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PAPER 3D: SCIENCE

For information only, not to be translated: The text is an excerpt from Climate Change – Biodiversity and Livelihood Impacts *by Hannah Reid, available at www.iied.org, and deals with the effects of climate change on coral reef systems and their biodiversity. Translate for readers of a similar publication in your target language.*

TRANSLATION TO BEGIN HERE:

How climate change affects biodiversity

Climate change is likely to have a number of impacts on biodiversity – from ecosystem to species level. The most obvious impact is the effect that flooding, sea level rise and temperature changes will have on ecosystem boundaries, allowing some ecosystems to expand into new areas, while others diminish in size. As well as shifting ecosystem boundaries, these changes will also cause changes in natural habitat – an outcome which will have a knock-on effect on species survival.

The impacts of climate change on biodiversity will vary from region to region. The most rapid changes in climate are expected in the far north and south of the planet, and in mountainous regions. These are also the regions where species often have no alternative habitats to which they can migrate in order to survive. Other vulnerable ecosystems and species include small populations or those restricted to small areas. Coral reefs have already shown devastating losses as a result of increased water temperatures.

Coral Reefs and Global Climate Change

Coral reefs have the highest biodiversity of any marine ecosystem, and they provide important ecosystem services and direct economic benefits to large and growing human populations in coastal zones. Although the natural habitat of coral reefs can be a stressful environment, recent global increases in reef ecosystem degradation and mortality suggest that the rate and nature of recent environmental changes often exceed the adaptive capacity of coral reefs. This can lead to the replacement of the coral reef community by non-reef systems. Such ecosystem shifts are well advanced in the Caribbean region, where two major reef-building coral species have been devastated by disease, and in the Indo-Pacific region, where repeated episodes of lethal 'bleaching' have occurred.

This crisis is almost certainly the result of interactions between multiple stresses. These include increased nutrient and sediment loading, direct destruction, contamination, over-harvesting, disease and predation. Rising ocean temperatures have been implicated in

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chronic stress and disease epidemics, as well as mass coral bleaching episodes and reduced calcification. Increasing atmospheric CO_2 levels can also inhibit calcification. It is difficult to separate the effects of global climatic and local non-climatic influences when considering reef condition or vulnerability.

Predicting the future of coral reefs is difficult because current environmental changes are causing a combination of surface ocean chemistry and temperature conditions that have not occurred in the evolutionary history of modern coral reef systems. Although climate change has the potential to yield benefits for certain coral species in specific regions, such as the expansion of their geographic ranges, most effects are stressful rather than beneficial. Continued climate change will almost certainly cause further degradation of coral reef communities, which will be even more devastating in combination with the continuing non-climatic stresses.

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