CLIMATE COUNCIL

CLIMATE COUNCIL ALERT: CLIMATE CHANGE AND CORAL BLEACHING

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The influence of climate change on coral bleaching

Coral reefs are highly vulnerable to a changing climate. Warmer ocean temperatures are driving an increase in coral bleaching events which can damage and destroy reefs and the species they support.

In February 2016, sea surface temperatures climbed to an astounding 33°C in the waters off the far north Queensland coast resulting in coral bleaching across the Great Barrier Reef.

Oceans cover more than two-thirds of the Earth's surface and the increasing heat content of the upper ocean has a very important influence on the global climate and on marine ecosystems (Hoegh-Guldberg et al. 2014). Over the past year or so, the temperature of the surface ocean has risen by 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 (NOAA 2015a).

This record breaking ocean heat has triggered a global coral bleaching event, which began in the north Pacific in mid-2014 and expanded to the south Pacific and Indian Oceans in 2015 (NOAA 2015b). In February 2016, sea surface temperatures climbed to an astounding 33°C in the waters off the far north Queensland coast, resulting in coral bleaching across the Great Barrier Reef (GBR), particularly the most pristine and isolated reefs in the far north (GBRMPA 2016).

Human activities, primarily the emission of greenhouse gases from the combustion of fossil fuels (coal, oil and gas), are driving climate change. Through both rising surface ocean temperatures and increasing ocean acidity, climate change has become the most serious threat to the future viability of coral reefs.

Heat stress through rising sea surface temperatures can cause corals to expel tiny algae, called zooxanthellae, which live inside their tissues and provide corals with most of their colour and energy needs. If bleaching persists, corals begin to starve and eventually die (GBRMPA 2016). Bleaching events on the GBR have occurred repeatedly since the late 1970s, while none were observed before the 1970s. The ability to recover from bleaching events varies among coral species and among regions, but there is only limited evidence so far that corals will be able to adapt fast enough to rising temperatures (Hoegh-Guldberg et al. 2007).

Already the Earth has warmed about 0.9°C above pre-industrial levels, with much of that warming occurring since 1970 (IPCC 2013). Furthermore, despite the focus on air temperature, warming of the air accounts for only 1 percent of the additional energy stored in the climate system - more than 90 percent of the total energy accumulated since 1971 has been absorbed by the world's oceans, and the upper 75 m - where most of the world's reef-building corals live - has warmed by 0.11°C per decade over the period 1992 to 2010 (IPCC 2013).

We are likely to lose most corals worldwide in as little as 30 to 40 years if we continue to burn fossil fuels and warm the climate at current rates (Hoegh-Guldberg 2016). We have a clear and urgent choice. The future of coral reefs around the world depends on how much and how fast we reduce greenhouse gas emissions now, and in the coming years and decades.

We are likely to lose most corals worldwide in as little as 30 to 40 years if we continue to burn fossil fuels and warm the climate at current rates.

References

Gattuso JP, Magnan A, Billé A (2015) Contrasting futures for ocean and society from different anthropogenic CO2 emissions scenarios. Science, 349:45.

GBRMPA (Great Barrier Reef Marine Park Authority) (2016) Reef coral bleaching intensifies in far north. Published 14/03/2016. Accessed at http://www.gbrmpa.gov.au/media-room/latest-news/coral-bleaching/2016/reef-coral-bleaching-intensifies-in-far-north.

Hoegh-Guldberg O, Mumby P, Hooten A, Steneck R, Greenfield P, Gomez E, Harvell C, Sale P, Edwards A and Caldeira K (2007) Coral reefs under rapid climate change and ocean acidification. Science, 318:1737-1742.

Hoegh-Guldberg O et al. (2014) The Ocean. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros VR et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1655-1731.

Hoegh-Guldberg O (2016) It's not 'doom and gloom' to point out what's really happening to coral reefs. The Conversation, 4 March 2016. Accessed at https://theconversation.com/its-not-doom-and-gloom-to-point-out-whats-really-happening-to-coral-reefs-55695.

Intergovernmental Panel on Climate Change (IPCC) (2013) Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and PMP. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

NOAA (National Oceanic and Atmospheric Administration) (2015a) Operational SST Anomaly Charts for 2015. Accessed at http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/2015.html.

NOAA (2015b) NOAA declares third ever global coral bleaching event: Bleaching intensifies in Hawaii, high ocean temperatures threaten Caribbean corals. October 8, 2015. Accessed at http://www.noaanews.noaa.gov/stories2015/100815-noaa-declares-third-ever-global-coral-bleaching-event.html.

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