



# CORAL BLEACHING: A CAUSE FOR CONCERN



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## ABSTRACT

Coral reefs are one of the richest ecosystems on the planet supporting an estimated quarter of all marine species, rivalling rainforests in terms of diversity of life. These complex ecosystems include soft & hard corals which form its foundation along with sponges, crustaceans, molluscs, fish, sea turtles, sharks, dolphins and many more. However they are under imminent risk of destruction; anthropogenic climate change has resulted in a major existential threat to these coral reefs. Mass bleaching events occurring from time to time are causing enormous coral mortality ultimately leading to species extinction locally.

## INTRODUCTION

Corals are found throughout the world's tropical seas creating not only some of the largest living structures on the planet but also providing a habitat to millions of marine species. Corals thrive as a result of their successful symbiotic relationship with zooxanthellae algae.

### Why are coral reefs important?

Coral reefs provide some of the most essential ecosystem services.

#### Oceanic services:

- protect coastlines from the damaging effects of wave action and tropical storms
- provide habitats and shelter for many marine organisms
- are the source of nitrogen, oxygen and other essential nutrients for marine food chains
- assist in carbon and nitrogen fixing
- help with nutrient recycling.
- Remove and recycle carbon dioxide

#### Economic services:

- The fishing industry depends on coral reefs because many fish spawn there and juvenile fish spend time there before making their way to the open sea
- The Great Barrier Reef generates more than 3.9 billion dollars every year for the Australian economy, from fishing and tourism by providing jobs for around 70,000 people
- Local economies also receive billions of dollars from visitors to reefs through diving tours, recreational fishing trips, hotels, restaurants, and other businesses based near reef ecosystems
- Scientists are carrying out valuable medical research to cure diseases like cancer, HIV etc with corals,

Despite their great economic and recreational value, coral reefs are severely threatened by pollution, disease, and habitat destruction. Once coral reefs are damaged, they are less able to support the many creatures that inhabit them. When a coral reef supports fewer fish, plants, and animals, it also loses value as a tourist destination.



Vibrant marine ecosystem

## MECHANISM OF BLEACHING

The zooxanthellae that live within corals not only provide them with much needed energy but are also responsible for their distinct coloring. However conditions of stress, break down this relationship between corals and zooxanthellae. A rise in temperature by even 1-2°C results in the death of the algae causing the coral tissue to become transparent and the bright white of the underlying coral skeleton makes it appear bleached. Without the energy provided by the algae, the corals gradually starve to death or succumb to diseases.

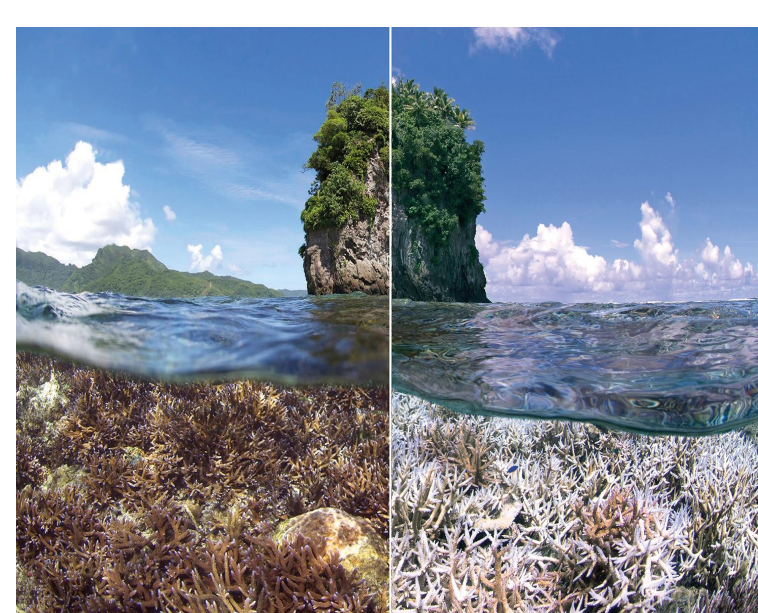
Mass bleaching events in the Great Barrier Reef in the years 1998, 2002, 2006, 2016 and most recently 2017 were caused by unusually warm sea surface temperatures during the summer season. The longest and most destructive coral bleaching event was because of the El Nino that occurred from 2014 to 2017. During this time, over 70 percent of the coral reefs around the world have been damaged.



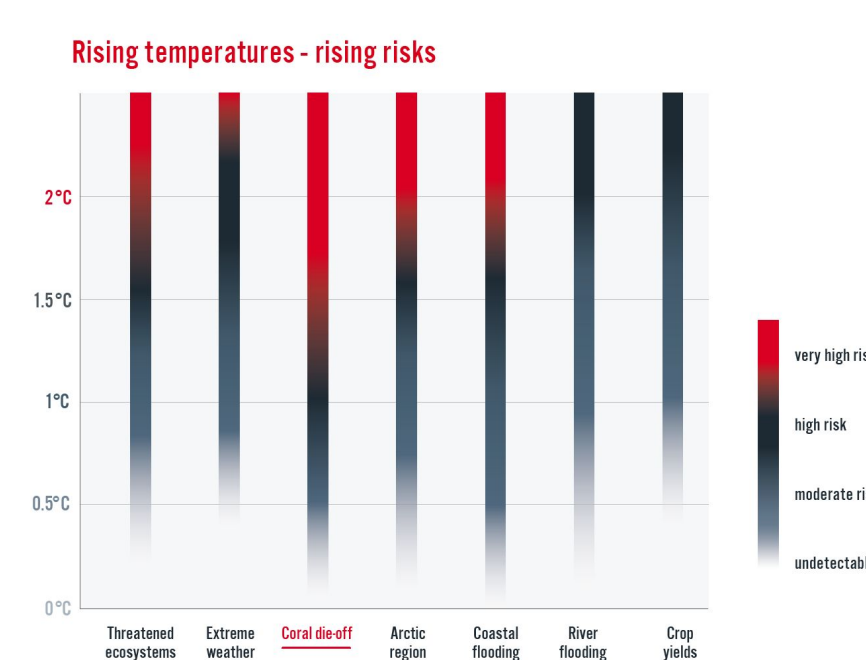
Coral bleaching

## CAUSES

The climate crisis is a severe threat to coral reefs. As the global temperature rises, reefs are put at risk from warming oceans, higher frequency cyclones, increased precipitation, sea level rise, rising acidification and changing ocean circulation. Other stressors include overfishing & destructive fishing leading to coral habitat damage, pollution of water & outbreak of diseases. These factors alter the necessary conditions needed for coral reefs to function, causing bleaching and destruction of reefs.



Before & After



IPCC'S prediction that 99% of corals would be lost under 2°C of global heating.

## CONSEQUENCES

Coral reefs help seed the ocean and provide shelter and food to a complex web of organisms that leads all the way up to man. They act as natural barriers to shorelines, protecting them from the effects of the water.

As the coral reefs die, coastlines become more susceptible to damage and flooding from storms, hurricanes, and cyclones. Without the coral reefs the ocean will not be able to absorb as much carbon dioxide, leaving more CO<sub>2</sub> in the atmosphere. The loss of the coral reefs would have a devastating impact on tropical countries' economies, food supplies, and the safety of their coastal communities. These impacts immediately affect the richer industrialized countries that depend on seafood from coral reef ecosystems.

## PREVENTION

- Illegal and unsustainable fishing practices must be stopped by enforcing bans on them.
- Reduce stormwater and fertilizer run off as well as avoid usage of herbicides and pesticides
- Practice safe snorkelling and diving practices
- Taking a reef friendly approach to sun protection by using a sunscreen whose chemical composition does not adversely affect the corals.
- Ensure safe disposal and recycling of trash.
- All major economies must transition to zero carbon by 2030
- Marine protected areas must expand to 30% of the oceans
- All stakeholders must be involved intimately in future planning for the reefs.

## RECOVERY

Coral farming/propagation is the process whereby fragments of corals are collected from local reefs, raised in farms until mature, and then installed at the restoration site. This is achieved by the process of micro fragmentation. The fragmentation technique consists of breaking the corals into smaller pieces of 1 to 5 polyps. This stimulates the coral tissue to grow, allowing them to grow into clones at 25 to 50 times the normal growth rate. Clone fragments recognise each other so instead of fighting for resources, they fuse together to form larger colonies which after 4-12 months are ready to be planted back into the ocean. It is a viable solution to counter large scale degradation as it helps accelerate coral growth rates, and increases species diversity and special propagation techniques to enhance genetic diversity.



Coral Farming

## ALARMING FACTS

1. In the context of Indian reefs, 3 mass coral bleaching events have occurred. In 1998 and 2010, it was reported from Andaman-Nicobar & Gulf of Kutch regions by the Indian National Centre for Ocean Information Services (INCOIS). While for Lakshadweep & Gulf of Mannar regions, 2016 was the high intensity mass bleaching event year.
2. **Not all bleaching is due to warm water.** In Jan 2010, cold water temperatures (below the typical temp) in Florida Keys caused a coral bleaching event resulting in coral death.
3. Study conducted by the World Resources Institute has found that **"nearly 2-3rds of coral reefs in the Caribbean are threatened by human activities and coastal development."**

## REFERENCES

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