

CLIMATE CHANGE THREATENS CORAL REEFS

“Coral reefs are a vital resource, and an increasingly endangered one,” writes BBC Online Environment Correspondent Alex Kirby. The world's coral reefs, already facing several threats to their health, are now thought to be in further jeopardy. Scientists from the USA, France and Australia say their research suggests that increasing levels of carbon dioxide (CO<sub>2</sub>) in the atmosphere may be imperiling the coral's ability to construct reefs. Their work is reported in the latest issue of the magazine *Science*. Many reefs have already been affected by bleaching, a process in which the coral loses its colour and turns a pallid white. Bleaching is a sign of stress, which is caused by several factors, including pollution, silt, changes in salinity, and rising water temperatures.

Climate change is expected in any case to raise water temperatures significantly. But this new research suggests that it will affect the coral in another way as well. It shows that when CO<sub>2</sub> dissolves in seawater it makes it more acidic. And that affects the way in which the coral forms. Reefs consist of calcium carbonate, produced by tiny creatures called coral polyps. Coralline algae "glue" various corals together with compounds of calcium, and other organisms - for example tube worms and molluscs - add their skeletons to the structure. The researchers found that as the CO<sub>2</sub> dissolves in the water, the increasing acidity it causes slows down the production of calcium carbonate. It does this by lowering the levels of essential carbonate ions in the seawater. The scientists calculate that the precipitation of calcium carbonate has already fallen by an average of between 6 and 11% since the industrial revolution. And if the atmospheric CO<sub>2</sub> level increases to double what it was in pre-industrial times, they think the precipitation will fall by a further 8 to 17%. CO<sub>2</sub> is the chief gas caused by human activities that is contributing to global warming. And climatologists think it will have reached double its pre-industrial level by as early as 2065.

If the coral does suffer further damage, places like the Red Sea and Australia's Great Barrier Reef will lose their attraction for tourists. But the reefs' importance is far more fundamental than that. They are among the world's most diverse and productive ecosystems, something which has earned them the title of "the rainforests of the seas". They shelter fish and other forms of marine life, and help to protect shorelines against erosion. Nearly 60% of them are already at risk from some kind of human disturbance. But more damage seems inevitable, as the CO<sub>2</sub> levels continue to rise. And quite apart from the CO<sub>2</sub> that finds its way into seawater by natural processes, several recent experiments have explored ways of deliberately using the oceans to absorb CO<sub>2</sub>. The experiments, which involve "seeding" the water with iron, are aimed at seeing whether the oceans could help to mitigate the effects of climate change. They have encouraged some scientists to believe that seawater's natural ability to absorb CO<sub>2</sub> could be exploited artificially, by pouring immense quantities of iron into the oceans. And that would spell even worse news for the coral.