

THE CONVERSATION



In pictures: a close-up look at the Great Barrier Reef's bleaching

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Bleached coral can take on luminously beautiful pink and purple hues - but don't be deceived, these corals are under stress. Justin Marshall/coralwatch.org, Author provided

Justin Marshall

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These images are a selection of photos taken recently near Lizard Island off the north Queensland coast. They document the ongoing bleaching on the Great Barrier Reef as ocean temperatures continue to be driven upward by climate change.

The bleaching process

Before corals bleach, they are often a deep brown or khaki-green colour. These colours come from the symbiotic algae (sometimes called zooxanthellae) that co-exist with the coral polyp.



Before bleaching... Justin Marshall/coralwatch.org, Author provided

During bleaching, as the symbiotic algae depart, you can see the beautifully coloured polyps. Sometimes polyps are transparent and we see only the white skeleton beneath. Other polyps may be brightly coloured, as seen here.



...during... Justin Marshall/coralwatch.org, Author provided

But whether white or fluorescent, these corals are far from happy. Once the final stage of the bleaching process is reached, it is likely the coral has been stressed for days or weeks. From here on, it may recover slowly – by re-acquiring its symbiotic friends – or it may die, having run out of energy in the absence of the symbiotic algae that provide it with carbohydrates.

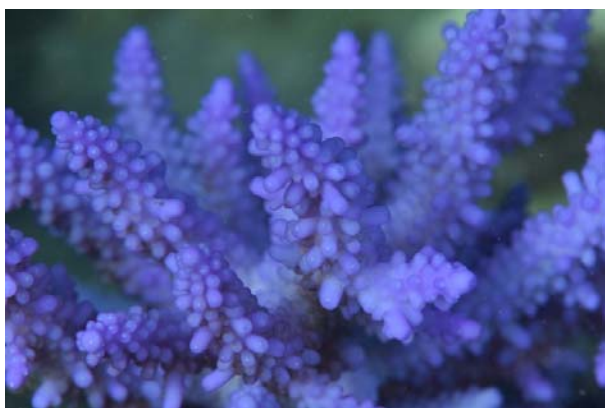
What often happens next is that the coral is covered with a film of turf algae, which takes over the parts of the reef previously colonised by healthy coral.



... and after. Justin Marshall/coralwatch.org, Author provided

Bleaching can be strangely beautiful

Unfortunately, what we are now seeing on the northern third of the Great Barrier Reef is the death of many of these beautiful organisms. But, as noted above, the bleaching can in some cases be weirdly beautiful, as the corals shed their algal cloaks and reveal themselves.



Bleached corals glow a striking shade of purple. Justin Marshall/coralwatch.org, Author provided

These pictures show a variety of heavily bleached corals, with almost no remaining symbiotic

algae. From this point it is a long, slow road to recovery – even those corals that survive will remain metabolically and reproductively compromised for months.



Purple-tinged bleaching. Justin Marshall/coralwatch.org, Author provided



Pure white bleaching. Justin Marshall/coralwatch.org, Author provided

The amazing colours are pigments present in the coral polyps themselves. They are often fluorescent – hence the day-glo appearance of some corals and their amazing fluorescence on torch-lit night dives.

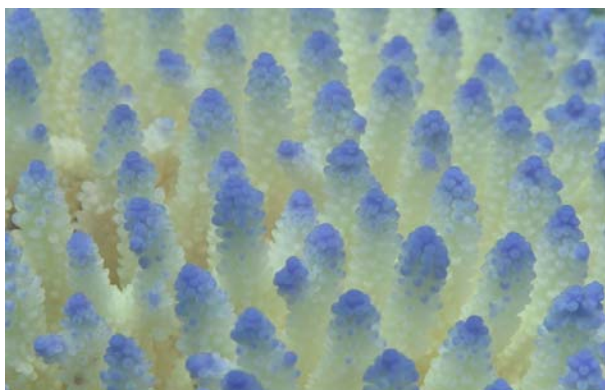


Purple glow. Justin Marshall/coralwatch.org, Author provided

Some healthy corals display such vivid blues and other colours naturally, not during a bleaching event. But these corals are rare. What we are seeing on reefs in northern Queensland is certainly bleaching.



Pink-tinged bleaching. Justin Marshall/coralwatch.org, Author provided



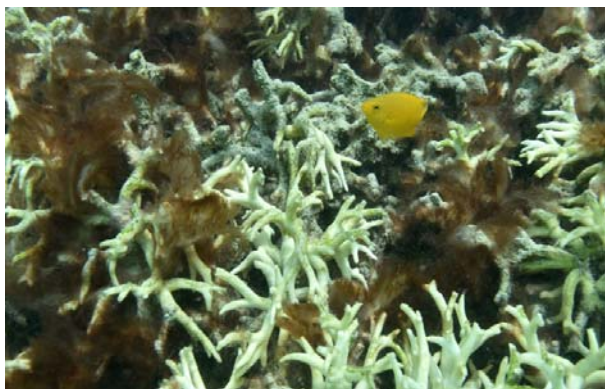
Blue tips. Justin Marshall/coralwatch.org, Author provided



Bleached colonies stand out starkly. Justin Marshall/coralwatch.org, Author provided

Algal overgrowth

When the polyps die, macro or turf algae take over – a process that is already evident along parts of the 800 km of worst-affected Great Barrier Reef.



Non-symbiotic algae begin to take hold. Justin Marshall/coralwatch.org, Author provided

Especially in warm or nutrient-rich waters, these algae outcompete any coral trying to settle or spread on the reef, taking over areas that corals previously dominated.



Algae growing on coral tips. Justin Marshall/coralwatch.org, Author provided



A mix of starkly bleached coral and algal colonisation. Justin Marshall/coralwatch.org, Author provided

Fish losing their homes

Not only is the turf algal community uglier than healthy coral, but it means the other species that depend on the coral lose their livelihoods too. Eventually, the reef structure itself breaks down, meaning that many fish species will need to move on or die.

That includes fish that feed on coral, such as this Okinawa goby...



An Okinawa goby on a coral colony. Justin Marshall/coralwatch.org, Author provided

... and those that just use it for shelter, such as this black damselfish juvenile.



Juvenile black damselfish. Justin Marshall/coralwatch.org, Author provided

The turquoise-blue chromis damselfish form huge clouds or schools over coral heads, and use coral branches for shelter when predators come along. The picture immediately below was taken before bleaching, while the one after that shows the fish on a bleached colony.



Before: chromis damselfish on a healthy reef. Justin Marshall/coralwatch.org, Author provided



After: chromis damselfish on bleached coral. Justin Marshall/coralwatch.org, Author provided

Anemones (which are close relatives of corals) are also prone to bleaching, which causes similar problems for the fish that use them for shelter.



Anemones are prone to bleaching too. Justin Marshall/coralwatch.org, Author provided



Searching for shelter. Justin Marshall/coralwatch.org, Author provided

Here are some more before and after photos, showing the effects of bleaching on the anemones that species such as clownfish use as a refuge.



Before: fish living on a healthy anemone. Justin Marshall/coralwatch.org, Author provided



After: fish on a bleached anemone. Justin Marshall/coralwatch.org, Author provided

Living with coral... or without it

When I saw the coral this perky little blenny is sitting in, I was convinced I was looking at a healthy colony! Maybe Lizard Island was not 100% bleached after all.

Unfortunately, closer examination shows that the coral head has died and a thin film of algae covers the branches. The little blenny is farming his patch and cropping the algae so that it does not become overgrown.



A blenny on the reef. Justin Marshall/coralwatch.org, Author provided



Tending the algae. Justin Marshall/coralwatch.org, Author provided

One-third of all marine life spends at least part of its life cycle on a reef. What happens when these reefs disappear?

Current predictions are that coral reefs worldwide could be gone within 25 years. How much will be left after this global bleaching event? How much will be left for future generations?

Given the globally accepted link between carbon emissions, climate change and reef bleaching, the decision to approve the Carmichael coal mine in Queensland right next to the Great Barrier Reef really is adding insult to injury.

The continued loss of the Great Barrier Reef is an environmental tragedy and a huge blow to all Australians who cherish this natural wonder and to the tourists who flock here to see the reef – particularly after seeing David Attenborough's new documentary on it.

Further afield, coral bleaching is a potential humanitarian crisis in countries that rely on reefs for food and basic livelihoods. Let's not forget that when Australia burns or sells coal it is contributing to this global problem as well.



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