

Reefreality



It's no secret that we could lose the Great Barrier Reef to climate change. Our correspondent puts on a snorkel to report on the state of the reef that attracts a million visitors a year

Will it last? The majesty of Hook and Hardy Reefs on the Great Barrier Reef.

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Channelling Mick Jagger was the last thing I'd imagined I'd be doing when I eagerly signed up for four days cruising the Great Barrier Reef. But life, while not necessarily like a box of chocolates, is indeed full of surprises.

Standing on the lower deck of the 35m expedition ship *Coral Princess 2*, we, a group of 20, prepare for our induction on ocean etiquette. Having presented themselves as quiet personalities, our onboard marine biologist Josh and dive instructor Alice transform during snorkel training.

With the water glowing a brilliant blue just metres away, the two guides use serious-looking hand signals and entertaining improvisation in the name of equipping us to navigate the World Heritage-listed environment with mask, flippers and snorkel.

Like most people who have snorkelled since they were children, I'm sceptical about the need for training, but it's an international crowd and many of my fellow snorkellers are novices. Happily, listening pays off.

I learn my mask should be tight enough to stay on without a strap (some gentle head shaking reveals mine is not) and, as a Mick Jaggeresque purse of the lips should stop water entering my snorkel, I work on developing the big, blubbery lip movements Josh and Alice perform with ease.

Over the next four days, we visit remote reefs and unspoiled islands and travel from Cairns to Cooktown in our quest to enjoy the delicate marine environment that is one of Australia's major tourist attractions.

Mentally, I've been preparing for very little physical activity on my reef wanders, distracted by the prospect of good food, a bar with a view and the spa on the top deck. So it's no wonder that my lips purse for real as I read my snorkellers' indemnity form, which alerts swimmers (more than once) that "snorkelling is a strenuous activity".

"The reef is 2300 kilometres long," Josh reminds us, "so just swim slowly — you'll see what you can."

Secretly, I wonder what I will see. With growing awareness of climate change, it's no secret that scientists, environmentalists and the average Australian are all concerned about the future of the reef.

Of our marine environments, reefs harbour the world's highest concentrations of marine biodiversity. The complex ecosystem of the

Great Barrier Reef is no exception, with 1500 species of fish, 350 coral species and around 800 types of echinoderms (starfish, sea urchins etc) coexisting with marine mammals, seabirds, molluscs and, of course, 1 million divers and snorkellers a year.

Preparing to enter the tropical waters, I'm most interested in the coral. Coral bleaching is the most visible of the reef's concerns and, as the issue is given so much press, I wonder if I'm about to plunge into a field of white rather than the vivid colours most visitors hope to see.

Ten years ago, marine biologist Dr Ove Hoegh-Guldberg predicted we would lose the Great Barrier Reef to climate change far sooner than we thought. As reported recently on ABC TV's *Australian Story*, he was howled down by many of his peers.

"It's fair to say he was met by a lot of scepticism and not believed at first," Dr Charlie Veron, former chief scientist of the Australian Institute of Marine Sciences, told *Australian Story*. "He was 100 per cent right. The Great Barrier Reef is just hanging on by its fingernails."

WITH 16 PER CENT OF THE WORLD'S CORAL REEFS ALREADY LOST FROM BLEACHING, THE ISSUE IS OF GLOBAL CONCERN.

Given the facts, I'm surprised by what I see. Floating slowly around the secluded ribbon reefs *Coral Princess* visits regularly, the ocean delivers a playground as impressive as promised in the brochures. I pass happy hours observing parrot fish, marvelling at the coral and nervously keeping an eye out for (harmless yet frightening) reef sharks.

But the experts are right: coral bleaching is a serious threat. This stress response occurs when the symbiotic relationship between the coral and the algae that live on it (zooxanthellae) breaks down.

Zooxanthellae may be microscopic but their presence within the coral's tissue provides it with both food and colour. The breakdown is usually associated with heat, but low water salinity, pollutants and high light intensity can also provoke bleaching.



A turtle enjoys the beauty of the reef. Below right: Dr Ove Hoegh-Guldberg who 10 years ago predicted we would lose the reef to climate change.



The colour in the coral is lost due to the expulsion of algae called zooxanthellae that live within its tissues. In this case, the zooxanthellae have been expelled due to high water temperature and bleached this coral in the Maldives.

"When algae get ejected, the coral still has tissue but not colour, which is why it looks so white," says Dr Ray Berkelmans, a research scientist with the Australian Institute of Marine Science's climate change group.

With 16 per cent of the world's coral reefs already lost to bleaching, the issue is of global concern. The Seychelles and the Maldives lost 70 per cent of their corals in 1998, when every reef in the world was affected. Since then the impacts have been more regional: the Caribbean had a terrible year last year, with 30–40 per cent dying off, while in Australia, 2002 saw the reef's worst bleaching to date.

Berkelmans, while conducting aerial surveys on the impact of bleaching on the reef, has flown over the area I've been snorkelling in and agrees that this section still looks fantastic. Like others I speak to after my trip, he feels the Great Barrier Reef's current healthy state, compared with others worldwide, is due to its size, good management and old-fashioned luck.

"The Great Barrier Reef is huge, so patches of warm water may span tens of kilometres but not necessarily hundreds of kilometres," he says. "In 2002, there were some areas where it wasn't bleached much at all and others where it was badly bleached."

Both the day-to-day and ongoing management of the area falls to the Great Barrier Reef Marine Park Authority. The authority's Climate Change Director, Dr Paul Marshall, says that despite three serious bleachings (including the two reef-wide bleachings in 1998 and 2002) recovery has been good.

"We've been lucky that in those events most coral survived," he says. "If temperatures cool soon enough, corals can get their zooxanthellae back and continue to live. They struggle a bit and won't reproduce as much for a few years, which is bad news, but it's much better news than dying."

It's certainly appreciated by visitors, although I have to wonder where the rest of the Australians are. While Tourism Queensland reports that of the 1 million visitors who dive or snorkel on the reef each year, 600,000 are Australian, they're in the minority on my boat. Germans, Canadians, Italians and Scandinavians make up a big percentage of my travel companions and they're not the only internationals interested in the reef.

Many tour operators, including *Coral Princess*, are accredited by Ecotourism Australia, a fact that visitors apparently do appreciate.

"International travellers are starting to worry about their impact in travelling here," says Jill Brown, a manager with the Great Barrier Reef Marine Park Authority's partnerships team. "So the industry is working hard to offer a climate-friendly experience once they're here."

With a new climate change certification program for reef operators garnering plenty of interest, and many operators now holding advanced ecotourism accreditations, the Great Barrier Reef Marine Park Authority says most operators (and visitors) generally do the right thing. If that remains the case, the near future involves simply keeping the reef healthy enough to continue delivering world-class experiences for visitors.

While the issue of bleaching is as serious as scientists such as Hoegh-Guldberg report, it's only one of the threats the reef faces under the predicted conditions of climate change.

"The coral bleaching story is important, but we've found that almost every other part of the ecosystem is being affected," says Marshall. "Climate change is much more than global warming and that's particularly apparent when you look at marine ecosystems," he adds, pointing out that stressors such as overfishing and land pollution from rivers leading into the reef can have big impacts on a system under strain.

Imogen Zethoven is an activist who's been concerned about the reef for many years. She has spent a great deal of time campaigning for protection of threatened

HOW TO HELP THE REEF

→ **Get educated about marine environments:** Australian Institute of Marine Science

www.aims.gov.au

→ **Keep up with the latest research:** Great Barrier Reef Marine Park Authority

www.gbrmpa.gov.au

→ **Travel with an eco-accredited operator:** www.ecotourism.org.au or www.coralprincess.com.au. "High standard operators" are also accredited on the GBRPMA site.

→ **Look within:** "We're all contributing to climate change. Coral reefs are so sensitive that every little reduction in the rate and extent of climate change will make a big difference to the future of the reefs. So taking action to reduce our own climate footprints is really important."

— Dr Paul Marshall, Climate Change Director, GBRMPA

"The reef used to be extraordinarily abundant in all life," Zethoven says. "We have reduced this, but the new zoning plans resulted in a resurgence of some commercially caught species such as coral trout. Although it's not working for all species, it's a good news story that shows zoning can make a difference."

Of course, zoning laws can't protect animals from a world that's getting hotter. "A lot of sea birds nest on islands in the Great Barrier Reef," says Marshall. "We've recently seen islands covered in dead chicks. We initially thought they were suffering from the heat, but it turned out the parents couldn't find enough food for their chicks as the small fish they rely on are going further offshore for cooler water."

Sea turtles, too, are already suffering: "In really hot summers, we've seen that the beaches they use for nesting get so hot the eggs have cooked in the nest. Those things have occurred before, but climate change will make these things happen more often."

For Marshall, one of the reef's biggest concerns is ocean acidification. "Not only are the oceans going to get warmer, they are going to get more acidic," he says. "About one-third of the carbon dioxide we leak into the atmosphere is absorbed by the oceans.

acidification sets in, that balance will tip the other direction."

While all of this may sound a bit ominous to the average nature lover, as Hoegh-Guldberg pointed out on *Australian Story*, it's not over yet.

"There are solutions out there, but we've got to get behind them," he says. "This really does take action from grass roots to the top of government. We need to decarbonise our economies. I don't think we should be accepting targets that make no sense scientifically. Those targets are fanciful because they make Australia unliveable."

Now is the time to act, says Zethoven, adding, "Where we have capacity locally and federally, we need to drive that change."

Marshall agrees that, for the individual, the prospect of where to start can feel slightly overwhelming: "We do find that people feel a bit daunted about what they can do. But, even though we can't stop climate change individually, we can avoid putting extra pressure on the reef.

"Whether it's taking too many fish or putting the wrong things down the drain that end up on the reef, all those things make it harder for it to cope with the stress that climate change brings."

Pulling up on a ribbon reef on my last day at sea, I'm grateful to see it as it is today and find it heartbreaking to imagine the reef may not be part of our future unless we reduce our complacency about climate change.

Of course, as a visitor, the "way" I see the reef also counts, so I'm pleased I ventured out with an ecotourism-accredited operator. As with all tourism entities using the Marine Park, *Coral Princess* has specific sites it can use. While it seems random — there's not another boat or person to be seen in any direction — the area is tightly managed and moorings are used extensively to ensure that anchors don't disturb the marine environment (in fact, anchoring is an offence in many areas of the Great Barrier Reef Marine Park).

Coral Princess has private use of this mooring, so today, the only things lying between me and another fantastic snorkelling experience are the dozens of (harmless) jellyfish that have chosen to swim between me and the coral, just metres away.

Pausing on the back of the boat, warm water lapping at my feet, there seems only one sensible thing to do. I take a breath, pucker my Jagger lips and plunge in. ♦

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species and addressing water quality issues.

"It's difficult to feel optimistic about the future of the reef because of the threat of climate change, as the action around the world doesn't currently inspire hope," says Zethoven, now with Pew Environment Group. "But I feel more optimistic about some of the other issues around the reef because they're in our hands, like commercial and recreational fishing and pollution from agricultural lands."

While Zethoven believes the water quality issue "is not going to be turned around quickly", she says the Great Barrier Reef Marine Park's zoning laws have already begun to make a positive difference in the issue of overfishing. Put in place in 2004, the laws restrict the area where fishing can take place. Fishing is now banned in the "blue zones", which cover 30 per cent of the reef.

"This is good for land systems, as it has meant the climate isn't warming as fast. But the downside is that the chemistry of the oceans is changing."

This shifting pH is problematic for the corals, crustaceans and plankton that build calcium carbonate skeletons. "All of these things are going to have a harder time building their hard structures and will either grow them more slowly or they become weaker structures," says Marshall.

Although reefs are constantly being eroded — whether by storms, parrot fish scraping the sides of the reef or the boring organisms that live inside it — a healthy reef will find a balance between what Marshall labels the "forces of erosion" and the "forces of rebuilding". "Currently," he says, "the reef-building forces are winning but, as ocean