

## ENVIRONMENT

# Rainforests of the Sea

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**WORLD Wetlands Day** was observed earlier this month. Many may be of the opinion that only the areas where mangroves are present are considered wetlands.

However, "wetlands" is an umbrella term and includes a variety of other ecosystems like marshes, estuaries, swamps, floodplains, flooded forests, lakes, ponds, rivers, shorelines and coral reefs. The welfare of these habitats may not be in the forefront of our minds with other environmental issues like climate change being given much attention. However, these ecosystems have their own unique flora and fauna that need to be preserved. One such diverse ecosystem is coral reefs which are touted as being the "rainforests of the sea" as their level of species richness rivals that of their terrestrial counterpart. But what are corals, why are they important, what threats they face and why should they be protected? I hope to answer all of these questions in the following article.

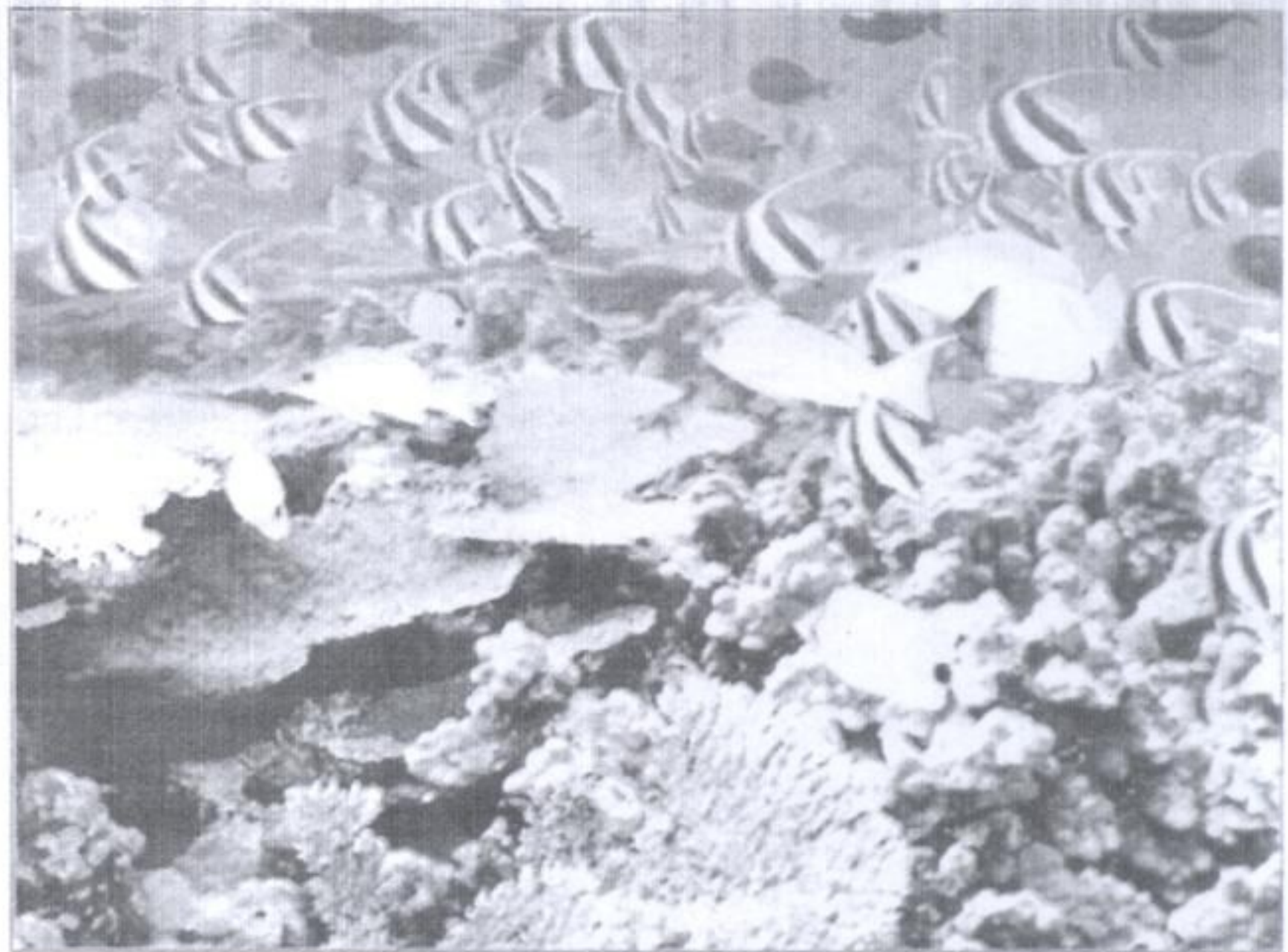
Corals are cnidarians (pronounced ny-dare-ri-ans) which simply means that they belong to the taxonomic group Cnidaria. These radially symmetric animals, which mean they look the same, all the way round (360°). They are referred to as polyps and look like a thin membrane punched inwards to form a sac and the margin of the membrane contains stinging tentacles. You may be more familiar with its larger cousins - jellyfish. Juvenile coral polyps look like miniature jellyfish while they swim about in search of a hard substrate on which to land and start their life cycle. Once attached,

they construct a cup-like shell around themselves. They mostly feed at night sticking their tentacles out and stinging passing plankton and dragging them into their shell to feed. Also when they die new polyps land and grow on top of the old empty shells and it is the structures formed by the accumulation of used shells is what most people usually associate with coral reefs.

They grow at an annual rate of approximately 1 1/4 cm, and the best conditions for reef growth are clear and shallow water (rarely deeper than 40 metres) which allows lots of sunlight to penetrate the water column. This light is required by the single-celled algae which live symbiotically in the polyp to photosynthesize and produce and supply the polyp with oxygen which in turn supply the algae with carbon dioxide. They prefer temperatures between 25 to 30 degrees C and salinities between 34 and 37 ppt (parts per thousand). Therefore it comes as no surprise to find them growing in tropical waters where these conditions are close to optimum.

By now you must be anxious to know about the importance of coral reefs, which includes providing a habitat and shelter for many species of marine animals. Some of these reef inhabitants are fish and mollusks which are a source of food to 30 to 40 million people every year. Therefore these reefs provide the islands they are associated with a source of income via fishing for food or as a source of exotic pets for export. Corals also regulate the carbon dioxide in the ocean to levels tolerable to marine life by converting it to calcium carbonate when they construct their shell. Coral reefs also provide physical protection to the coastline from strong wave action and currents.

Currently ten percent of the world's coral reefs have been com-



pletely destroyed. This destruction is at its worst in the reefs around the Philippines where 70 percent was destroyed and five percent regarded as being in good condition.

Human activity contributes both directly and indirectly to reef destruction. Some of the direct methods include the greenhouse effect caused by global warming, raising the water temperature beyond the point these sensitive creatures can tolerate, where an increase by a single degree can cause them harm. Warmer temperatures also encourage the growth of harmful algae on the corals which block out the sunlight from reaching the zooxanthellae in the polyps. The increased carbon dioxide in the atmosphere dissolves in the oceans creating a carbonic acid which can dissolve the calcium carbonate structures of the reef.

Humans also directly damage the reef through activities such as reef walking which many tour guides would advertise to drum up business. Thankfully this practice is banned in the Buccoo Reef off the southwestern shores of Tobago. Also in other countries where harvesting of reef animals for food and export, overfishing results in some parts of the reef getting damaged through the use of explosives to stun the fish. Sometimes cyanide is used to incapacitate

the fish, but is often used in excess as with the explosives and end up killing a lot of marine life including the coral which is then ripped apart to get to the stunned fish.

Overfishing also removes many of the species that coexist symbiotically with each other in the reef.

Some of these relationships include species that eat the harmful algae that can accumulate on the polyps, those that cover themselves with sponges as a means of camouflage which allows the sponges to access new feeding areas.

Some of these fish may have parasites and come to the reef to be cleaned by other fish species so they personally provide a food source of the members of the reef ecosystem.

Indirect damage to the reefs are caused by pollutants that enter the ocean through the runoff from agricultural land have the effect of accelerating the growth of these harmful algae because of its high nitrate and phosphate content. Raw sewerage has the same effect and this practice of dumping of this into the ocean is still practices in some developing countries. Freshwater entering the ecosystem also act as a pollutant as it affects the salinity of the reef.

One of the indications that the corals are sick is coral bleaching where the symbiotic algae in the polyp leaves or

dies. These algae give the coral their colour so their absence allows one to see right through their transparent bodies and the white shells. Although this phenomenon has been observed since the turn of the century it has worsened since the 1980s.

Although the situation sounds dire there are ways to restore these ecosystems, one of the most obvious ones being the restriction of activities such as reef fishing, while some activities are banned altogether like coral mining, reef walking with the implementation of strict penalties and fines for breaking the law. Our own Buccoo Reef has been declared a protected marine area. Another method of restoration is to provide substrates for the corals to grow on like old tires, automobiles and ships or boats.

Large sections of coral can be reattached with cement. A low voltage electrical current applied through the water causes the dissolved minerals on steel structures in the water to crystallise. The resulting white carbonate coating is similar to the mineral in natural reefs and has the temporary effect of encouraging rapid colonisation by corals.

It is our only hope that this amount of attention be placed on other wetland ecosystems before they become totally destroyed.

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