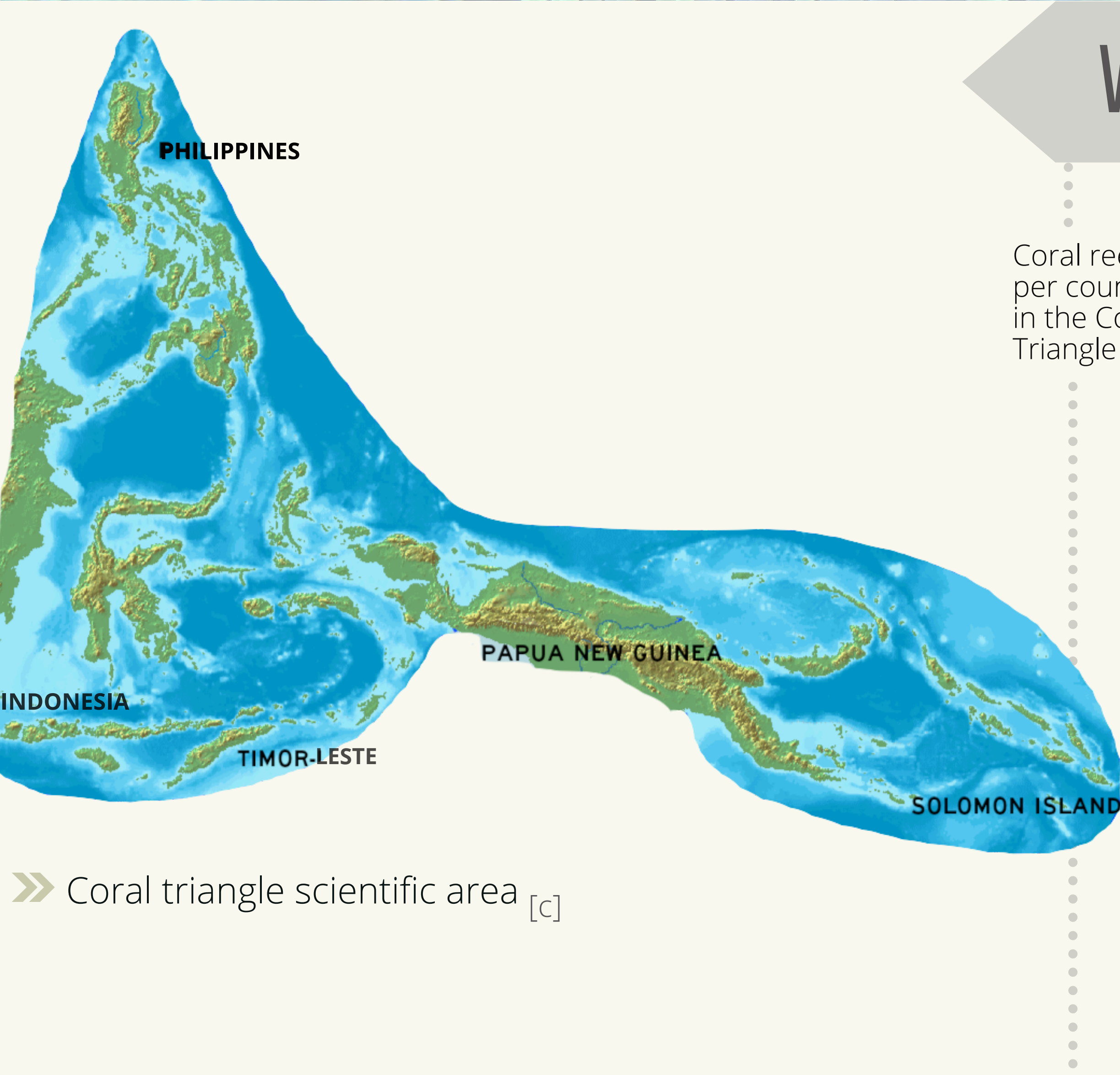


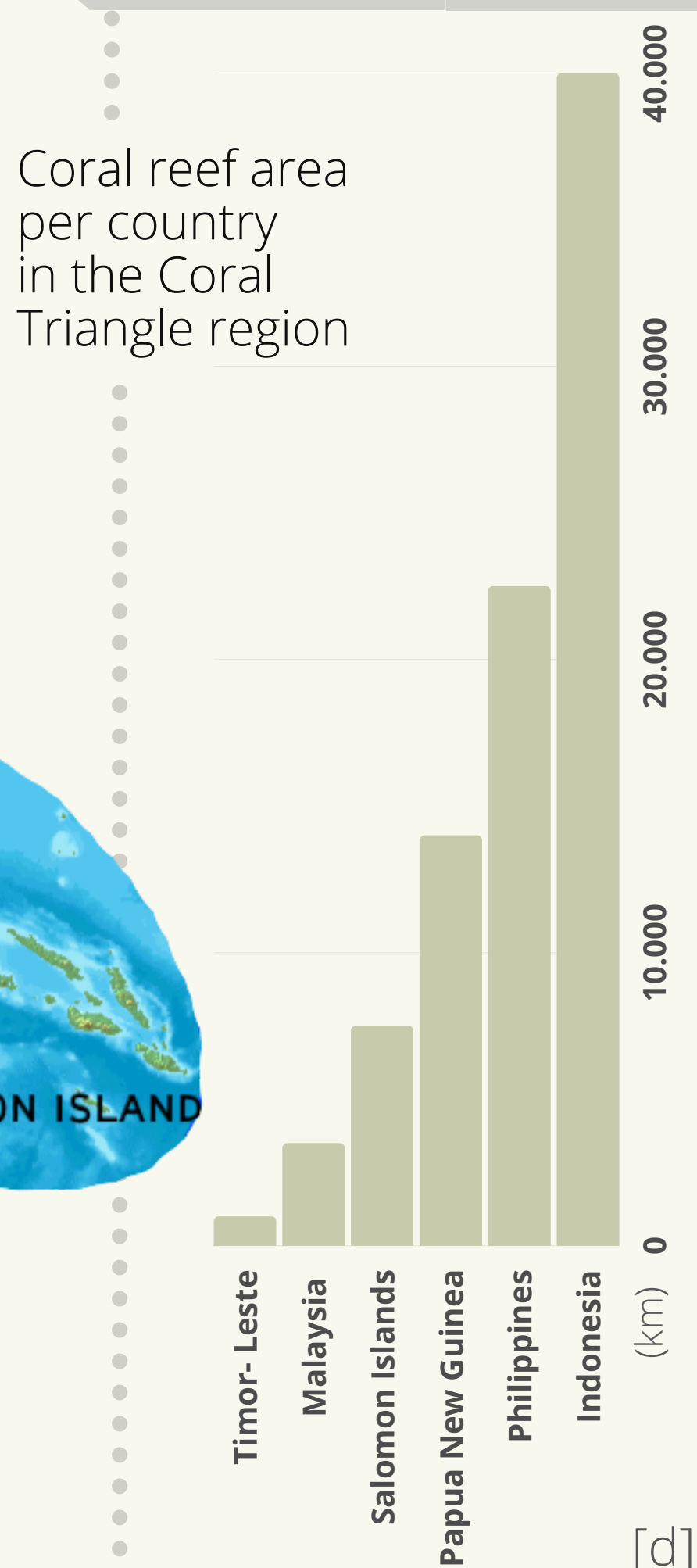


# THE CORAL TRIANGLE



## WHY REEFS MATTER:

Food & livelihoods, shoreline protection, treatments for disease, tourism, biodiversity [4]



## INTRODUCTION

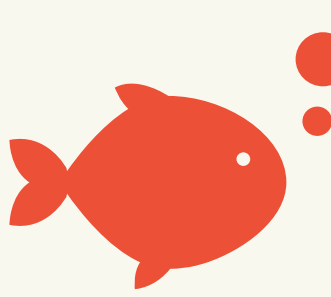
The Coral Triangle (CT) is the center of the highest coastal marine biodiversity in the world. It extends over six countries in Southeast Asia and Melanesia: Indonesia, the Philippines, Malaysia (Sabah), Timor-Leste, Papua New Guinea and the Solomon Islands. [1]

1



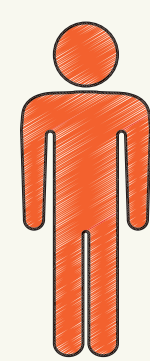
This area, often referred to as “Amazon of the Seas,” includes nearly 30 % of the world’s coral reefs and 75 % of all known coral species.

2



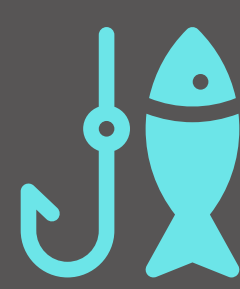
It contains the highest diversity of coral reef fishes in the world. More than 3,000 species of fish are distributed over the Coral Triangle.

3



The region’s coral reefs are fundamental to human livelihoods. The reefs sustain the lives of more than 100 million people. [4]

## OVERFISHING



People living in coastal areas depend on local marine ecosystems for their food and economic benefits. Small- scale fisheries constitute 95% of the total marine fisheries production in Indonesia and more than 50% in the Philippines. Many local people are fishing for direct consumption or sale in local markets. Besides subsistence fisheries, communities may also engage in pelagic fishing activities such as the live reef fish trade that increased in recent years due to the growing demand from China and Taiwan.

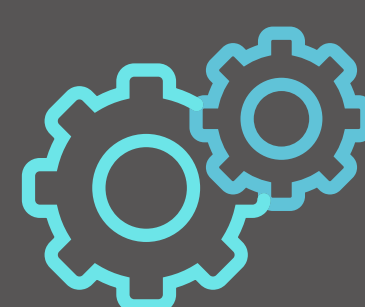
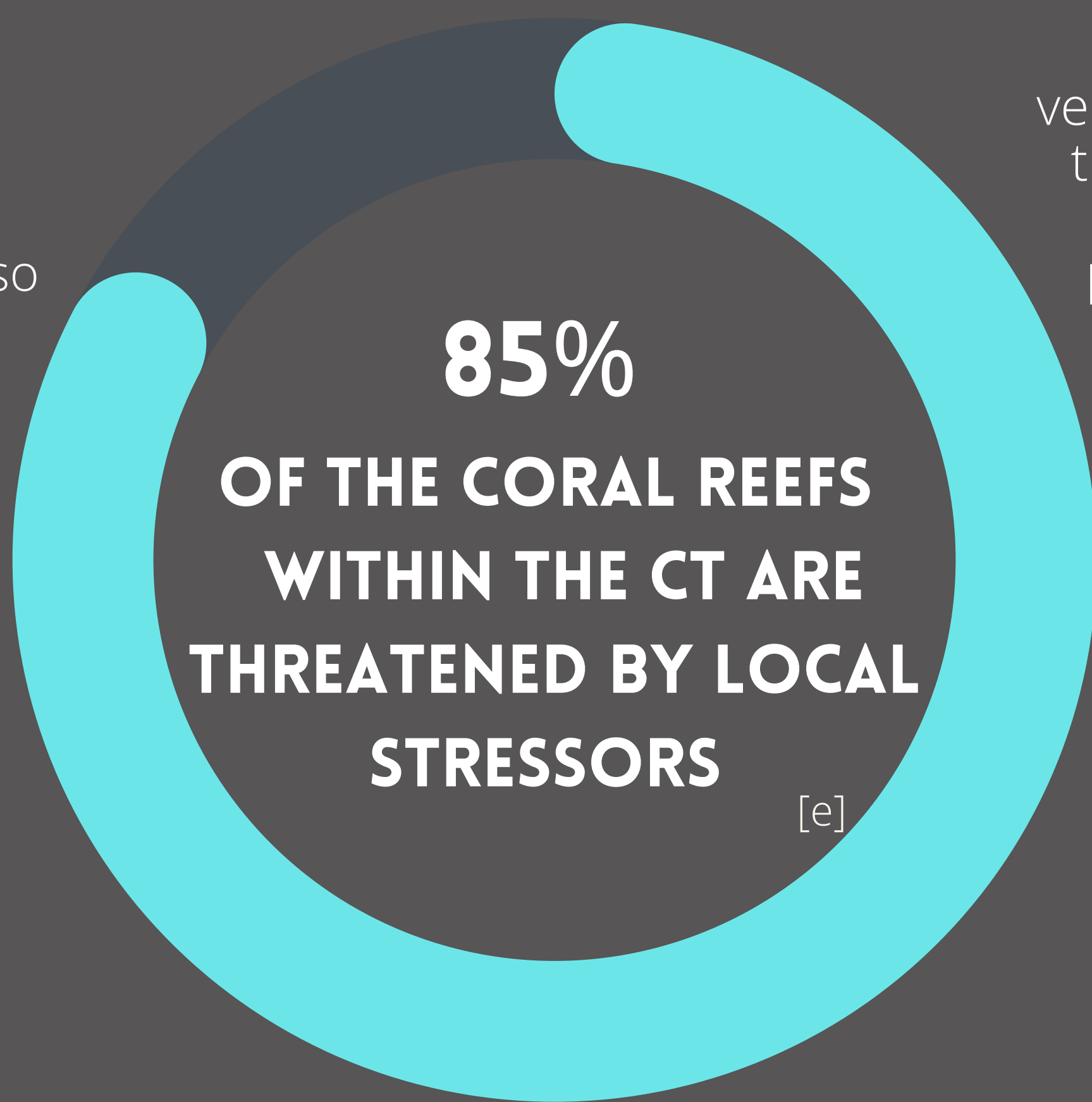
## DESTRUCTIVE FISHING



The use of poisons has spread throughout the Coral Triangle, except for the Solomon Islands. The fishes are captured with sodium cyanide or insecticides.

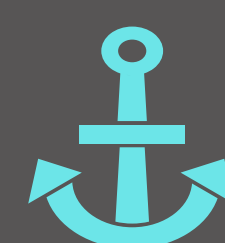
Dynamite fishing is outlawed throughout Southeast Asia. Even so, it is used regularly. The fishes are killed by rupturing their internal organs through the pressure waves produced by the blast. The explosion leave behind rubble corals and the recovery of the reefs from the physical damage may take many decades.

## LOCAL THREATS



## COASTAL DEVELOPMENT

Construction projects (airports, living space, piers, tourist venues) in coastal areas may be built on land reclaimed from the sea. Corals have also been mined directly turning it into limestone or a cement substitute. The expand of human population along coastal lines has led to a highly increased inflow of sewage and garbage.



## MARINE BASED POLLUTION

The Southeast Asian region is a major hub for shipping lanes. Many risks arise from intense shipping activity including oil spills, bilge water, solid waste and garbage disposal. In addition, reefs can directly destroyed from groundings and anchors.

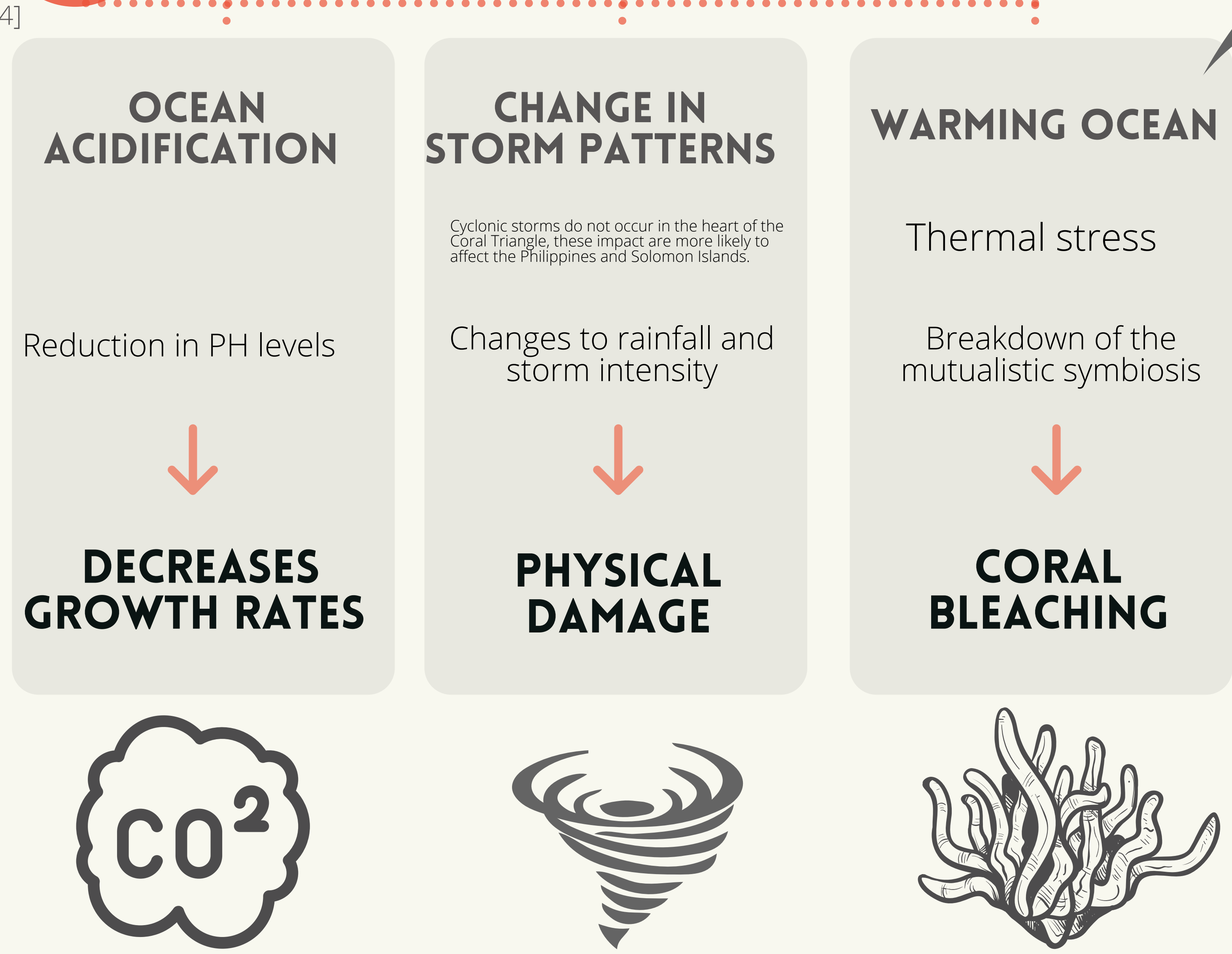
## BUT WAIT, THERE'S MORE:

## GLOBAL THREATS

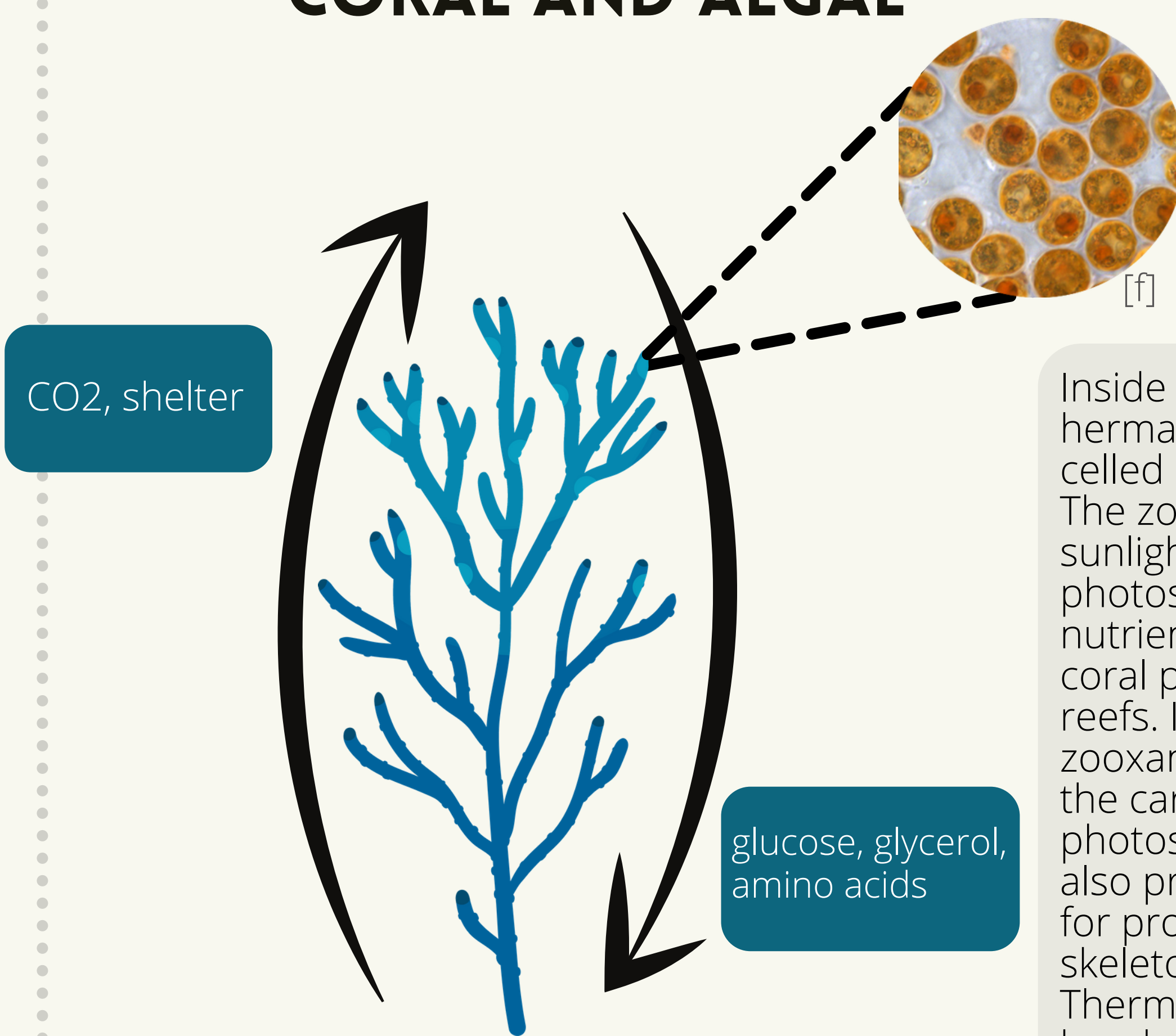


## CLIMATE CHANGE

### UNDERSTANDING CORAL BLEACHING EVENTS



## SYMBIOSIS OF CORAL AND ALGAE



Inside each coral polyp of hermatypic coral lives a single-celled algae (zooxanthellae). The zooxanthellae require sunlight and perform photosynthesis. They supply nutrients and oxygen to the coral polyp that helps to build reefs. In exchange zooxanthellae is provided with the carbon dioxide to undergo photosynthesis. The microalgae also provide colored pigments for protection of the coral's skeleton from sunlight. Thermal stress causes a breakdown of the mutualistic symbiosis. When the corals expel the zooxanthellae, the coral looks bleached. [3]

[1] Hoegh-Guldberg, O., Hoegh-Guldberg, H., Veron, J.E.N., Green, A., Gomez, E. D., Lough, J., King, M., Ambariyanto, Hansen, L., Cinner, J., Dews, G., Russ, G., Schuttenberg, H. Z., Peñaflor, E.L., Eakin, C. M., Christensen, T. R. L., Abbey, M., Areki, F., Kosaka, R. A., Tewfik, A., Oliver, J. (2009): The Coral Triangle and Climate Change: Ecosystems, People and Societies at Risk. Brisbane: WWF Australia.  
[2] Burke, L., Reynter, K., Spalding, M., Perry, A. (2012): Reefs at Risk. Revisited in the Coral Triangle. World Resources Institute.  
[3] Van Treck, P. (2017): Korallenriffe. Lebendige Metropolen im Meer. Darmstadt: WGB.  
[4] Kunzmann, A.: Korallen, Fischer und Touristen, in: Deutsche Hydrographische Zeitschrift, 1999, 10, S. 25-32.  
[5] Boilard, A., Dubé, C.E., Gruet, C., Mercière, A., Hernandez-Agreda, A., Derome, N.: Defining Coral Bleaching as a Microbial Dysbiosis within the Coral Holobiont, in: Microorganisms 2020, 8, 1682. S. 1- 28.

[1] <https://pixabay.com/de/photos/wasser-korallen-unterwasser-1283152/>  
[b] <https://commons.wikimedia.org/w/index.php?curid=1931295>, CC BY-SA 2.0  
[c] <https://commons.wikimedia.org/w/index.php?curid=96348294>, CC BY-SA 3.0  
[d] own figure based on Burke et al. 2012  
[e] own figure based on Burke et al. 2012  
[f] <https://commons.wikimedia.org/w/index.php?curid=79980176>, CC BY-SA 2.0