

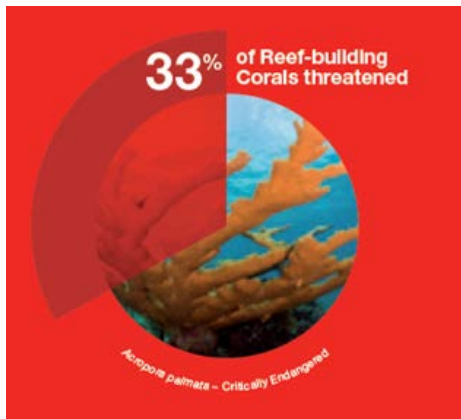
NOVEMBER 2017

CORAL REEFS AND CLIMATE CHANGE

- Coral reefs harbour the highest biodiversity of any ecosystem globally and directly support over 500 million people worldwide, mostly in poor countries.
- They are among the most threatened ecosystems on Earth, largely due to unprecedented global warming and climate changes, combined with growing local pressures.
- Over the last three years, reefs around the world have suffered from mass coral bleaching events as a result of the increase in global surface temperature caused by anthropogenic greenhouse gas emissions.
- According to UNESCO, the coral reefs in all 29 reef-containing World Heritage sites would cease to exist by the end of this century if we continue to emit greenhouse gases under a business-as-usual scenario.
- Limiting global average temperature to well below 2°C above pre-industrial levels in line with the Paris Agreement provides the only chance for the survival of coral reefs globally.

What is the issue?

Anthropogenic greenhouse gas emissions have caused an increase in global surface temperature of approximately 1°C since pre-industrial times. This has led to unprecedented mass coral bleaching events which – combined with growing local pressures – have made coral reefs one of the most threatened ecosystems on Earth.



One third of reef-building corals around the world are threatened with extinction. © IUCN 2015

When conditions such as the temperature change, corals expel the symbiotic algae living in their tissues, responsible for their colour. A spike of 1–2°C in ocean temperatures sustained over several weeks can lead to bleaching, turning corals white. If corals are bleached for prolonged periods, they eventually die. Coral bleaching events often lead to the death of large amounts of corals.

Reefs around the world have suffered from mass bleaching events for three consecutive years. Iconic reefs such as the Great Barrier Reef in Australia and the Northwestern Hawaiian Islands in the United States have all experienced their worst bleaching on record with devastating effects. The bleaching of the

Great Barrier Reef in 2016 and 2017, for instance, killed around 50% of its corals.



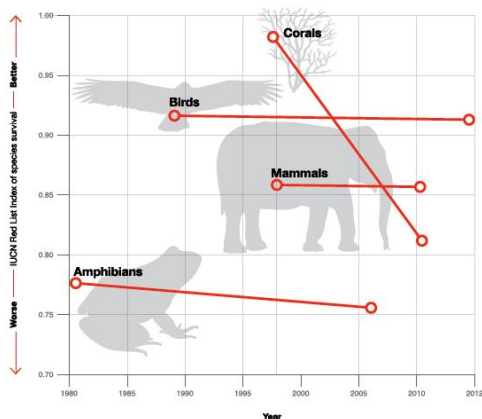
Bleached corals in the Seychelles. © Christophe Mason-Parker, Archipelago Images

Corals cannot survive the frequency of current bleaching events from global temperature rise. If temperatures continue to rise, bleaching events will increase in intensity and frequency. Scientists estimate that even those events that occur twice per decade can threaten corals' survival. The first global scientific assessment of climate change impacts on World Heritage coral reefs, published in 2017 by UNESCO, predicts that the coral reefs in all 29 reef-containing World Heritage sites would cease to exist as functioning coral reef ecosystems by the end of this century if humans continue to emit greenhouse gases under a business-as-usual scenario.

Why is this important?

Coral reefs harbour the highest biodiversity of any ecosystem globally. Despite covering less than 0.1% of the ocean floor, reefs host more than one quarter of all marine fish species, in addition to many other marine animals. Additionally, reefs provide a wide variety of ecosystem services such as subsistence food, protection from flooding and sustaining the

fishing and tourism industries. Their disappearance will therefore have economic, social and health consequences.



The IUCN Red List Index of species survival 1980-2012, showing corals species are deteriorating the fastest. A RLI value of 1.0 means that all species are not expected to become extinct in the near future. An RLI value of 0 indicates that all species have gone extinct. © IUCN 2015

Coral reefs are estimated to directly support over 500 million people worldwide, who rely on them for daily subsistence, mostly in poor countries. A 2014 assessment published in the journal *Global Environmental Change* estimated the social, cultural and economic value of coral reefs at US\$1 trillion. A 2015 study by WWF projects that the climate-related loss of reef ecosystem services will cost US\$500 billion per year or more by 2100.

Coral reefs are also key indicators of global ecosystem health. They serve as an early warning sign of what may happen to other less sensitive systems, such as river deltas, if climate change is not urgently addressed. Once the tipping point for the survival of coral reefs is passed, the deterioration of other systems may cascade more quickly and irreversibly.



Tropical fish and coral reefs around the Fakarava atoll in French Polynesia. Photo: IUCN Photo Library / © Catherine Gras

What can be done?

Limiting global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C, in line with the Paris Agreement on climate change, provides the only chance for the survival of coral reefs globally. If the agreement is fully implemented, we will likely see a decrease in atmospheric carbon concentrations. This will improve conditions for the survival of reefs, and enable other measures to rescue reefs to be successful. Other measures alone, such as addressing local pollution and destructive fishing practices, cannot save coral reefs without stabilised greenhouse gas emissions.

Reinforcing commitments to the Paris Agreement must be mirrored in all other global agreements such as the Sustainable Development Goals. SDG 13, for instance, calls for urgent action to combat climate change and its impacts.

There also needs to be a transformation of mainstream economic systems and a move towards circular economic practices. These are highlighted in SDG 8 (inclusive and sustainable economic growth) and SDG 12 (sustainable consumption and production patterns). Economic systems need to rapidly move to the low greenhouse gas emission scenario to enable global temperature decrease.

A move away from current economic thinking should include the benefits provided by coral reefs, which are currently not taken into account in mainstream business and finance. Therefore, sustaining and restoring coral reefs should be treated as an asset, and long-term investments should be made for their preservation.

Investments should also include support for research at the frontiers of biology, such as genetic selection of heat-resistant corals that can withstand rising global temperatures.

Where can I get more information?

IUCN Species Survival Commission (SSC) Coral Specialist Group: iucn.org/invertebrates

IUCN Species Survival Commission (SSC) Climate Change Specialist Group: iucn-ccsg.org

Heron et al. (2017). *Impacts of Climate Change on World Heritage Coral Reefs: A First Global Scientific Assessment*. Paris, France: UNESCO World Heritage Centre.

Obura, D. (2017). 'Refilling the coral reef glass'. *Science* 357(6357):1215–1215.