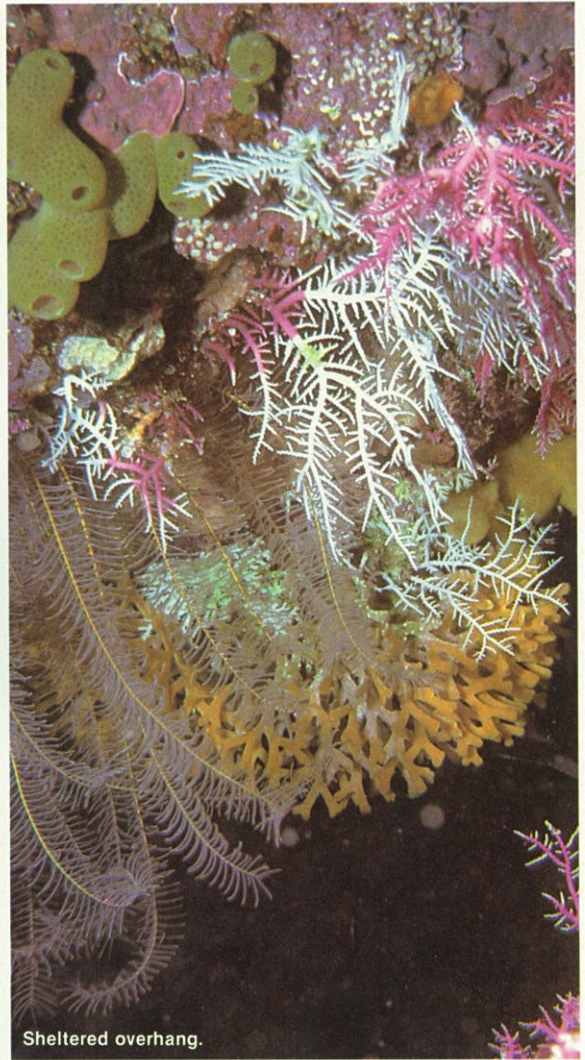
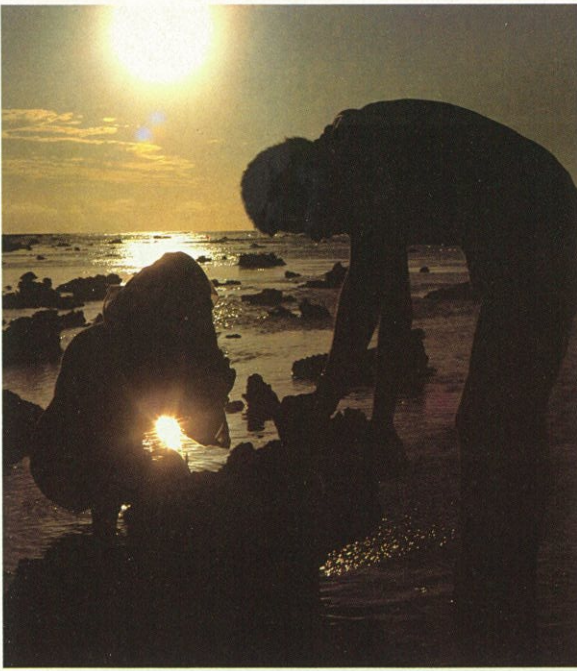
Modern research on the Great Barrier Reef began with the voyage of exploration by James Cook and Joseph Banks in 1770. This was followed by more than a dozen research expeditions during the next two centuries. In the past two decades, field research stations have been built on Great Barrier Reef islands. These and the development of major research facilities in coastal cities, have allowed scientists to carry out complex research, close to the areas where the animals and plants which they study normally live.

As a complex ecosystem, the Great Barrier Reef has evolved to cope with many stresses: cyclones, droughts, floods, the death of coral, and many other natural fluctuations.

The status of a coral reef is a fine balance between the rate of production of limestone and the rate of erosion and destruction. Studies of this balance and of change and growth in coral reefs involve many disciplines and are vital to our understanding of reef systems.

Many reef organisms gain their food by filtering it from the water mass. Numerous others reproduce by having their larvae float as plankton in the water mass. Such organisms may be spawned on one reef, be carried in the waters for a number of weeks, and end up on another reef hundreds of kilometres away. Studies on water movements and on the plankton communities of the Barrier Reef, are aiding our understanding of the relationship between reefs.





Sheltered overhang.

Another rewarding area of research relates to the behaviour and biology of the colourful reef fishes. This has yielded many interesting stories. For instance, many fish change sex at various times in their life cycle. For some fish colonies the normal social unit is one male and a number of females. If the male dies, the most dominant female changes into a male and the social unit carries on. In other cases, such as the popular coral trout, the fish when first mature are females, but when they get larger they change to males. This may have some important implications for the management of fisheries for such species.

Recently modern man and the range of his activities has become an important factor in the ecology of the Great Barrier Reef. If the Reef is to continue to be a source of wonder and delight, the need to discover how it functions is urgent so that man's impact can be minimized.



Parrot fish sleeping in cocoon.



Blue Lagoon.



Tropical Paradise



The Great Barrier Reef is many things to many people. To the fisherman it is large, colourful, delicious fighting fish; to the reef-watcher, scientist, walker, photographer, snorkeller or diver it is abundant, fascinating, curious life; to the boatman it is clear blue waters, sunshine, exotic anchorages and swimming, reef-watching and fishing at distant locations; to the camper it is tropical islands of white sands near blue lagoons, the chance to swim, sunbake, explore a fascinating world and maybe catch a fish for dinner. To some it is their source of living, and to some it is a navigational hazard.

Fishing and boating have long been an integral part of the use of the Reef. Throughout the year many fishermen and divers journey for hours from the mainland to reach the Reef. Their effort is usually rewarded. The rich warm shallows and deep blue canyons offer an ideal habitat for hundreds of species of fish. In more open waters less obstructed by coral formations, commercial fishing has been undertaken for most of this century. The professional fisherman has a deep knowledge and respect for the Reef and its ecology.

The Loggerhead and the Green turtle inhabit the Reef and they can be seen from three quite different view points. From an aircraft they can be spotted swimming among the reefs; from a boat they can be seen surfacing briefly and quite unexpectedly; and when diving or snorkelling we can be lucky to briefly share their underwater world.

For the diver, snorkeller or glass bottomed boat viewer, a treasured experience is to taste the exhilaration of the shallow sun-drenched lagoon teeming with colourful fish, or to hang suspended near a vertical wall of coral over waters that drop off to the abyss.

The Great Barrier Reef is a world of rich exciting colour far removed from the everyday.

Underwater the delicate colours of sand, corals and sponges are the background for the spectacular reef fish. From the air the colours are a range of breathtaking contrasts: the deep blue of ocean water, the white of breaking waves; the pink brown of the reef top; the yellow to emerald green to blue green of the sandy back reef slopes studded with dark brown coral pinnacles.





Great Barrier Reef Marine Park Authority

The Authority is the co-ordinating Commonwealth agency for one of the world's biggest and most significant marine conservation projects. The Authority has the responsibility for establishment, control, care and development of a Marine Park within the Great Barrier Reef Region. The Marine Park concept is based upon the need for conservation of reefs and their prolific animal and plant life, while allowing reasonable human usage to continue.

The management techniques for the Great Barrier Reef Marine Park differ in some respects from those applied to other parks because all reasonable human activities including commercial uses consistent with conservation of the Reef may continue within its boundaries. Only the recovery of minerals for purposes other than scientific research is specifically prohibited within areas declared to be part of the Marine Park. The method of controlling all other uses is by the development of zoning plans.

The zoning process seeks to ensure that human activities are compatible with each other within zones and with the overall need to conserve the natural qualities of the reef.

Zones can be defined for a single use or multiplicity of uses which may include: diving, reef walking, recreational fishing and general tourist activities.

In other zones, reefs may be preserved in their natural state, undisturbed by man except for purposes of scientific research. The process of development of zoning plans for sections of the Marine Park is complex, and provides for extensive public involvement during the preparation and finalisation of plans.

Both the Commonwealth and Queensland Governments have administrative responsibilities in the Great Barrier Reef Region. The Great Barrier Reef Marine Park Authority, which was established under Commonwealth legislation has three members who reflect the nature of the cooperative arrangements between the Commonwealth and Queensland. The Chairman is a Commonwealth nominee, one member is nominated by the Queensland State Government and the third represents non-government interests.

Our task in creating the Great Barrier Reef Marine Park is to help you enjoy and use the Reef in ways which conserve the beauty, diversity and abundance of the animals and plants which live in this magic world.

We hope that this booklet will increase your knowledge and enjoyment of the Reef and stimulate your curiosity about how its inhabitants live and interact in this complex natural system.



Pickersgill Reef.



Research



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OCTOBER

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Lizard Island from northwest.