CLIMATE COUNCIL

Climate Council Communications Guide:

GREAT BARRIER REEF BLEACHING EVENT

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Introduction

The Great Barrier Reef is the biggest single living structure on Earth and one of the world's natural wonders. Currently, a catastrophe is unfolding on the Great Barrier Reef. From Cairns to the Torres Strait, vast ribbons of once-colourful reef are now ghostly white.

There has been substantial interest in the impact of climate change on the Great Barrier Reef. Particularly, the role of climate change on the current bleaching event.

This Communications Guide outlines the key facts about the current bleaching event, as well as providing some answers to frequently asked questions. We hope this guide supports a fact-based public discussion on the risks to the reef.

Figure 1: Coral bleaching at Lizard Island, Great Barrier Reef.

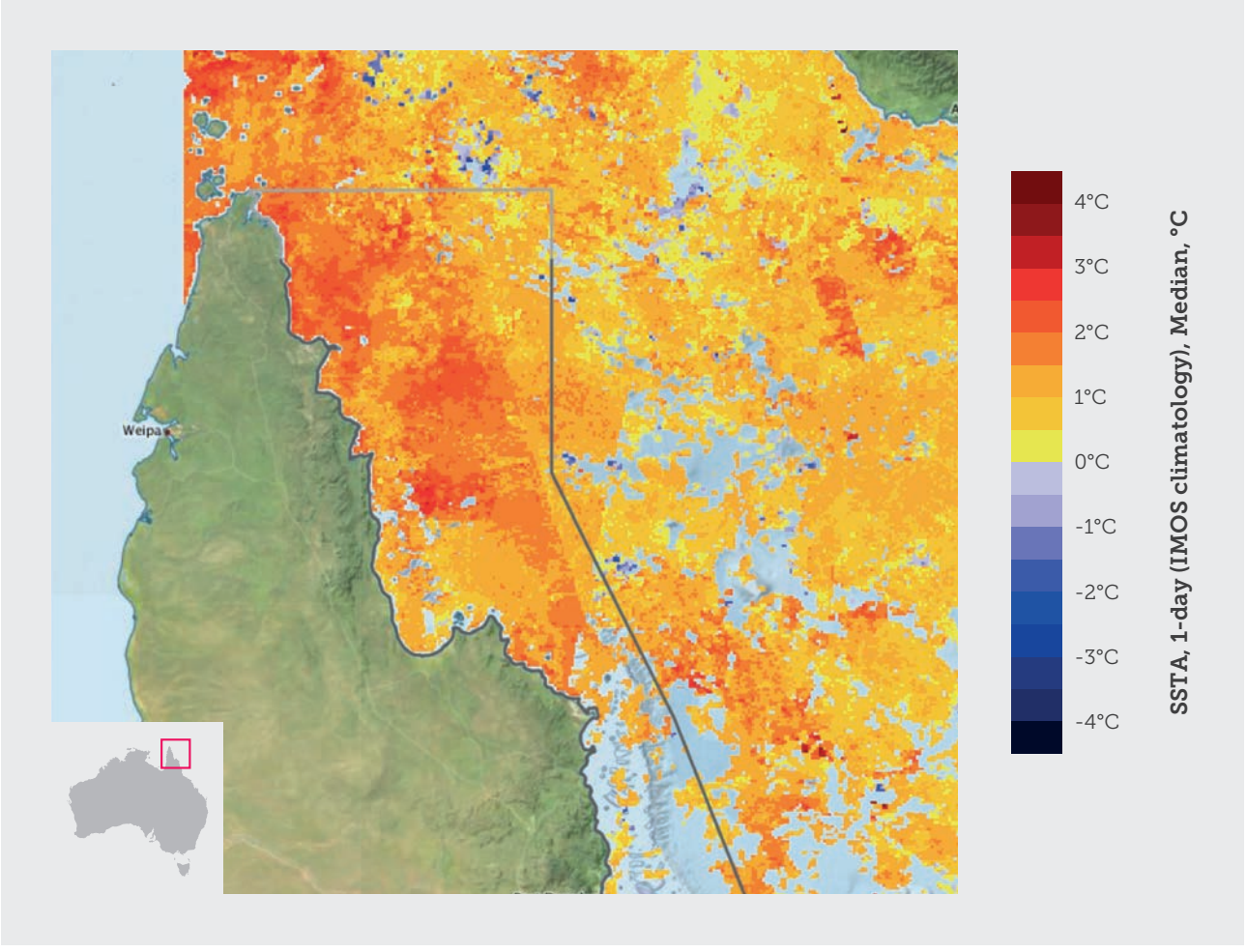
Key Facts

1 The Great Barrier Reef is experiencing the worst mass coral bleaching event in its history.

More than 1000 km (approximately half) of the Great Barrier Reef has so far been affected and there are individual reefs where up to 90% of the corals are bleached and coral death rates are expected to be very high.

Since March 2016, the sea surface temperature over the northern Great Barrier Reef has been around +1°C above the recent long-term average (2002-2011) for this time of year, with higher temperatures in some areas (Figure 2). This has resulted in coral bleaching across large areas of the Great Barrier Reef, particularly the most pristine and isolated reefs in the far north.

Figure 2: Image of the northern Great Barrier Reef (29 February to 6 March 2016), showing the sea surface temperature around +1 to 1.5°C above the recent long-term average (2002-2011) for this time of year, with higher temperatures in some areas. **Source**: Adapted from BoM 2016.



The bleaching event is still unfolding and we will not know the full extent of the bleaching and the ultimate degree of coral death for at least a few months.

The Great Barrier Reef is not the only reef to experience bleaching. Record breaking heat in parts of the Pacific and Atlantic oceans have led to the longest global bleaching event ever. It began in the north Pacific in mid-2014 and expanded to the south Pacific and Indian Oceans in 2015 and now to the Great Barrier Reef. More recently, bleaching of reefs off the coast of Western Australia have also been reported.

2 Climate change is driving the record-breaking sea surface temperatures that are bleaching the reef.

Coral reefs are highly vulnerable to a changing climate.

As the Earth's temperature rises with climate change, our oceans are experiencing record-breaking heat. Sustained, above-average ocean temperatures can damage and destroy coral reefs, with flow-on impacts on the plants and animals that reefs support. This situation is playing out on the Great Barrier Reef now.

Above average water temperatures have resulted in extensive coral bleaching across the Great Barrier Reef, particularly the most pristine and isolated reefs in the far north. Aerial surveys of more than 500 coral reefs from Cairns to Papua New Guinea reveal that the overwhelming majority of reefs in this section are ranked in the most severe bleaching category. Whilst the full extent of the damage is still unfolding, the current bleaching is far worse than previously expected, with large portions of the reef severely bleached.

Climate change is driven by the greenhouse gas pollution produced from the burning of coal, oil and gas for energy, land-clearing and some other sources. We must rapidly transition to other forms of energy, like solar and wind, if we are to protect the Great Barrier Reef and other reefs worldwide.

3 Australia is the custodian of one of the seven wonders of the natural world.

Not only is the reef astoundingly beautiful, it's also a multi-billion economic asset. Its value-added economic contribution to the Australian economy in 2011-12 was $5.7 billion and it supported 69,000 jobs.

4 The Great Barrier Reef is at crisis point. Its future depends on how much and how quickly we can reduce greenhouse gas emissions and limit ocean warming.

The solutions to climate change are well known. We must rapidly phase out our existing inefficient coal-fired power stations. There can be no new coal mines. There can be no new coal-fired power stations. The transition to a renewables-led energy system, already underway, must be rapidly accelerated.

Figure 3: Clownfish and a bleached anemone.

Key Questions

Is climate change influencing the current bleaching of the Great Barrier Reef?

This is what climate change looks like - vast ribbons of ghostly white reefs where only weeks before there was a myriad of colours and teeming marine life.

Heat stress can cause corals to lose tiny algae, called *zooxanthellae*, which live inside their tissues and provide corals with most of their colour as well as much of their food and energy needs. If bleaching continues for a long enough period, corals begin to starve and eventually die. Corals can recover from a bleaching event that is not severe enough to kill them. However, repeated bleaching events can lead to coral death.

The temperature of waters off the coast of Northern Queensland in February and March has been well above average for weeks on end. This has led to bleaching, which has damaged and destroyed parts of the reef.

Figure 4: Filming coral bleaching on Lizard Island, Great Barrier Reef.

Why are temperatures rising?

Global temperatures, including ocean temperatures, are rising due to greenhouse gas (primarily carbon dioxide) emissions from burning coal, oil and gas. This means that we are now regularly seeing sustained above-average temperatures on land and in the ocean, with repeated bleaching events now occurring. Ocean temperatures are particularly rising near the surface where reef ecosystems live.

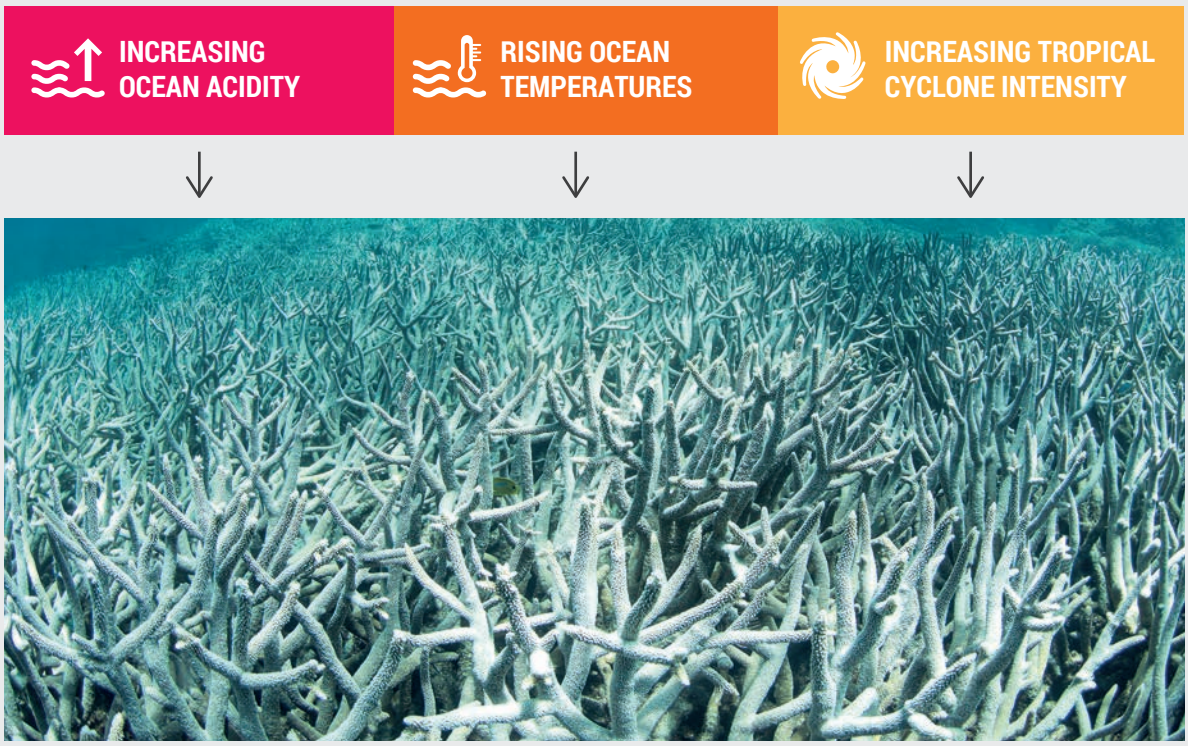
In what other ways does climate change affect the Great Barrier Reef?

The Great Barrier Reef Marine Park Authority has identified climate change as the 'greatest threat to the Reef'. In addition to rising temperatures the reef is vulnerable to:

Ocean Acidity: The burning of fuels like coal, oil and gas releases carbon dioxide (CO_2), a long-lasting greenhouse gas. CO_2 traps heat in the lower atmosphere and is the primary cause of climate change. About 25-30% of the CO_2 emitted by burning fossil fuels is absorbed by the world's oceans, making them more acidic. More acidic oceans make it more difficult for corals to grow.

Extreme weather: Climate change may drive the intensification of tropical cyclones which can cause physical damage to reefs.

Figure 5: Climate change damages coral reefs.



How bad is this bleaching event relative to other events?

The current bleaching event is the worst mass coral-bleaching event in the Great Barrier Reef's history. So far, more than 1000 km of the Great Barrier Reef has been affected. There are parts where up to 90% of the corals are bleached and death rates are expected to be very high. However, at other reefs to the south there is less severe bleaching. The bleaching event is still unfolding and so we don't yet know the full extent of coral bleaching or of coral death.

Research shows that the reef has been recovering in the last three years, is this correct?

Previously the Australian Government reported to UNESCO a 60% decline in the qualities that show the Outstanding Universal Value of the Reef, which were the basis for the GBR being added to the World Heritage List in 1981.

A survey done six months before this bleaching event found that the Great Barrier Reef had recovered about 19% of its coral cover. This is not surprising, as there is usually some recovery after earlier bleaching events. However, when considering the long-term trend over the past 30 years, the Great Barrier Reef has lost a significant amount of coral cover. And while it's positive news that the Reef's coral cover has increased in recent years, the current, ongoing widespread bleaching event will adversely affect its condition, wiping out some or all of the recent gains in overall coral cover. In addition, not all corals that bleach will die, but even partially bleached corals have reduced reproduction and growth for up to two years, which is likely to slow or halt further recovery.

What is a larger threat to the reef's long-term health and survival: climate change, or other pressures like the crown-of-thorns starfish and agricultural run-off?

The Great Barrier Reef is under substantial pressure from a number of different factors. However, climate change, through both rising surface ocean temperatures and increasing ocean acidity, has become the most serious threat to the long-term viability of coral reefs.

The ability to recover from bleaching events varies among coral species and among regions, but it is unlikely that corals will be able to adapt fast enough to rising temperatures. Reducing local stressors, such as crown-of-thorns starfish and agricultural run-off, can increase the resilience of coral reefs. However, rapidly rising ocean temperatures are beginning to overwhelm even the most resilient of coral reefs, such as those in the northern Great Barrier Reef. So if we do not rapidly and deeply reduce our greenhouse gas emissions, future bleaching events are expected to increase in frequency, intensity and extent in decades to come, reducing coral cover even further.

Figure 6: To protect the reefs from climate change we need to raplidly and deeply reduce our emissions from the burning of coal, oil and gas.

What role has El Niño played in this bleaching event? Is it more or less significant than the role of climate change?

The current El Niño event and local wind and cloud cover conditions have exacerbated the impact of climate change in pushing sea surface temperatures in the GBR region to very high levels. As the current El Niño event begins to break down towards the end of summer, the warm waters in the central equatorial Pacific move towards Australia as normal wind and ocean current patterns are re-established. Ocean temperatures around northern Australia also warm substantially from December to March during El Niño events, in response to reduced cloud cover and weakened winds, as El Niño tends to suppress and delay the monsoon. Nevertheless, Australia has weathered El Niño events for centuries but it was only from the early 1980s that the Great Barrier Reef began to experience repeated coral bleaching events, after global temperatures clearly began to rise above natural variability because of climate change.

The evidence is very clear – the El Niño event is not a factor in the coral bleaching that is devastating the Great Barrier Reef; the bleaching would not have occurred without the strong influence of climate change.

Can the Great Barrier Reef recover from this bleaching event?

Recovery from the current bleaching event will largely depend on how long ocean temperatures remain high. If conditions return to normal, the tiny algae that give corals their food and colour can repopulate corals. However, if ocean temperatures are too high for too long, the corals will eventually starve and die.

In the last significant bleaching events in 1998 and 2002, temperatures came down quickly enough for the vast majority of corals to recover. However, research in the past decade shows bleaching can set the stage for other declines in reef health, such as an increase in coral diseases and lower reproduction rates. Climate change is expected to increase the severity, frequency and extent of future bleaching events, which will put reefs at even more risk and is likely to raise mortality rates.

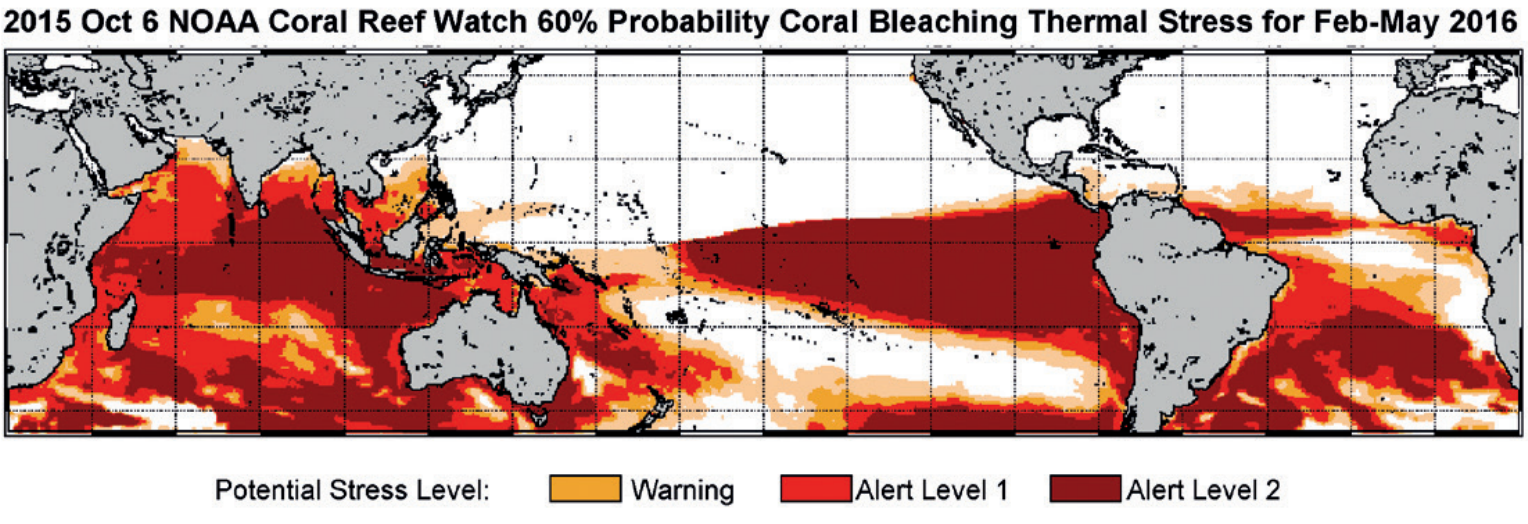
Will the Great Barrier Reef be able to cope with the climate changing?

Reefs worldwide are highly vulnerable to climate change and it is unlikely that many corals will be able to adapt to the current rate of temperature rise. Significant action to tackle climate change is essential to protect the Great Barrier Reef in the long term.

What is happening around the world?

Over the past year or so, the temperature of the surface ocean has risen by up to 2°C more than normal in a large band across the eastern and central equatorial Pacific Ocean and in parts of the western Atlantic Ocean. This record-breaking ocean heat has triggered a global coral bleaching event (Figure 7), which began in the north Pacific in mid-2014 and expanded to the south Pacific and Indian Oceans in 2015 and then the Great Barrier Reef.

Figure 7: Global mass bleaching event. This outlook issued by the US National Oceanic and Atmospheric Administration (NOAA) on 6 October 2015 predicted the likelihood of heat stress that causes coral bleaching. From February to May 2016 there was an estimated 60% chance of many of the world's reefs likely to be affected by a mass bleaching event. The potential stress levels categories are 'Warning' = possible bleaching, Alert Level 1 = bleaching likely, and Alert Level 2 = mortality likely (NOAA 2015c).



More Information

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