



CORAL REEFS AND ATOLLS

Coral reefs are calcium carbonate (limestone) structures which are created by colonies of polyps that create a hard exoskeleton (the coral), which then becomes home to zooxanthellae which give the corals their colour. The zooxanthellae and corals live in a relationship which is mutually beneficial, called a symbiotic relationship. Coral bleaching refers to the loss of the zooxanthellae, reducing the stability of the coral; they also lose their colour. Coral reefs have three main structure types. The first is a fringing reef, which forms along the shoreline of most tropical islands. The Barrier Reef is created through the sinking of land below the sea surface, due to a lack of volcanic activity. Lastly the third is an atoll, which is created similarly to the

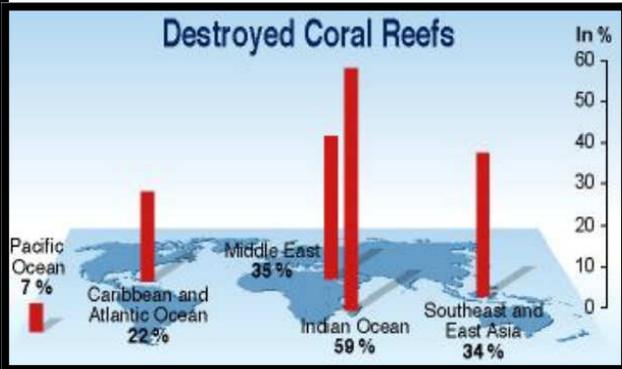
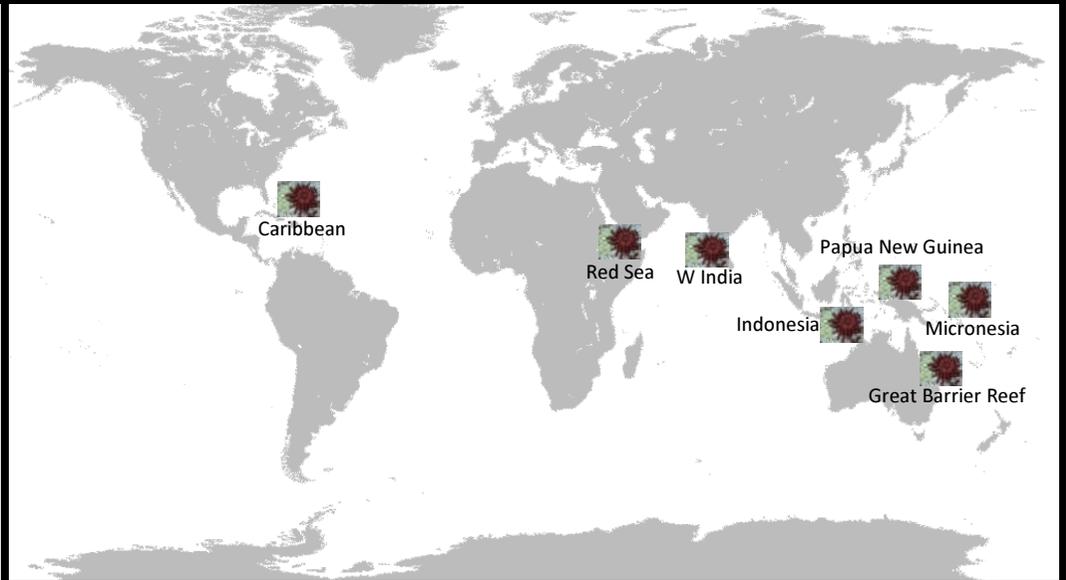
Barrier Reef, but the land sinks quicker, and the reef grows upwards to be near the sunlight.

Coral reefs are produced under very specific conditions. Firstly, the sea temperature should be between 22-28°C, but their minimum temperature is 18°C and maximum is 29°C. The corals require plenty of sunlight, therefore will not grow below 50m below the surface. The corals also grow have an optimum pH of the

water, 8.1. These such narrow boundaries of growth, mean that the corals are vulnerable to changes in their surrounding environment.

Such changes can be human and natural. Corals cannot survive if the water temperature is too high. Global warming has already led to increased levels of coral bleaching, and this is predicted to increase in frequency and severity in the coming decades, as a result of increasing temperature, and acidity of the oceans. Overfishing, careless tourism, pollution and coral mining are all threats which the coral reefs face as a result of human activities. As humans influence over the world increases, there is nearly nowhere in the world untouched by humans. The increased threat from predators also provides a natural threat to this ecosystem. The ability for corals to adapt and change is much lower than other species, due to the slow growing nature of corals, and the relatively fast speed at which their environment is changing; and for this rea-

<http://www.marinebio.net/marinescience/04benthon/crform.htm> SON,
<http://www.com.univ-mrs.fr/IRD/atollpol/ecorecat/ukrecifs.htm> COR-

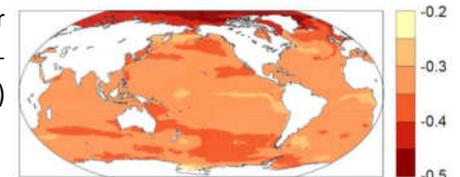


<http://www.clarku.edu/departments/biology/biol201/2008/JaMitchell/Bermuda/bermudai.html>

FUTURE PREDICTIONS (below)

(above) DISTRIBUTION OF HAZ-

- Ocean acidification acts together with other global changes (e.g., warming,) and with local changes (e.g. pollution, eutrophication) to impact coral reefs (*high confidence*).
- - If sea temperatures increase by 0.43°C and 0.46°C by 2099, it will ultimately irreversible degrade coral reefs (*very likely*).



(Above) Prediction of pH changes from 1990-2090



(Left) A common atoll formed as a result of volcanic activity. (Centre) A healthy coral (pink) next to bleached coral. (Right) This is a coral that has died as a result of sedimentation, which can be caused by increased soil erosion, human dumping and degradation of the habitat.