

Acid oceans spell doom for coral

By Carolyn Fry
In Stockholm

The increasing acidity of the world's oceans could banish all coral by 2065, a leading marine expert has warned.

Professor Katherine Richardson said sea organisms that produced calcareous structures would struggle to function in the coming decades as pH levels fell

The Danish expert told the EuroScience Open Forum 2004 that human-produced carbon dioxide was radically changing the marine environment.

CO2 levels are now said to be at their highest level for 55 million years.

Most of it will eventually be absorbed by seawater, where it will react to form carbonic acid.

The normal acidity of the ocean is around pH 8, but experts predict this could drop to pH 7.4.

Scientists fear this increasing acidification could have a particularly detrimental effect on corals and other marine organisms, because it reduces the availability of carbonate ions in the water for them to make their hard parts.

Record readings

As climate change research has primarily concentrated on the impacts on land and in the atmosphere, our knowledge of what the rise will mean is uncertain.

However, as there are 78,000,000 gigatonnes of carbon locked up in ocean sediments compared with 750 gigatonnes of carbon in the atmosphere, the rise could have very serious implications for the carbon cycle, Professor Richardson believes.

"It makes sense that the component of the Earth's system we need to understand the most is the biggest," said the researcher from the Department of Marine Ecology in Aarhus, Denmark. "But it just happens to be the one that's most difficult for us humans to explore."

CO2 levels in the atmosphere, driven up by the burning of fossil fuels, currently stand at about 380 parts per million (ppm) - up from their pre-industrial mark of around 280 ppm.

Carbon dioxide is removed from the atmosphere by microscopic ocean-dwelling plants called phytoplankton, through photosynthesis. But one group, called the coccolithophorids, also produce calcium carbonate platelets, called liths.

Each lith is only about 2.5 micrometres (millionths of a metre) across but a very great many are produced each year.

It is estimated that blooms of the dominant species, *Emiliana Huxleyi*, annually cover about 1.4 million sq km of the ocean.

When they die, they rain down to the ocean floor, in the process locking carbon away in a vast sediment store. This biological pump helps to control the exchange of carbon between the oceans and atmosphere.

Knowledge search

" *E. Huxleyi* has dominated the world's oceans since the Holocene, but prior to that a different species was responsible for moving all the carbon to the bottom," explained Professor Richardson.

"It's anyone's guess if another species would step in if *E. Huxleyi* can't tolerate the more acidic conditions."

Scientists are beginning to address the gaping holes in our knowledge. Last week, the UK's academy of science, the Royal Society, announced a study concentrating on the impact of increased acidity on marine life.

An extra reason for the concern is that scientists have considered exploiting ocean processes to help mitigate rising CO2 levels.

The idea is that by artificially "fertilising" phytoplankton at the ocean surface, it might be possible to stimulate the take-up of CO2 - locking away some of the extra CO2 in the atmosphere that is believed to be forcing global temperatures to rise.

If increased acidity begins to hinder the natural removal of CO2 from the atmosphere, however, then we may lose one opportunity to reverse any damage induced by human activity.

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