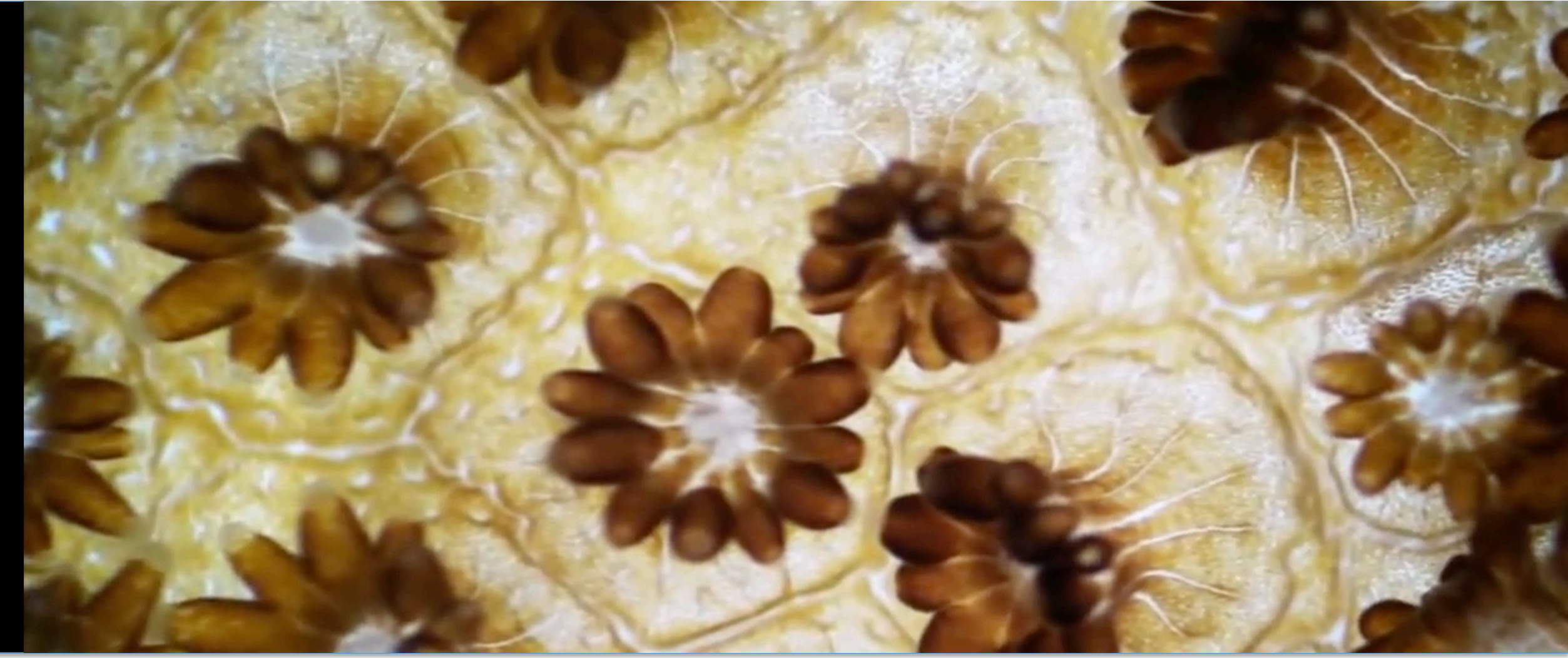


# Coral bleaching. A second chance to Climate change



## Introduction

Coral bleaching is a phenomenon that occurs when the symbiosis between the alga and the polyp host is lost or there is a loss of photosynthetic pigment in the zooxanthellae residing within scleractinian corals. It is triggered mostly by sea temperature rise. Due to these sudden environmental changes massive coral bleaching events have taken place in the last decades. The purpose of this review is to answer what coral bleaching is, why and how it occurs as well as the adaptations of the holobiont (host + alga) to overcome this phenomenon and conclude if coral bleaching really is a negative effect as it has been stated in most bibliography.

## Corals

Corals are marine invertebrate animals usually living in colonies of thousands of identical polyps. The ones belonging to Scleractinia order build an exoskeleton around them thanks to carbonate-calcium ( $\text{CaCO}_3$ ) depositions. Corals obtain the majority of its energy and nutrients from a symbiosis with a dinoflagellate algae called zooxanthellae, of the genus Symbiodinium. They live in the gastrodermis of the coral and via photosynthesis provide the coral with energy and aids with the calcification and building of the exoskeleton. In exchange, the algae benefit from a safe place to live and consume the nitrogen waste and carbon dioxide of the coral.

Corals live in clear, shallow waters, typically at depths shallower than 60m, where they can still reach sunlight and symbionts can make photosynthesis. The optimum temperature for most corals is 26-27°C, and few exist in waters below 18°C. These needs make tropical and subtropical waters perfect for their establishment. Major coral reefs are found in the Indo-pacific region.

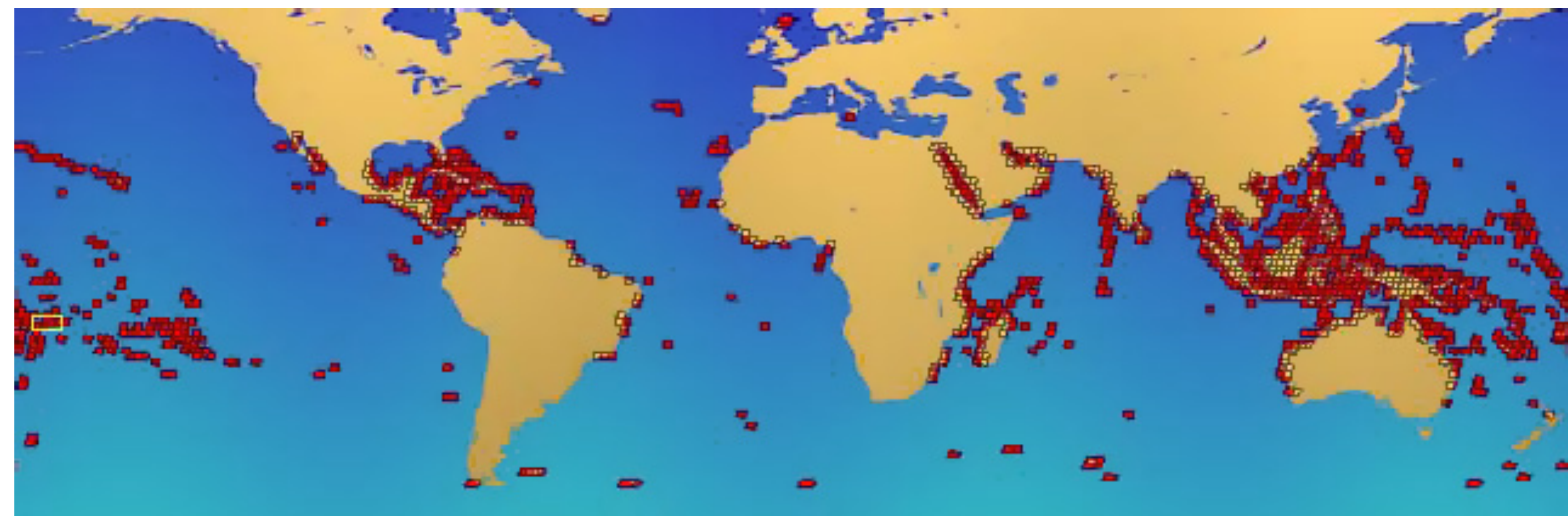


Fig. 1: Coral reef locations

## Bleaching process

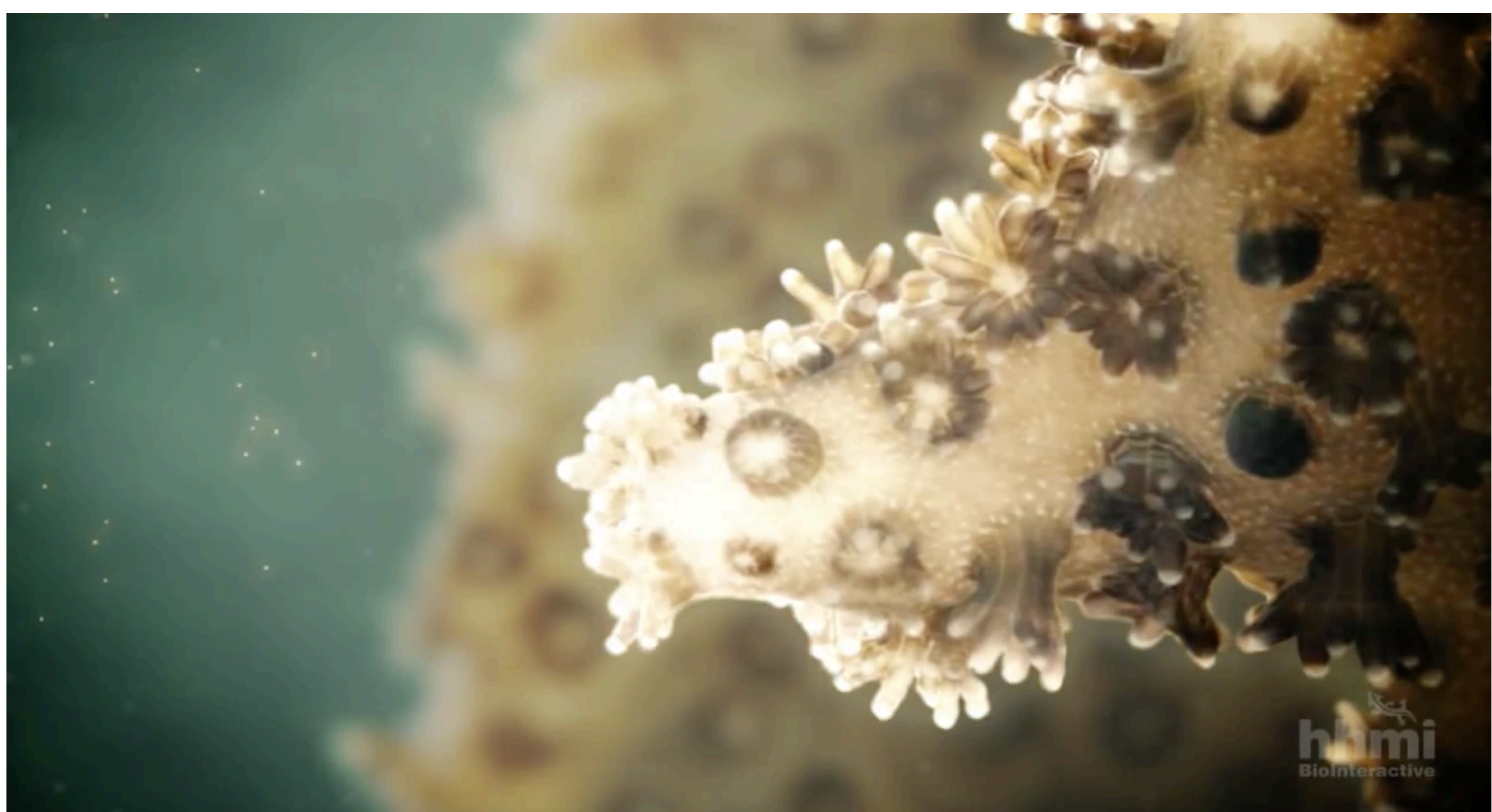
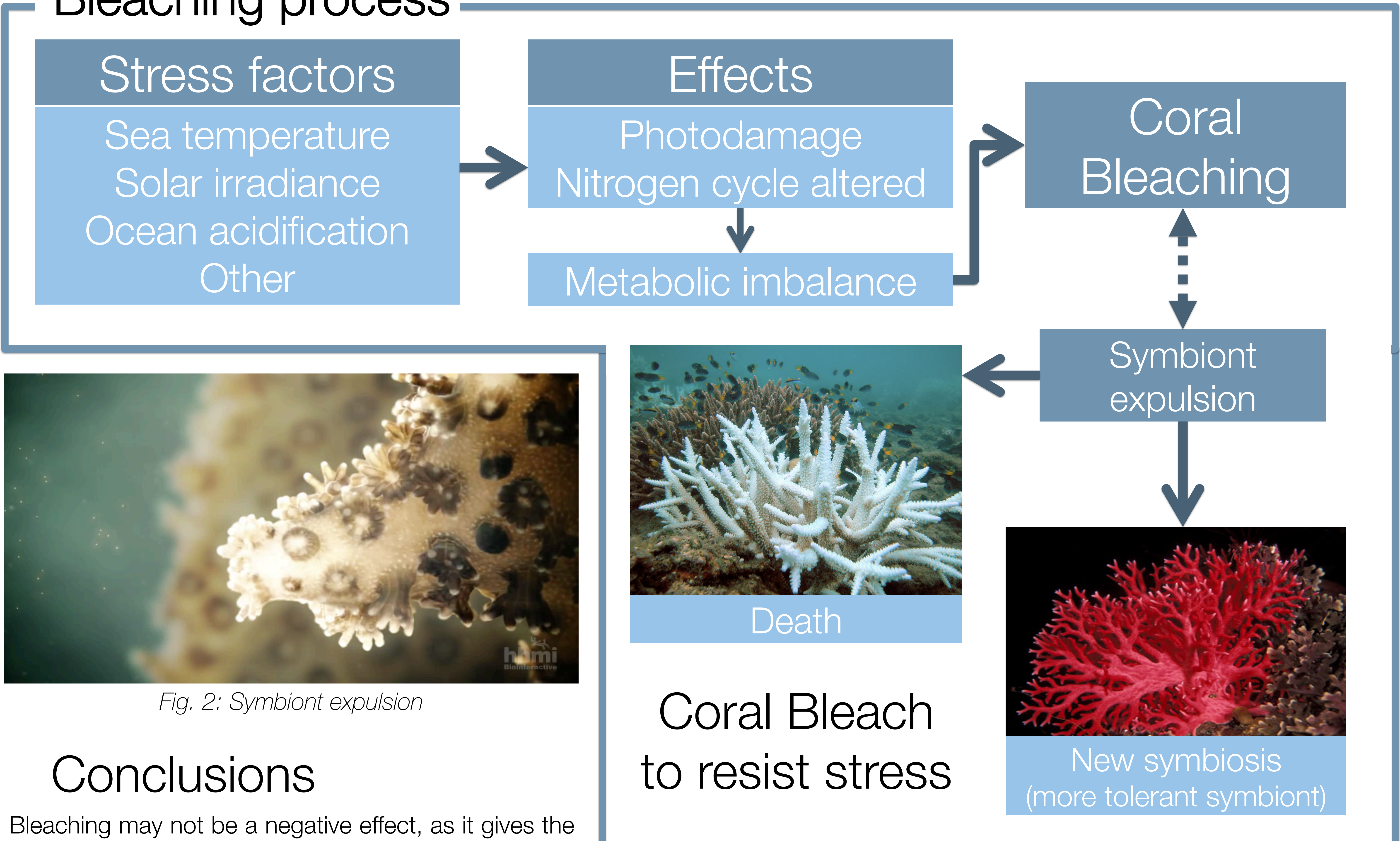


Fig. 2: Symbiont expulsion

## Conclusions

Bleaching may not be a negative effect, as it gives the opportunity to the coral to establish a new symbiosis with a more tolerant symbiont and survive. However, it is an emergency mechanism. Therefore climate change policies should be taken as coral reefs are key for the biodiversity and provide home and protection for thousands of threatened marine species.

## References

- Glynn, P. W. Coral reef bleaching: Facts, hypotheses and implications. *Glob. Chang. Biol.* 2, 495–509 (1996).
- Hoegh-Guldberg, O. Climate change, coral bleaching and the future of the world's coral reefs. *Mar. Freshw. Res.* 50, 839 (1999).