

Denis Faye enters the complex realm of marine protected areas. What are they? Why have them? Are they improving our guardianship of the sea?

Marine protection

Learning to give and take

For Brendan Dillon, Pope's Eye is a treasure trove. The tiny, horseshoe island, built with a military fort in mind, now harbours hundreds of sea creatures including leatherjacket, Morwong, blue devilfish and stingarees. Most of these inhabitants hug the protective reef, loath to venture past its surrounding sands.

This amazing abundance of life, combined with the water's relative shallowness, makes Pope's Eye popular with novice divers. So Dillon, a local dive instructor, brings all his recruits here, knowing they'll be back for more.

Looking below the waterline, you can't help but wonder how this oasis of life hasn't been snatched up by local fishers.

'Mate,' Dillon says with a grin, 'they can't touch it. It's a reserve.'

The Pope's Eye, one of the Harold Holt Marine Reserves, is a no-take zone. No-take means you can look, but can't take, and this includes fishing.

As the United Nations International Year of Ocean fades into the horizon, the world is becoming increasingly aware of the need to protect the sea.

Overfishing is threatening species such as Atlantic halibut and orange roughy, and scientists and ecotourism operators are demanding pristine seabeds to study and explore. Governments, scientists, conservationists and industry groups are considering Marine Protected Areas (MPAs), including



Mary Malloy/Ultragraphics



Neville Barrett

Main picture: Pope's Eye, a protected oasis of sea life near the mouth Port Phillip Bay.

Inset top: Blue devilfish are among the hundreds of species found at Pope's Eye.

Inset above: A banded Morwong at Tasmania's Governor Island Marine Reserve.



Graham Edgar



Neville Barrett



Neville Barrett

Studies by Neville Barrett and Graham Edgar of The University of Tasmania have found a substantial rise in in the average number of fish, invertebrate and seaweed species in no-take reserves. Fish species such as ling (above right), draughtboard shark (top) and bastard trumpeter (above), which had been rare to the region, have reappeared in large numbers. These reef-hugging species are particularly vulnerable to netting.

multiple-use and no-take zones, as part of the management solution.

So, what is a Marine Protected Area?

In 1994, the International Union for the Conservation of Nature and Natural Resources (IUCN) defined marine and terrestrial protected areas as 'an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associate cultural resources, and managed through legal or other effective means'.

Because this is a broad definition, six management categories were created. These range from Category I: 'strict nature reserves or wilderness areas managed for science or wilderness protection through national parks, habitat or species management areas,' to Category VI: 'generally larger areas managed mainly to ensure long-term protection and maintenance of biological diversity while providing a sustainable flow of natural products and services to meet community needs'. In other words, Category I includes no-take zones and Category VI includes multiple-use areas.

Marine protected areas have existed in Australia since the early 1970s, but the Federal, state and Northern Territory governments each have different naming and management systems. Because of this inconsistency, it can be difficult to tell whether an area is no-take, such as the Pope's Eye, or multiple-use, where controlled gas and oil exploration and commercial fishing is permitted.

For example, tourists often assume the Great Barrier Reef has Category I protection, but actually it is multiple-use, with about 4% of the park designated no-take. By adopting the IUCN system, the Federal Government aims to clarify each MPA's protective status, on an national and international scale.

Why MPAs?

'It's hard to define what it takes to have an effective MPA,' says Dr Keith Sainsbury, senior principal research scientist at CSIRO Marine Research, Hobart. Sainsbury has studied the benefits for MPAs from all categories while working as program leader for multiple-use management of Australia's Exclusive Economic Zone (EEZ).

Scientists and conservationists often criticise Category VI MPAs, insisting they do little more than give large areas a fancy name and allow industry to continue exploiting its resources.

While it is true that fishing and mineral exploration can still occur in many 'protected' areas, Sainsbury says the MPA designation is still beneficial.

'In a category VI MPA, you have a declaration that says the ecosystem in this region will be used sustainably,' he says. 'It's perhaps a subtle difference, but it's a major one.'

'The world has come from this notion that the ocean is a common property resource and we basically can do anything that somebody can't stop you from doing.'

Existing and proposed Marine Protected Areas

Marine Region	Existing	Proposed
Antarctic	17	0
Arctic	16	29
Mediterranean	53	57
North West Atlantic	89	12
North East Atlantic	41	112
Baltic	43	22
Wider Caribbean	96	11
West Africa	42	59
South Atlantic	19	4
Central Indian Ocean	15	22
Arabian Seas	19	15
East Africa	50	24
East Asian Seas	92	44
South Pacific	65	58
North East Pacific	167	1
North West Pacific	190	1
South East Pacific	19	1
Australia and New Zealand	291	20

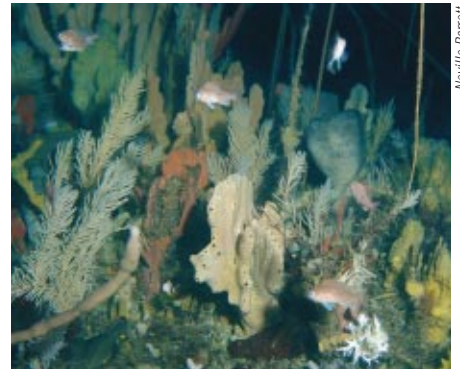
Source: *The Ocean Our Future*, IWCO (1998)



Graham Edgar



Neville Barrett



Neville Barrett

'In the same area you can have commercial and recreational fishing managed separately, aquaculture managed separately, oil and gas managed separately. Everything managed separately. There's no mechanism, usually, for looking at the combined effect of all those things on a particular region.'

If Sainsbury had his way, the entire Australian EEZ would be one big Category VI MPA, with smaller no-take zones where appropriate. 'It would make my job one hell of a lot easier,' he laughs.

Sainsbury isn't the first scientist to make this suggestion.

To take or not to take

Sainsbury says that for a no-take zone to be effective, it has to be part of a larger network of MPAs, including those designated multiple-use. He says there are generally three arguments for no-take zones.

The first relates to ecosystem protection and integrity. 'It's important to maintain biodiversity, to maintain minimally disturbed food chains,' Sainsbury says. 'To have a piece of the ocean that is minimally disturbed acts as an insurance policy against accidental management errors elsewhere.'

Secondly, no-take zones enable scientists to assess the ecological effects of marine industries. 'How does a certain industry have a certain effect on the ecosystem?' he asks. 'Without these control areas, you can't really answer these questions.'

Thirdly, no-take zones provide support for industry operating outside these reserves. 'This is the fish replenishment argument,' Sainsbury says. 'Its premise is that Category I MPAs can act as a replenishment zone for fishing outside.'

This argument for no-take zones is the most controversial of the three. Mention 'fishing' and 'Category I MPAs' in the same sentence in most company and you'll have a hearty debate on your hands. While concerned parties see the benefits of multiple-use areas, no-take zones are different.

The fishing industry, for one, often opposes the concept. Today's fishers pay big money for commercial fishing licenses. They feel that taking fishing grounds away from them is akin to taking money from their pockets.

'If some of the more productive fishing areas are going to be taken away from commercial fishermen,' says Bob Lister, chief executive of the Tasmanian Fishing Industry Council, 'then compensation in some form has to be considered.'

On the other side of the debate sits Dr Neville Barrett, of the University of Tasmania's Zoology Department. Between 1992 and 1997, Barrett and Dr Graham Edgar studied four Tasmanian no-take reserves established in 1991.

Of the four reserves, Maria Island, Tinderbox, Ninepin Point and Governor Island, Maria Island yielded the most substantial results. This is partially believed

Above left: Rock ling numbers increased at the Maria Island Reserve.

Top: A significant increase in the size and number of rock lobsters occurred across the Tasmanian marine reserves.

Above: Invertebrate species in reserved areas rose in number by an average of 31%.

Dividing waters

BROAD goals for caring for, using and understanding Australia's oceans are set out in the Federal Government's Ocean Policy. Under the policy, Regional Marine Plans for Australia's Exclusive Economic Zone and a National Representative System of Marine Protected Areas (NRSMPA) will be developed.

To establish the MPA system, Australian waters have been divided into 60 marine ecosystems, ranging from 3000 to 240 000 km². This division is called the Interim Marine and Coastal Regionalisation for Australia (IMCRA). Environment Australia is working with the states and Northern Territory governments to establish MPAs in the 60 IMCRA regions.

A draft Strategic Plan of Action for the NRSMPA was released for public comment late last year. Copies are available from Environment Australia, Director of Marine Protected Areas Strategies, GPO Box 787, Canberra ACT 2601, or on the Internet at <http://www.environment.gov.au/marine/or2000/mpa/mpa.html>.

to be because of its size: while Maria Island has 7 km of coastline, the others are 1 or 2 km long.

Barrett and Edgar found that species numbers recorded in the reserve increased significantly during their study. Relative to changes at external reference sites, the average number of fish species increased by 29%, invertebrate species increased 31% and seaweed species increased 13%. Fish species such as ling and draughtboard shark, which had been rare to the region, started appearing in big numbers.

Other animals to benefit from the reserves included rock lobsters and bastard trumpeter. Barrett says the trumpeter population increased 'one hundred-fold' in the reserve, while few trumpeters were sighted outside.

'The common perception was that the trumpeter ventured offshore to mature,' Barrett says. 'But recent evidence suggests this probably isn't true. It appears that they are so susceptible to fishing they are just being removed before they have a chance to mature.'

The researchers reached two conclusions. First, size does matter. While small MPAs can work well in terms of education, recreation and research, they don't allow for the volume required to repopulate most fish stocks.

'Small MPAs often are chosen at a similar scale to the daily movements of their resident fish species, with these movements resulting in a substantial loss to adjacent fished areas,' Barrett says. 'In addition, small MPAs would rarely contain the volume of fish required to repopulate fish stocks over a wider area.'



Fishing vessels at Hobart wharf. The fishing industry, while acknowledging the importance of marine conservation, argues that Tasmanian waters already are fished on a sustainable basis.

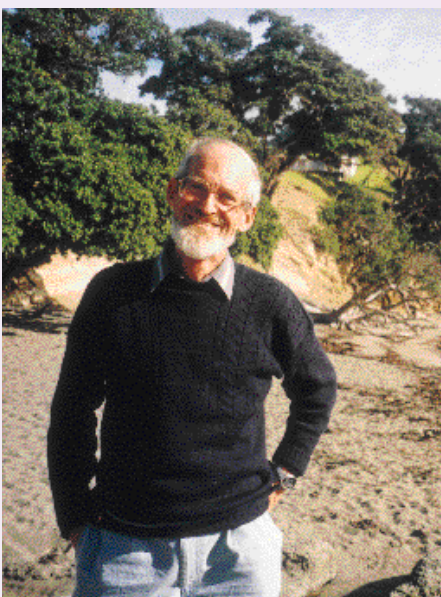
'Marine reserves need to be several orders of magnitude greater than the scale of movement of the species requiring protection. If they aren't, species will always be rapidly lost in places where fishing is relatively heavy, such as in the waters of Tasmania and Port Phillip Bay.'

Secondly, it is important to have an environmental boundary of some sort surrounding a reserve, particularly if it is relatively small. An excellent example of this is Pope's Eye, where a small reef is well protected by the sand boundary surrounding it.

'Unless you have that boundary, forget about it,' Barrett says. 'Because most resident species do move about their home reefs occasionally. Even the most territorial species will occasionally get sick of their neighbours and move 500 metres over.'

While Bob Lister believes conservation is important, he has to look after the interests of the people he represents.

'We aren't opposed to marine reserves, but you have to look at all the issues,' he says. 'I think it's wrong of people to suggest we close up areas and take away productive waters from the commercial fishing industry'



Enjoy, learn and conserve

MEET the number one crusader for no-take zones: Bill Ballantine, a marine biologist at the University of Auckland's Leigh Marine Laboratory. Ballantine's work at the Leigh Marine Reserve (Leigh Category I MPA) earned him the 1996 Goldman Environmental Prize. The reserve was founded in 1977 and New Zealand now has a further 12.

When asked about the benefits of no-take MPAs, Ballantine answers the question at length. His reasons, such as science, ecosystem support and insurance, are akin to Keith Sainsbury's (see main story), but he has a few additions.

Recreation: While recreational fishers are often concerned with their rights to access a certain area, Ballantine asks about those who wish to appreciate the environment untainted. 'Why if you want to kill it do you have more rights?' he asks.

Conservation: 'We still haven't discovered most of the world's marine species,' he says, 'We're never going to discover them, and conserve what we have, if we don't keep whole chunks untouched.'

Education: No-takes play an important part in showing people what goes on under the sea. 'When you take kids to the forest, you'd like to go to one where all the trees are still standing.'

because it's a feel-good proposition, particularly when commercial fishermen have paid large sums of money to exist in a fishery that is managed in a sustainable basis around Tasmania anyway.'

Barrett questions this last statement. 'Tasmania has the best fisheries management regulations in Australia bar none,' he says. 'But that's not to say that they are any good. They're just better than anywhere else. We don't have the information to make sure they are sustainable.'

In the northern hemisphere, MPAs such as the Florida Keys National Marine Sanctuary have been established to rebuild decimated ecosystems. In Australia, we have the luxury of establishing MPAs to preserve as opposed to remediate.

It is because of this that Sainsbury feels a solution needs to be reached. 'Because,' he says flatly, 'we'd very much like to avoid the need for that remediation.'

More about MPAs

Attwood CG Harris J and Williams A (1997).

International experience of marine protected areas with relevance to South Africa. In *Towards a new policy on Marine Protected areas for South Africa*. Marine reserves Task Group. South African Network for Coastal and Oceanic Research Occasional Report No 2.

Ballantine Bill (1991) *Marine Reserves for New Zealand*. University of Auckland.

Barrett, N S and Edgar GJ (1998) Marine reserves work for fish. *Fishing Today* 11:23-27.

Roberts CM and Polunin NV (1991) Are marine reserves effective in management of feer fisheries? *Reviews in Fish Biology and Fisheries*, Vol 1:65-91.

Independent World Commission of the Oceans (1998) *The Ocean Our Future*. Cambridge University Press.

A B S T R A C T

An international system of Marine Protected Areas (MPAs), involving six management categories, was created by the International Union for the Conservation of Nature and Natural Resources in 1994. The categories range from 'no-take' zones to multiple-use areas. The system is being adopted by the Federal Government to clarify the status of reserves in Australia's Exclusive Economic Zone. No-take zones are advocated to protect ecosystems, enable scientific research and to replenish marine resources. Tasmanian research has found increases in fish, invertebrate and seaweed species in no-take reserves.

Keywords: Marine Protected Areas (MPAs); fisheries management; no-take zones; fish; marine environment; environmental management.

Conquering old habits, from east to west

THERE'S an old American expression that goes 'if you believe that, I have some swamp land in Florida to sell you'. It implies that wetlands are commercially useless and therefore foolish to invest in.

Apparently, nobody let the United States Army Corps of Engineers in on this little joke. They spent the early 1950s draining and dredging the Florida Everglades in hopes of reclaiming the land. Not surprisingly, this proved highly detrimental to the environment.

Recently, the Corps recognised their mistake and committed to fixing the problem. Unfortunately, because ecosystems are linked, the devastation of the wetlands began a series of foul-ups that ended at the bottom of the chain, in the Florida Keys. This is one of the many issues facing the Florida Keys National Marine Sanctuary.

The sanctuary, one of 14 in the United States, encompasses 2800 square nautical miles. The US Congress designated it in 1990, after years of environmental degradation culminating with three large ships running aground on the reef in an 18-day period. It is cooperatively managed with the State of Florida.

The Keys also has the distinction of being the first sanctuary in the US with no-take zones, albeit small ones (about 2-3% of the area) established about a year ago.

Joy Tatgenhorst of the Florida Keys National Marine Sanctuary education department says the reserves are being monitored, but insufficient data is available to assess their effect.

In 1996, it was estimated that more than a million people came to the Keys to fish recreationally. These fishers, as well as their commercial counterparts, have proved an interesting challenge for sanctuary authorities. 'They're highly regulated already,' Tatgenhorst says. 'We've had our go arounds with the fishers. Educating them has been quite a challenge.'

Sanctuary in the Philippines

THE need for no-take zones is also being recognised by island fishing communities in the Philippines. In 1994, at Handumon village on the Philippine island of Getafe, fishers became aware that local seahorse populations were plummeting.

The seahorse fishery is vital to the local economy, so when Dr Amanda Vincent and her team from the Philippines Environmental Organisation The Haribon Foundation offered to help replenish it, the villagers were keen to accept.

After extensive consultation and education, a one kilometre by 300 metre no-take sanctuary – about one third of the village's waters – was established and fishing laws were enforced in the remaining village waters.

'This area was in really bad shape,' said Vincent. 'You could swim for minutes at a time without seeing a fish. On a coral reef that's surprising.'

It was an uphill battle all the way. The villagers, who policed the sanctuary themselves, encountered outsiders who challenged their authority with guns and dynamite. But as the fishes returned, their determination began to pay off.

'Now it's absolutely clear that within the sanctuary there have been dramatic increases in the number and size of fish,' Vincent says.

'Fishers (fishing in buffer zones just outside the sanctuary) say they now have enough to sustain themselves and extra to buy rice. Also, fishers from other villages now hover at the sanctuary's edge.'

The sanctuary has prompted other villages to approach Vincent and her colleagues about forming no-take zones and the team is hard at work developing seven new community-based sanctuaries in the central Philippines.

Why have Philippines subsistence fishers adapted so well to concept of no-take zones, while many of Western society's fishers remain resistant?

'I think it's partly that our (western) fishers, for the most part, have been buffered from the immediate responses of the environment by social security nets, government support and subsidies,' Vincent says. 'I don't think they've been forced into the same acute realisation that something has to change.'