Research Report

Environment Commission

Strengthening the measures to protect coral reefs in the Pacific region

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Forum	Environment Commission
Issue:	Strengthening the measures to protect coral reefs in the Pacific region
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Introduction

Coral reefs, sometimes referred to as “rainforests of the sea”, form some of the most diverse ecosystems on the planet. They cover no more than 1% of the ocean floor, yet they house a total of 25% of all marine species. Roughly 91.9% of all coral reefs are located in the Indo-Pacific region, with 40.8% of all coral reefs directly in the Pacific region (the Pacific region including Australia). Aside from being aesthetically pleasing and housing a quarter of all marine life, coral reefs are an asset to people as well, providing roughly $375 billion dollars in services each year. Coral reefs are currently under threat from several different factors and most of them will have to be tackled if we are to save these reefs from extinction. The immediate threats to coral reefs include coral mining, blast fishing, overfishing, agricultural and urban runoff, and the digging of canals. A broader threat is climate change, which is causing a rise in sea temperature, a rise in sea levels, and changes in ocean pH. All of the above are due to greenhouse gas emissions. Recent research has shown that 10% of the world’s coral reefs have already died out while 60% of the world’s coral reefs are currently under threat, and estimates reveal that by 2030 that number will have risen to 90% of all coral reefs being under threat of destruction by humans.

Coral reefs are a source of livelihood for people living near reefs: they generate money through tourism, are a source of unique compounds used in modern medicine to treat illnesses like cancer, are the nurseries for the world’s fish colonies, and form natural protection against storms, hurricanes or tsunamis. In short, losing coral reefs could impact the economy and the rest of the world very negatively. Protecting coral reefs is in the interest of all parties involved, as losing them would mean losing all the benefits that they provide.

Definition of Key Terms

Coral Reef

A coral reef is defined as an underwater structure made up of stony corals, which in turn are made up of clusters of polyps. Polyps are animals belonging to the Cnidaria group (this group also includes jellyfish) and these polyps secrete a hard calcium carbonate exoskeleton for protection. That exoskeleton is what we commonly observe and call 'coral'.

Coral Aquaculture

Coral aquaculture, otherwise referred to as coral gardening or coral farming, is a process by which coral can be grown faster and reefs restored. The process bypasses the early stage of coral growth when they are most likely to die by growing the seeds in monitored nurseries, and only planting the coral into the reef once its chances of survival have notably increased.

Algae Encroachment

Algae encroachment refers to the situation when algae which is normally present in almost all marine environments starts to outcompete other plant or animal species, such as coral, resulting in the demise of that species and an even further increase in algae levels. Algae encroachment can occur due to decline in fish populations that feed on algae, or a rise in ocean temperatures, as algae thrive in warmer conditions while most other species do not.

General Overview

How coral reefs are formed

Most coral reefs alive today were formed during the last glacial period, when the sea levels rose rapidly and covered the continental shelves. Coral communities started to grow on these shelves, creating the coral reefs. This makes most coral reefs around 10,000 years old. Healthy coral reefs can grow around 1 to 25 cm vertically, and 1 to 3 cm horizontally. However, they can only grow at a depth shallower than 150 m, otherwise there is too little sunlight for the young coral to survive. This puts into perspective how long it would take to correct the damage already made to coral reefs, which amounts to many kilometers.

Benefits of coral reefs

Tourism

Coral reefs generate a huge amount of money through tourism, benefiting the world economy and the economies of around 100 countries worldwide. They also provide millions of jobs in these countries. Statistics reveal that on average, countries with coral reef industries derive more than half of their GDP from the coral reefs. These countries are usually quite small and have local economies. A good example is the small Caribbean island Bonaire. Annually, its coral reef industries produce $23 million while costing only $1 million to uphold. The island's entire economy relies on the coral reefs, and coral destruction for places such as Bonaire could have very serious consequences as a result.

Fishing

In the Southeast Asian region alone, coral reefs produce $2.4 billion dollars worth of seafood per year. Without these reefs, seafood would become scarce and those relying on fishing for an income would suffer and find it difficult to support themselves. The destruction of coral reefs would not only effect the fishing near the reefs, but fishing worldwide, as coral reefs are used as nurseries by numerous fish species, and since coral reefs form the bottom of the food chain in the marine ecosystem, all manner of marine life could be endangered. This would mean huge losses to the fishing industry and as a result it would impact the world economy.

Medicine

As well as having provided local remedies for centuries, the unique compounds produced by the coral in coral reefs is starting to be applied in modern medicine. New drugs originating from coral reefs have been developed to treat diseases such as cardiovascular disease, ulcers, leukemia, lymphoma, and skin cancer. Other chemicals have been found to treat inflammation, kill viruses and relax muscles. In addition to this, the unique structure of coral makes it ideal for bone grafting. Furthermore, more than half of all research into drugs that combat cancer is focused on marine organisms (most of which can be found in coral reefs).

Coastal protection

For centuries coral reefs have formed a natural barrier between the waters of the Ocean and the coast. Coral reefs act as a buffer between violent waves created by

storms, hurricanes and tsunamis, preventing erosion, property damage, and loss of life. If these barriers were lost, artificial ones would have to be built to replace them to prevent loss of life and damage to property.

Causes of coral reef destruction

Without fail all of the causes of coral reef destruction are due to human interference, and are reversible.

Blast fishing and overfishing

Blast fishing is a form of fishing using explosives. Fishermen use the explosives to scare fish into their nets. However, when an explosive hits a coral reef, the reef is heavily damaged. Overfishing poses a whole new array of problems. Overfishing is when so many fish are killed that the fish population cannot replace them, and thus the population of fish starts to decrease heavily. For the coral this means that the fish population, which normally keeps the algae levels in check, is gone, and this results in excess algae, which suffocates and kills the coral.

Algae

Algae encroachment is a huge threat to coral reefs. Recent rises in water temperatures, absence of the fish that normally feed off the algae, and an increase of nutrients spilled into the water from the shore, means that the algae concentration has risen drastically. In some areas the algae is outcompeting the coral for both nutrients and sunlight, effectively killing the reef.

Green house gases

The green house gases causing climate change are responsible for several factors threatening the existence of coral reefs. The rise in air and water temperature caused by climate change is destroying the reefs. Coral reefs are very delicate ecosystems that thrive only in cool and shallow waters. Rise in sea levels and temperature inhibits coral growth and health. Furthermore, ocean acidification, also caused by green house gases, is decreasing the pH of the water and as such is destroying the coral.

Major Parties Involved and Their Views

Australia

Australia has been a major player in drafting UN resolutions on the topic of coral reef preservation. The resolution entitled 'Protection of Coral Reefs for Sustainable Livelihoods and Development' was drafted and submitted to the General Assembly by Australia. This issue also personally affects Australia, as they famously have control over the largest coral reef on the planet, the Great Barrier Reef, which has been named a UNESCO world heritage site. The destruction of this site would be a great loss for Australia.

United States of America

The US has its own smaller coral reefs off the coast of Hawaii, and is very dedicated to preserving all other coral reefs in its vicinity. With the help of its National Oceanic and Atmospheric Administration (NOAA), it is closely monitoring the changes in all of its coral reefs with the help of an extensive database.

International Coral Reef initiative

The ICRI, set up in 1994, is an organization independent of the UN in which governments and various organizations can meet and discuss solutions to the coral reef issue. All parties in this organization are dedicated to preserving coral reefs.

United Nations Environment Program (UNEP)

This is the major branch of the UN that has been set up to deal with the execution of all the programs the UN has endorsed regarding the environment. The UNEP has set up a specific sub-sub committee to deal with the coral reef issues, the Coral Reef Unit (CRU), which represents the UNEP, and thus the UN, in the ICRI. The main goal of the UN environmental program is to preserve the coral reefs, taking into account its importance for the world as a whole.

Timeline of Events

Date	Description of event
1992	UNCED in Rio adopts the Agenda 21, of which Chapter 17 deals with the protection and sustainable development of marine and coastal environments

1994	The International Coral Reef Initiative (ICRI) was launched as the only global entity devoted to the conservation of coral reefs. It is made up of governments, international organizations and non-governmental organizations.
2000	United Nations Environment Program (UNEP) sets up Coral Reef Unit (CRU), an organization which deals with all of UNEP's involvement in the coral issue, even representing UNEP in the ICRI
2010	The General Assembly adopts its first two resolutions concerning coral reef protection, **(A/RES/65/105)** resolution and **(A/RES/65/37)**

UN involvement, Relevant Resolutions, Treaties and Events

- Protection of Coral Reefs for Sustainable Livelihoods and Development, 2010, **(A/RES/65/105)**
- Oceans and the Law of the Sea, 2010, **(A/RES/65/37)**

Evaluation of Previous Attempts to Resolve the Issue

One of the first steps taken to protect coral was to introduce a system similar to national parks and wildlife refuges. These are known as marine protected areas, MPA for short. Within these areas stricter guidelines for fishing and habitat protection exist, thus effectively limiting the negative impact of direct human activity on coral reefs. However, establishing these protected zones does nothing to curb the effect of green house gases and climate change on the coral reefs. A more complete solution remains to be found.

The UN has contributed to finding a solution to this problem by adopting two resolutions geared very specifically to protecting marine environments such as coral reefs. One of the resolutions, entitled Oceans and the Law of the Sea **(A/RES/65/37)**, provides guidelines for human interaction with the sea. The other resolution, resolution **(A/RES/65/105)** on the Protection of Coral Reefs for Sustainable Livelihoods and Development, written in close conjunction with the ICRI, focuses specifically on protecting coral and establishing the importance of this issue world wide. These two resolutions aside, the most active international party in this issue has been the ICRI, which holds numerous

meetings between governments and organizations to discuss the most effective ways of protecting coral reefs.

Another attempt at resolving the issue was to grow more coral through coral aquaculture. This is a viable option in that it increases the amount of coral in the ocean. However, coral is disappearing at a rate that no amount of aquaculture can match: we are simply not able to replace all the coral that is lost. This option would prolong the existence of coral on our planet, but ultimately coral would still disappear without any protection.

Possible Solutions

Listed above are several previous solutions, along with some of their advantages and disadvantages. The MPA's protect coral from threats such as blast fishing and overfishing, and consequently also a little bit from algae, while the coral aquaculture solution is a viable way of replacing coral already lost and combating coral losses to an extent. However, neither option tackles the crucial issue of coral destruction due to climate change and the adverse effects brought on by it.

Without tackling the issue of climate change, coral reefs will be near extinction by 2050, as they cannot survive in water that is even a few degrees different than what they are used to. However, this does not mean that the whole resolution should revolve around global warming. Although some clauses could be dedicated to tackling greenhouse gas emissions, such as suggesting the use of clean energy sources and energy-efficient homes, running campaigns that raise awareness, or mentioning global warming as one of the main threats to coral reefs in a perambulatory clause, the main focus should still lie on coral-specific solutions to this issue. After all, this issue is specifically about strengthening measures to protect coral reefs, not combatting global warming.

Many coral reefs have been declared a world heritage site, and they offer the world numerous economic and social benefits. Loss of these coral reefs would be a hardship for everyone involved and a conscious effort to protect them must be made.

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Appendix or Appendices

I. http://water.epa.gov/type/oceb/habitat/coral_index.cfm

II. http://coral.unep.ch/CRU_Home.html