

# Paris Agreement goals slipping away and with it Australia's chance to save the Great Barrier Reef

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## Outline

1. Paris Agreement goals: a paradox for "success" [If we succeed we fail]
2. Expected catastrophic impacts on coral reefs at 2°C or 1.5°C
3. Australia should set a 1°C / 350ppm CO<sub>2</sub> target if it is serious about trying to save the GBR

## Reference

### Editorial

#### PARIS AGREEMENT GOALS SLIPPING AWAY AND WITH THEM AUSTRALIA'S CHANCE TO SAVE THE GREAT BARRIER REEF

Dr Chris McGrath\*

##### A TORTUROUS PATH AND VICIOUS HEADWINDS

Following a tortuous path, in 2015 the global community agreed in the *Paris Agreement*<sup>1</sup> to a goal of:

Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.

The *Paris Agreement* was an enormous milestone that has been hailed as a "major diplomatic success"<sup>2</sup> and it certainly was in the context of the history, difficulty and complexity of the negotiations. It crossed political and legal canyons that had divided the global community and prevented progress on responding to the threat of dangerous climate change for over a decade. Its goals, and the impacts we expect to occur even if they are achieved, are far better than unmitigated climate change where the global temperatures increase by 4°C or more – a future that would imperil humanity's continued existence.<sup>3</sup> And, as Peter Christoff writes:<sup>4</sup>

the power of storytelling in policy and politics should not be underestimated. The acclamation of the *Paris Agreement* as a success is a powerful mobiliser, in contrast to the narrative of failure that followed [the 2009 international climate meeting in] Copenhagen. ... Crucially, *Paris* has also amplified the economic narrative of an increasingly cheap and viable path for decarbonisation.

(2019) 36 EPLJ 3

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## Article 2 of Paris Agreement sets (hard) 2°C and (aspirational) 1.5C targets

### Article 2

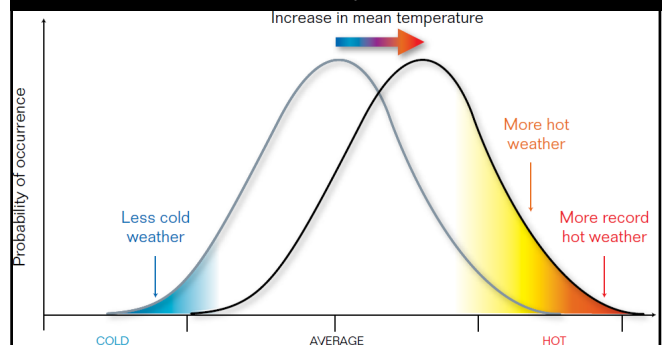
1. This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:
  - (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
  - (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
  - (c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.
2. This Agreement will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.

Paradox: the Paris Agreement was both an amazing success and a tragic failure.  
[If we succeed we fail]

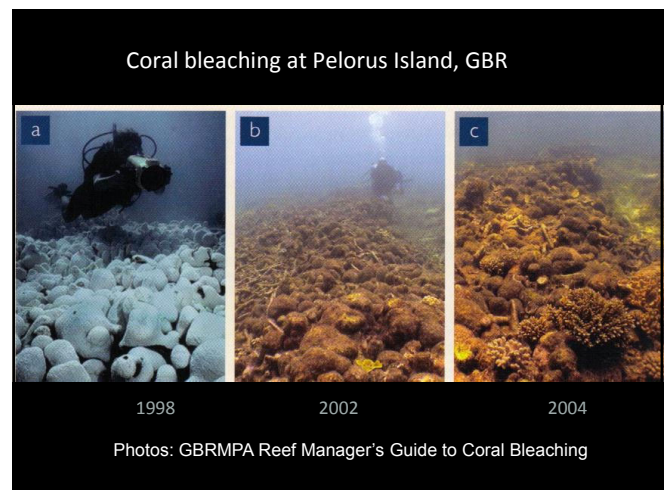
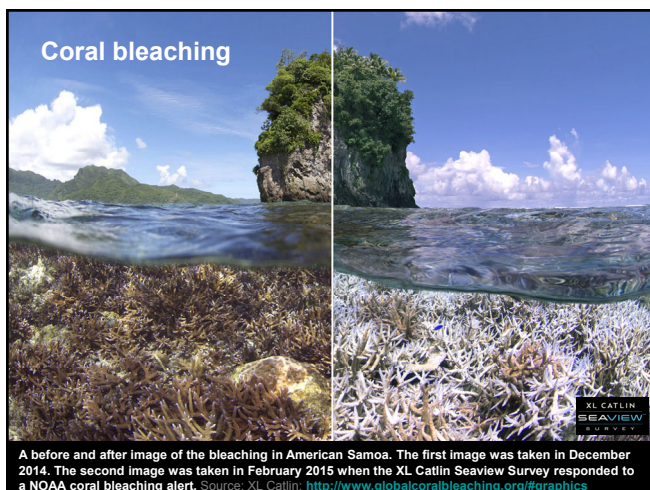
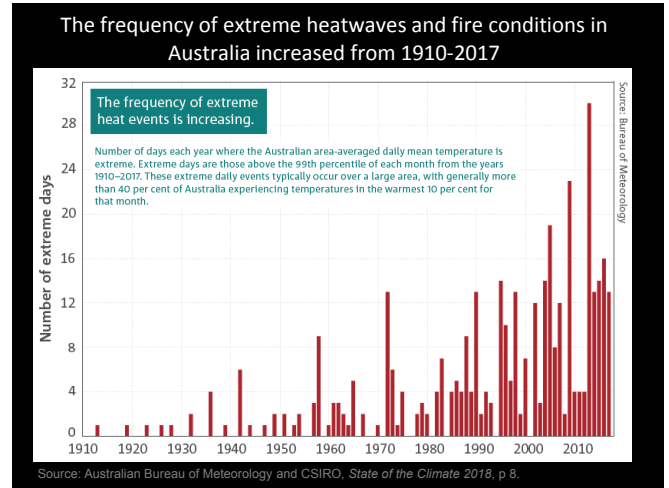
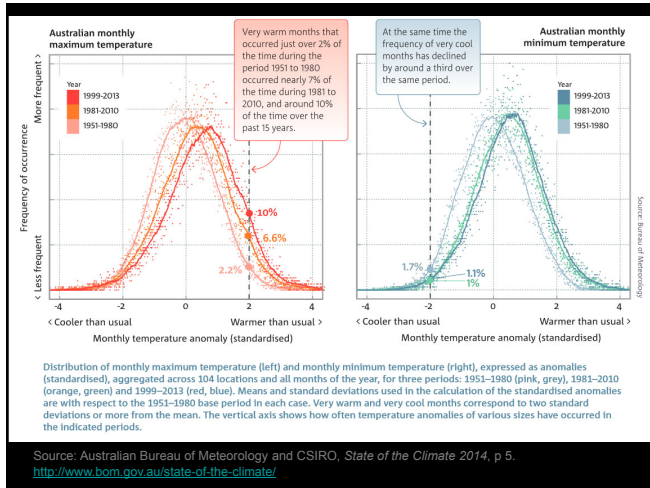


Credit: Paris COP / Flickr

## Effect on extreme temperatures from increase in mean temperature

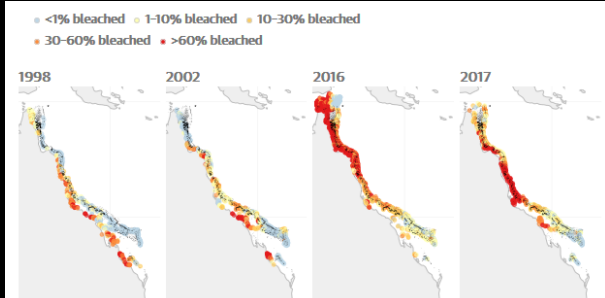


Source: Garnaut 2008 based on IPCC (2001b: Figure 4.1)



### Mass bleaching events on the Great Barrier Reef

Showing aerial survey data from four mass bleaching events on the Great Barrier Reef in 1998, 2002, 2016 and 2017



Sources: 1998 and 2002 data from Aims, 2016 and 2017 data from the ARC Centre of Excellence for Coral Reef Studies

Source: ARC (Corals) via <https://www.theguardian.com/environment/2018/dec/19/great-barrier-reef-surviving-corals-greater-heatwave-resistance>

Hughes et al (2017) "Global warming and recurrent mass bleaching of corals" *Nature* 543: 373–377 found:

- "no support for the hypothesis that good water quality confers resistance to bleaching"
- "no effect of the level of protection (in fished or protected zones) on bleaching"
- "no evidence for a protective effect of past bleaching (for example, from acclimation or adaptation)"
- "local management of coral reef fisheries and water quality affords little, if any, resistance to recurrent severe bleaching events: even the most highly protected reefs and near-pristine areas are highly susceptible to severe heat stress"
- "Securing a future for coral reefs, including intensively managed ones such as the Great Barrier Reef, ultimately requires urgent and rapid action to reduce global warming."

### IPCC Fourth Assessment Report 2007

(WGII, 6 April 2007)

Very high confidence that:

"Corals are vulnerable to thermal stress and have low adaptive capacity. **Increases in sea surface temperature of about 1 – 3°C are projected to result in more frequent coral bleaching events and widespread mortality ...**"

(see also IPCC AR5-WGII 2014)

### Climate change and the Great Barrier Reef

(GBRMPPA, 2007), p 295

"Successive studies of the potential impacts of thermal stress on coral reefs have supported the notion that **coral dominated reefs are likely to largely disappear with a 2°C rise in sea temperature over the next 100 years.**"

nature  
climate change

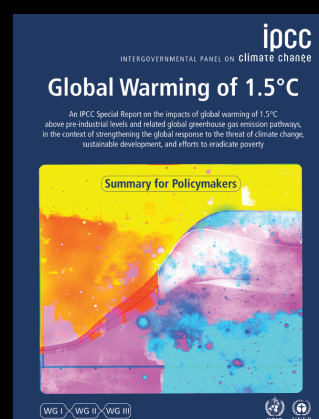
ARTICLES

PUBLISHED ONLINE: 16 SEPTEMBER 2012 | DOI: 10.1038/NCLIMATE1634

### Limiting global warming to 2 °C is unlikely to save most coral reefs

K. Frieler<sup>1\*</sup>, M. Meinshausen<sup>1,2</sup>, A. Golly<sup>1</sup>, M. Mengel<sup>1</sup>, K. Lebek<sup>1</sup>, S. D. Donner<sup>3</sup> and O. Hoegh-Guldberg<sup>4</sup>

Mass coral bleaching events have become a widespread phenomenon causing serious concerns with regard to the survival of corals. Triggered by high ocean temperatures, bleaching events are projected to increase in frequency and intensity. Here, we provide a comprehensive global study of coral bleaching in terms of global mean temperature change, based on an extended set of emissions scenarios and models. We show that preserving >10% of coral reefs worldwide would require limiting warming to below 1.5 °C (atmosphere-ocean general circulation models (AOGCMs) range: 1.3–1.8 °C) relative to pre-industrial levels. Even under optimistic assumptions regarding corals' thermal adaptation, one-third (9–60%, 68% uncertainty range) of the world's coral reefs are projected to be subject to long-term degradation under the most optimistic new IPCC emissions scenario, RCP3-PD. Under RCP4.5 this fraction increases to two-thirds (30–88%, 68% uncertainty range). Possible effects of ocean acidification reducing thermal tolerance are assessed within a sensitivity experiment.



Released 8 October 2018



"Coral reefs ... are projected to decline by a further 70–90% at 1.5°C (*high confidence*) with larger losses (>99%) at 2°C (*very high confidence*). ...

Tropical coral reefs will reach a *very high risk* of impact at 2°C with most available evidence suggesting that coral dominated ecosystems will be non-existent at this temperature or higher (e.g., coral abundance near zero in most locations, intensifying storms 'flattening' reefs' 3-dimensional structure) (*high agreement, robust evidence*). Impacts at this point (coupled with ocean acidification) are likely to undermine the ability of tropical coral reefs to provide habitat for the current high levels of biodiversity as well as a range of ecosystem services important for millions of people (e.g., food, livelihoods, coastal protection, cultural services). ..."

Intergovernmental Panel on Climate Change (IPCC), *Global Warming of 1.5°C: an IPCC special report* (IPCC, Geneva, 8 October 2018)

"Tropical coral reefs face very high risks of becoming unsustainable as coral dominated ecosystems if warming exceeds 1.5°C. A 1.5°C world is better for coral reefs than a 2°C world, in which coral reefs mostly disappear. Even with warming up until today (0.87°C), a substantial proportion of coral reefs have experienced large scale mortalities that are causing them to rapidly contract. In the last 3 years alone, large coral reef systems such as the Great Barrier Reef (Australia) have lost as much as 50% of their shallow water corals. These changes are part of a series of heat stress impacts that began in the early 1980s events. ...

Even achieving emission reduction goals consistent with the ambitious goal of 1.5°C under the Paris Agreement will result in the further loss of 90% of reef-building corals compared to today, with 99% of corals being lost under warming of 2°C or more above the pre-industrial period."

Intergovernmental Panel on Climate Change (IPCC), *Global Warming of 1.5°C: an IPCC special report* (IPCC, Geneva, 8 October 2018)

PHILOSOPHICAL  
TRANSACTIONS  
OF  
THE ROYAL  
SOCIETY

Phil. Trans. R. Soc. A (2011) 369, 6–19  
doi:10.1098/rsta.2010.0303

# INTRODUCTION

## Four degrees and beyond: the potential for a global temperature increase of four degrees and its implications

BY MARK NEW<sup>1,\*</sup>, DIANA LIVERMAN<sup>2</sup>, HEIKE SCHRODER<sup>3</sup>  
AND KEVIN ANDERSON<sup>4,5</sup>

If we based our policies on the best available science, we would aim to return atmospheric CO<sub>2</sub> to 350 ppm and limit global temperature rises to 1°C to avoid 'dangerous climate change'

The Open Atmospheric Science Journal, 2008, 2, 217-231

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Open Access

### Target Atmospheric CO<sub>2</sub>: Where Should Humanity Aim?

James Hansen<sup>\*1,2</sup>, Makiko Sato<sup>1,2</sup>, Pushker Kharecha<sup>1,2</sup>, David Beerling<sup>3</sup>, Robert Berner<sup>4</sup>, Valerie Masson-Delmotte<sup>2</sup>, Mark Pagani<sup>4</sup>, Maureen Raymo<sup>6</sup>, Dana L. Royer<sup>7</sup> and James C. Zachos<sup>8</sup>

**Abstract:** Paleoclimate data show that climate sensitivity is ~3°C for doubled CO<sub>2</sub>, including only fast feedback processes. Equilibrium sensitivity, including slower surface albedo feedbacks, is ~6°C for doubled CO<sub>2</sub> for the range of climate states between glacial conditions and ice-free Antarctica. Decreasing CO<sub>2</sub> was the main cause of a cooling trend that began 50 million years ago, the planet being nearly ice-free until CO<sub>2</sub> fell to 450 ± 100 ppm; barring prompt policy changes, that critical level will be passed, in the opposite direction, within decades. If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO<sub>2</sub> will need to be reduced from its current 385 ppm to at most 350 ppm, but likely less than that. The largest uncertainty in the target arises from possible changes of non-CO<sub>2</sub> forcings. An initial 350 ppm CO<sub>2</sub> target may be achievable by phasing out coal use except where CO<sub>2</sub> is captured and adopting agricultural and forestry practices that sequester carbon. If the present overshoot of this target CO<sub>2</sub> is not brief, there is a possibility of seeding irreversible catastrophic effects.

350.org



[www.350.org](http://www.350.org)

I don't know if we can reduce atmospheric CO<sub>2</sub> to 350 ppm and stabilise global temperature rises at 1 °C.

But it is the **right goal** and the one we should be **trying** to achieve.

Paradox: the Paris Agreement was both an amazing success and a tragic failure.



Under the Paris Agreement we have **agreed to destroy** the Great Barrier Reef.

Photographer: unknown

Scott Morrison contradicts energy advice, saying Paris targets can be met 'at a canter'

Prime minister claims Australia will easily meet its obligations without an emissions reduction policy

The Guardian  
Australia edition  
Katharine Murphy Political editor  
@emurpharoc  
Wed 5 Sep 2018 20:08 AEST



▲ Scott Morrison (right) with energy minister Angus Taylor last week. The PM told 2GB radio lower power prices were more important than lower emissions. Photograph: Lukas Coch/AAP

The Morrison government has sent a clear signal that it is prepared to provide taxpayer support for both new and existing coal plants, opening registrations of interest in its controversial new power generation underwriting program.

**Delayers acting in bad faith**



▲ Angus Taylor, left, will confirm the underwriting program will potentially fund generation projects including new builds and brownfield projects.  
Photograph: Mick Tsikas/AAP

The Guardian  
Australia edition  
13 December 2018

Are we like the 'bookkeeper of Auschwitz' and accessories to mass murder of untold billions of future people through our passive inaction on climate change?

'Bookkeeper of Auschwitz' Oskar Groening to face trial on 300,000 counts of accessory to murder

Updated Tue at 6:21am 3 February 2015

A 93-year-old former Auschwitz death camp officer will go on trial in Germany charged with at least 300,000 counts of accessory to murder, a court says.

The German defendant, Oskar Groening, will face charges over the 425,000 people believed to have been deported to the camp in occupied Poland between May and July 1944, at least 300,000 of whom died in the gas chambers.

The regional court in the northern German city of Lüneburg said the trial, expected to be one of the last of its kind, would start on April 21.



PHOTO: Oskar Groening was known as the 'bookkeeper' of Auschwitz. (BBC/YouTube)

Source: ABC <http://www.abc.net.au/news/2015-02-03/german-to-face-trial-in-april-over-auschwitz-death/6064552>

NEWS