

IH300 The coupled effect of light and temperature on the thermal tolerance of Acroporids, Indonesia

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Coral reefs are an invaluable resource that millions of people worldwide are dependent upon. They provide a variety of 'ecosystem services' including the production of food, building materials, income, coastal protection and cultural heritage. Quantifying the worth of these benefits is very difficult due to the vast number and the many unknowns, Costanza *et al.*, (1997) has put a value of approximately \$30 billion per year in net benefits from these habitats. Coral reefs are especially important to isolated underdeveloped areas such as the islands of Indonesia. Here communities are very remote and do not have easy access to external resources or outside trade. People survive on the reefs making their homes out of the corals and gaining their main source of protein from the fish. Communities like this are very susceptible to reef destruction and may not be able to survive without them.

Southeast Asia is the heart of this incredible diversity, holding more than 77 percent of the almost 800 reef-building coral species that have been described by scientists. The Wakatobi is one of the largest marine parks in Indonesia, but also one of the most populated and regulations are difficult to enforce. In order to ensure the future of this important habitat it is essential to Gain a greater understanding about the susceptibility of key species on the reef.

One of the most important reef building coral genres of the Indo-Pacific is *Acropora* which are generally fast-growing, highly fecund corals that typically invest energy into 'quantity' not 'quality'. These provide topographic complexity in the reef system, which function as valuable habitats for juvenile and cryptic reef species. These coral species play an essential part in the diversity of coral reefs as well as playing an important role in associated reef fisheries.

Coral reefs are under threat from a number of anthropogenic induced changes such as; overfishing, coastal development, tourism and climate change (Burke et al. 2002). Human activities now threaten an estimated 88 percent of Southeast Asia's coral reefs. These impacts cause corals to become stressed and may lead to a breakdown in the symbiotic relationship between Cnidarian host and algal symbiont, the outcome of which may result in coral bleaching. Coral bleaching is initiated by the breakdown of this relationship and is characterised by the paling of coral tissue, loss of algal

symbiont and in severe cases the loss of host tissue and the death of the coral colony. Previous studies have suggested that Acroporid species are some of those more vulnerable to suffer lethal bleaching responses. Loss of these species will have vast knock on effects within the reef system with the potential to alter associated fish and invertebrate assemblages.

Coral bleaching is a widespread and extensively studied phenomenon, yet many of the underlying mechanisms are still poorly understood. In order to better understand and therefore implement more effective management plans it is imperative to investigate more in-depth the various factors and mechanisms involved in a thermal bleaching response

This project will investigate the coupled effect of light and temperature on Acroporids collected across environmental gradients. These include sites across a light environment as well as sites of greater turbidity and heavy anthropogenic influence. The research could determine whether *Acropora* obtained from shallower environments are more tolerant to thermal stress than conspecifics from deeper habitats. Coral fragments will be installed in to laboratory aquariums, where the environmental conditions can be carefully controlled and manipulated. A range of laboratory skills will be utilised such as fluorometry to assess photosynthetic efficiency, spectrophotometry to assess chlorophyll concentration and microscopy to analyse symbiont cell densities. The experimental component of the research is laboratory based but opportunities exist for both diving and snorkeling elements to be included.

Suggested Reading

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