Australian Government
Great Barrier Reef
Marine Park Authority

The Representative Areas Program (RAP): Restoring the biodiversity of the Great Barrier Reef

A total of 25 restoration projects from Australia and New Zealand have been recognized by the Global Restoration Network as having outstanding attributes of ecological restoration. The selection was made by a panel set up by Ecological Management & Restoration (EMR) with the support of the Ecological Society of Australia.

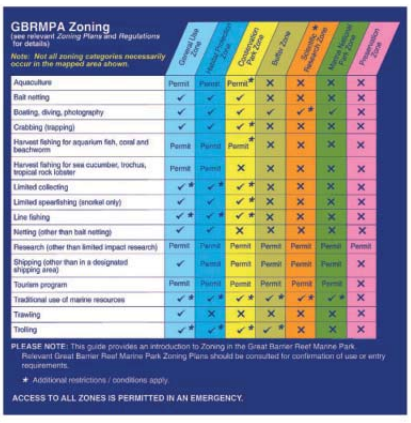
Summary

The Great Barrier Reef is home to an amazing range of plants, animals and habitats and today, these important natural values are protected so future generations can continue to enjoy them. A comprehensive range of management tools are in place to protect this special area and the most important of these is the wide-ranging and systematic zoning network.

Zoning is a fundamentally important management tool, and is designed to ensure protection of the area but also allow natural recovery (restoration) of its ecosystems, components of which have been progressively showing symptoms of ecological decline.

From the shallow inshore areas and fringing reefs to the deepest offshore oceanic waters, representative examples of each of the 70 broad habitat types (or bioregions) identified across the entire Marine Park are now fully protected by no-take zones. Also known locally as Green Zones, these highly protected zones cover over 33 per cent of the Great Barrier Reef.

Equally important, the no-take zoning network is complemented by other zone types and management arrangements. These ensure the comprehensive protection of plants, animals and habitats while still allowing the sustainable use of this enormous World Heritage-listed area. For example, large Habitat Protection Zones prohibit activities like bottom trawling that impact the seabed but allow many other uses.



The new zoning network, which came into effect on 1 July 2004, was the result of a systematic planning and consultative process for the entire area. A wide range of positive environmental outcomes are already occurring with this increased protection of the marine ecosystem. Among the most significant is the increase in coral trout numbers as well as the decreased incidence of the potentially devastating crown-of-thorns starfish. As further research is undertaken, additional benefits continue to be uncovered.

Background

Geographic location

The Great Barrier Reef covers 344,000 sq km on the north-east coast of Australia (see map). In length, the Great Barrier Reef is equivalent to the North American coast from Vancouver to Los Angeles. Its area is roughly the same as the area of Malaysia, New Zealand, Norway or the Baltic Sea.

The Great Barrier Reef

The Great Barrier Reef Marine Park was established in 1975 to protect the Great Barrier Reef and to ensure its sustainable use. As the world's largest coral reef ecosystem, the Great Barrier Reef is a critical global resource.

Because of the iconic status of the Great Barrier Reef, many people think the entire area is a marine sanctuary or a marine national park, and therefore protected equally throughout. Many do not understand that it is a multiple-use area with different zones, in which a wide range of activities and uses are allowed (including some extractive industries) while still protecting one of the world's most diverse ecosystems.

Prior to the Representative Areas Program (or RAP), there were concerns that the levels of protection were inadequate to ensure that the Great Barrier Reef remained a healthy, productive and resilient ecosystem into the future. At this time, the extent of no-take zones was less than five per cent and these areas were largely confined to coral reefs.

Rezoning the entire Marine Park was a five year process (1999-2003) with considerable scientific input and innovation. Equally significant, it was one of the most comprehensive processes of community involvement and participatory planning for any environmental issue in Australia's history.

The result was a zoning network that achieved the aim of increasing the protection of plants, animals and habitats across the Great Barrier Reef while also ensuring the activities taking place throughout the Great Barrier Reef are done so sustainably.

Today, the comprehensive, multiple-use zoning system governs all human activities. It provides high levels of protection for specific areas, whilst allowing a variety of other uses including shipping, dredging, aquaculture, tourism, boating, diving, commercial fishing and recreational fishing, to continue in certain zones. The benefits of the new zoning to users as well as to the environment continue to be realised as further research is undertaken.

Stakeholders and budget

Responsible agency

Management of the Great Barrier Reef involves a number of agencies; the Great Barrier Reef Marine Park Authority (GBRMPA) is the primary advisor to the Australian Government for the care and development of the Great Barrier Reef Marine Park and World Heritage area.

Management of the area is complex jurisdictionally, with both the Australian and Queensland Governments involved in the management of the waters and islands within the outer boundaries. A range of Australian and Queensland agencies are also involved in day-to-day management, with the Queensland Parks and Wildlife and Queensland Boating and Fisheries Patrol being major providers of management activities in the Great Barrier Reef (including the islands, many of which are national parks).

Stakeholders

A wide range of stakeholders have an interest in the Great Barrier Reef. Around 20 per cent of Queensland's population (almost 1 million people) live in the adjacent catchment. In recent years, the number of tourists carried by commercial operators to the Great Barrier Reef averaged around 1.6 to 2 million visitor days each year (GBRMPA data) with an estimate of an additional 4.9 million private visitors per annum. The industries and activities that utilise the Great Barrier Reef's natural capital contribute an estimated Gross Value of Product (GVP) of $5.4 billion per annum to the Australian economy (Access Economics, 2008).

The flow-on effect of these industries, which rely on the continued health of the Great Barrier Reef system for long-term economic sustainability, underpins a significant and growing proportion of Queensland's regional economy. This means that the Reef is important for a broad range of stakeholders, not just those who visit and use its resources.

Resourcing

A 2006 overview of GBRMPA's budget can be found in the Review Report (page 36). The resourcing required for the rezoning process in the Great Barrier Reef over the five-year period (1999-2003) was significant. It became a major activity for the agency for several years, requiring the re-allocation of resources particularly during the most intense periods of public participation. However, the costs of achieving greater protection for the Great Barrier Reef are readily justified when compared to the economic benefits that a healthy Great Barrier Reef generates every year (~ AUD$5.4 billion per annum), a significant component of the Queensland and Australian economy

Ecosystems and impacts

Existing ecosystems

While coral reefs initially made the area famous, they comprise only about seven per cent of the Great Barrier Reef ecosystem. The balance is an extraordinary variety of other marine habitats and communities ranging from shallow inshore areas to deep oceanic areas over 250 km offshore and deeper than 1000m, along with their associated ecological processes. Significant features of the variety of biodiversity in the Great Barrier Reef include:

- Six of the world's seven species of marine turtle
- The largest green turtle breeding area in the world
- One of the world's most important dugong populations (around 14,000)

- Over 43,000 square kilometres of seagrass meadows
- A breeding area for humpback whales and other whale species
- Over 2900 coral reefs built from over 360 species of hard coral
- Over one-third of all the world's soft coral and sea pen species (80 species)
- 1500 species of sponges equalling 30 per cent of Australia's diversity in sponges
- Over 5000 species of molluscs
- 800 species of echinoderms, equal to 13 per cent of the world's total species
- Approximately 500 species of seaweeds
- More than 1500 species of fish
- Spectacular seascapes and landscapes such as Hinchinbrook Island and the Whitsundays
- Over 175 species of birds.

Maps showing the 30 reef and 40 non-reef bioregions that make up the entire Reef can be viewed online. This extraordinary biological diversity provides habitats for many diverse forms of marine life and species.

Impacts on the ecosystem

The main threats to the Great Barrier Reef ecosystem are:

- Climate change leading to ocean acidification, sea temperature rise and sea level rise
- Catchment run-off of nutrients, pesticides and excessive sediments
- Coastal development and associated activities such as clearing or modifying wetlands, mangroves and other coastal habitats
- Unsustainable fishing practices including excess capacity in commercial fishery licences; increasing fishing effort (technology creep); declining catch and decreased average size of fish caught; and impacts of fishing on non-target species or seabed/benthic communities.

Restoration goals and planning

Goals of restoration

The primary aim was to increase the protection of biodiversity (with the additional intent of enabling the recovery of areas where impacts had occurred) by developing a representative and comprehensive network of highly protected no-take areas, ensuring they included representative examples of all different habitat types - hence the name, the Representative Areas Program or RAP. The rezoning, however, also provided an opportunity to revise all the zone types to more effectively protect the range of biodiversity. Whilst increasing the protection of biodiversity, a further aim was to maximise the benefits and minimise the negative impacts of the rezoning on the existing users of the Marine Park. These aims were achieved by a comprehensive program of scientific input, community involvement and innovation.

Stakeholder involvement in planning

There were two formal phases of public participation as well as ongoing stakeholder involvement throughout the rezoning program. More information is available online:

Representative Areas Program
First community participation phase
Second phase of community participation

Project implementation

How was the project undertaken

The Representative Areas Program and subsequent rezoning were undertaken in a number of stages:

Implementing the Zoning Plan
Post implementation

Progress to date

- Research by researchers at James Cook University published in 2008 (*Current Biology*, Vol 18) shows coral trout numbers have rebounded by 31 to 75 per cent on a majority of reefs that were closed to fishing after as little as 1.5 to 2 years. The increased fish populations in the no-take zones means huge benefits for the tourism industry on the Reef (tourism is the largest industry by far in economic terms) as well as enhancing the sustainability of reef fishing in the longer term.
- Equally exciting are the research results from Australian Institute of Marine Science (*Current Biology*, Vol 18) showing that a marked reduction in outbreaks of crown-of - thorns starfish (COTS) in the no-take areas closed to fishing. This has implications for the entire Great Barrier Reef, not just the highly protected zones. The relative frequency of outbreaks on reefs that were open to fishing was 3.75 times higher than that on no-take reefs in the mid-shelf region of the Reef, where most of the outbreaks have occurred.
- Another comprehensive research program of the non-reef areas of the entire Great Barrier Reef (Pitcher *et al*, 2007) analysed ~840 seabed species. Prior to the re-zoning, 160 of these species had less than 20 per cent of their predicted biomass in zones with higher protection, whereas after the re-zoning all 840 species had greater than 20 per cent of their predicted biomass in zones with higher protection.

How has the project influenced other projects

In November 2004, the Queensland Government mirrored the new zoning in most of the adjoining waters that are under State Government management. As a result, there is now complementary zoning for virtually all the Queensland and Australian Government managed waters within the Great Barrier Reef World Heritage Area.

The approach taken in the RAP is now recognised as one of the most comprehensive and innovative global advances in the systematic protection and recovery of marine biodiversity and marine conservation in recent decades. Widespread national and international recognition of the planning process has led to 12 awards (national, international, and local, including the Banksia and Eureka Awards, and the UNESCO/MAB Environmental Prize), and acknowledgement of the process and outcome as 'best practice' influencing many other marine conservation efforts.

Monitoring and research links

How the project drew on science

Scientists played a major role in assisting GBRMPA to map the biodiversity of the Great Barrier Reef into 70 bioregions. Thirty reef and 40 non-reef bioregions were identified and this provided the essential foundation for the comprehensive protection of the biodiversity of the entire area through the new zoning plan. Scientists also provided valuable advice such as:

- The benefits of no-take areas

- Information about aspects such as 'spill-over' and larval recruitment from no-take areas into adjacent fished areas
- Assistance in interpreting commercial fisheries log-book data and expert knowledge of fishing patterns to assist zoning while minimising impacts on commercial fishers (this also required a lot of interpretation by in-house experts in conjunction with Queensland fisheries managers).

An independent Scientific Steering Committee with expertise in Great Barrier Reef ecosystems and biophysical processes was convened to define operational principles to guide the development of a comprehensive, adequate and representative network of no-take areas in the Marine Park.

Science (both biophysical and social science) assisted by providing the best available information as a fundamental underpinning for the RAP. It is important to note, however, that the final outcome was not a science-based outcome. Rather, it was a socio-political outcome that was informed by the best available science but also other social, economic and pragmatic considerations.

Lessons learned

There were many lessons learnt during the Great Barrier Reef rezoning. This process and the subsequent results have set international benchmarks in marine conservation, with the GBRMPA often called upon by other marine managers to share their knowledge and experience. Many of these lessoned learned have been documented in RAP publications (see References below).

Further reading

A comprehensive list of RAP publications is available online. Some of the main publications include:

Day, JC, L Fernandes, A Lewis, G De'ath, *et al.* (2000). The Representative Areas Program for protecting biodiversity in the Great Barrier Reef World Heritage Area. Proc. 9th Int. Coral Reef Symp., Bali, Indonesia, October 2000, Vol 2.

Fernandes, L, JC Day, A Lewis, *et. al.* (2005). Establishing Representative No-Take Areas in the Great Barrier Reef: Large-Scale Implementation of Theory on Marine Protected Areas. *Conservation Biology*, Vol. 19, No. 6 (December 2005), pp. 1733-1744.

Russ GR *et al* (2006). Surveys of the effects of the rezoning of the Great Barrier Reef Marine Park in 2004 on some fish species-preliminary findings'. Department of the Environment and Water Resources, September 2006.

Russ GR, AJ Cheal, AM Dolman, MJ Emslie *et al.* (2008). Rapid Increase in Fish Numbers Follows Creation of World's Largest Marine Reserve Network. *Current Biology* Vol 18 (12).

Sweatman, H (2008). No-Take Reserves Protect Coral Reefs from Predatory Starfish. *Current Biology* Vol 18 (14).

Contact information

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