ECOLOGY

No escaping the heat

Glob. Change Biol. http://doi.org/fxh53r (2012)

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Warming ocean temperatures have been implicated in the degradation of the world's coral reefs. Marine protected areas (MPAs) provide one tool to increase coral reef ecosystem resistance and resilience (that is, recovery) to the negative effects of climate change, yet few studies have evaluated their efficacy in this regard.

Elizabeth Selig, from Conservation International, Arlington, USA, and co-workers used high-resolution global temperature records for 1985–2005 together with over 8,000 live coral surveys from protected and unprotected reefs to investigate whether MPAs have indeed helped to minimize temperature-driven coral loss.

Results suggest that protection in MPAs has generally not reduced the negative effects of warm-temperature events on coral cover. Shortcomings in MPA design may have contributed to the lack of a beneficial effect. Nevertheless, these findings do suggest that the benefits from MPAs may not be great enough to offset the losses from acute thermal-stress events, implying that additional conservation strategies may be required to combat coral loss from thermal stress. *AB*

CLIMATE FEEDBACKS

Open water and cloudy skies

Geophys. Res. Lett. http://doi.org/hqx (2012)

Arctic sea ice has been decreasing for the past 30 years. Model simulations of sea-ice extent have a tendency to underestimate this decline, with cloud feedback being a large source of uncertainty. Improved knowledge of the role of clouds in Arctic climate is needed to improve predictions of sea-ice cover in coming years.

Clouds are known to influence sea-ice growth and melt. To improve quantification of this relationship, Yinghui Liu, of the University of Wisconsin in Madison, and colleagues studied satellite data from 2000–2010, to measure sea-ice coverage and cloud amount.

Results show that for each 1% decrease in sea ice there is around a 0.4–0.5% increase in cloud cover during the July–November period. Increased cloud amount constitutes a positive climate feedback by trapping longwave radiation, which leads to greater warming and further accentuates sea-ice melt. 22–34% of cloud variability is linked to variability of sea ice. These findings indicate that further warming and sea-ice melt in coming years could lead to cloudier skies in the Arctic. *BW*

ECONOMICS

China's export carbon tax

Energ. Econ. http://doi.org/hqv (2012)

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Since 2007, the Chinese government has introduced restrictions — such as export taxes and quotas — in energy-intensive sectors as part of its low-carbon development strategy. This approach, however, has failed to generate an explicit carbon price and signal abroad China's political will to tackle climate change.

Ji Feng Li from the State Information Centre of China, Beijing, and colleagues analysed the economic rationale of directly taxing the carbon dioxide emissions of Chinese exports. In their model, they set the export carbon tax at 200 Yuan per tonne of carbon dioxide and analysed the associated effects. They found that the tax is likely to decrease the export of energy-intensive products with, for example, ferrous metal down by more than 8% and chemicals by 3.3%. In terms of the carbon emissions generated directly by exports, they estimated an overall cut of 3.77%.

The researchers also analysed the economic viability of the export tax. They found that in terms of increasing consumption levels and limiting losses in investment and gross domestic product, the best strategy is to earmark the fiscal revenues from the tax to stimulate consumption. *MC*

BIODIVERSITY

Rarity value

Ecol. Lett. http://doi.org/hqw (2012)

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Predicting the consequences of changes in biodiversity requires understanding of species' susceptibility to environmental drivers such as warming and their functional roles within ecosystems. Most studies so far have investigated the effects of random biodiversity losses. Although valuable, the limited realism of these studies limits their applicability to practical conservation problems.

Matthew Bracken from the Marine Science Center at Northeastern University, USA, and Natalie Low from the Department of Ecology and Evolutionary Biology at Brown University, USA, investigated the effect of realistic species loss on biodiversity by removing species from a rocky-shore community in a way that mimicked natural patterns of species loss.

Results indicate that the rarest species in this ecosystem act from the bottom up to disproportionately impact the diversity and abundance of consumers higher up the food chain. Losses of rare species — comprising <10% of biomass at the base of the food chain — resulted in a 42–47% decline in consumer biomass. These findings demonstrate the potential ecological importance of rare and otherwise seemingly insignificant species in determining ecological response following environmental changes. *AB*