BIODIVERSITY AND ECOLOGY

Ocean species shift

Glob. Change Biol.
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The world's major commercial fisheries could shift their distribution within decades if greenhouse gas emissions continue to soar. While high-latitude regions are expected to benefit from anticipated changes in ocean fisheries, the tropics are likely to suffer a decline in this much-needed food source, finds a new study.

A team of researchers led by William Cheung of the University of East Anglia, UK, estimated probable changes in the potential catch of 1,066 commercially exploited marine species, ranging from krill to sharks. Using an approach known as the bioclimatic envelope model to identify species' environmental preferences, the team analysed changes in the distribution of these fisheries up to the year 2055, relative to a 2005 baseline, in a low- and in a high-emissions world. Under the most extreme scenario, they found that catch potential would increase by an average of 30–70 per cent at high latitudes and decrease up to 40 per cent in the tropics. If these projections materialize, fishing nations in the Indo-Pacific region will fare badly, as will fisheries in semi-enclosed seas such as the Red Sea.

The authors note they were unable to account for some key variables that could influence fisheries, such as ocean acidification.

Olive Heffernan

TECHNOLOGY

Risky business

Geophys. Res. Lett. **36,** L19703 (2009)

Injection of aerosols into the atmosphere could be used to cool the climate in the case of a planetary emergency. But stratospheric 'geoengineering' would have considerable risks and costs, warns a new study.

Alan Robock and colleagues at Rutgers University in New Jersey evaluate the pros and cons of various methods of injecting a sulphur gas into the stratosphere. Among the dangers of such a scheme is the risk of substantial ozone depletion, including delayed recovery of the Antarctic ozone hole. Other risks include regional drought, ocean acidification, a reduction in sunlight and the end of blue skies. The cost would depend on how the gas was deployed; using existing US military planes would be the cheapest option, at roughly several billion dollars per year, say Robock and colleagues. Lofting the gas using artillery shells or balloons would be more expensive. Other options, such as pumping the gas through a tall tower or lifting it into the stratosphere using a space elevator, may be possible in the future, say the scientists, but the costs of those methods cannot be evaluated yet.

Associated dangers, rather than cost, will ultimately limit the potential of geoengineering as a solution to climate change, conclude the authors.

Olive Heffernan

SOCIETY

Green and greedy

Psych. Sci. (in the press)

Purchasing green products can make people behave less altruistically, suggests new research.

Nina Mazar and Chen-Bo Zhong of the University of Toronto conducted three experiments to gauge how people's interaction with green products affected their other social interactions. The first experiment, involving 59 students, showed that participants rated those who buy green products as being more cooperative, altruistic and ethical than those who purchase conventional products. In the second experiment, each of 156 students was randomly assigned to shop at either a

conventional or 'green' online store, in which they were either exposed to items or invited to purchase items. The same students then participated in a game that involved sharing money with an unidentified person in a separate room. While those exposed to the green products shared more money than those exposed to the conventional products, participants who had bought green products shared less money. In a final experiment, which set 90 students the task of playing a computer game, purchasers of green products were the most likely to lie and steal to earn extra money.

The authors suggest that buying green products may act as a 'moral offset', prompting people to be more lax with other ethical norms.

Olive Heffernan

REGIONAL CLIMATE

Southeast drought

J. Clim. **22,** 5021–5045 (2009)

A recent drought that struck the southeastern United States was largely the result of rising demand for water, rather than human-induced climate change, suggests a new study.

A team led by Richard Seager of the Lamont-Doherty Earth Observatory at Columbia University in Palisades, New York, investigated the nature and cause of the drought, which began in the winter of 2005–2006 and lasted two years. The team used a wide range of data in their analysis,

including satellite and ground-based precipitation measurements, tree-ring records of moisture over the last millennium, model-simulated atmospheric conditions from 1856 to 2007 and climate change projections from the fourth assessment report of the Intergovernmental Panel on Climate Change. They found that the recent event was typical for the region, where long and severe droughts have occurred in earlier centuries. Climate models differ considerably in their estimates of how climate change will affect the hydrology of the southeastern US, on average predicting a modest increase in precipitation and evaporation, with the overall outcome highly uncertain.

They authors warn that climate change should not be relied upon to solve the region's water woes and that it could make matters worse rather than better.

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PALEOCLIMATE

All creatures small

PNAS

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A rapid warming about 55.5 million years ago led to the brief proliferation of smaller-bodied insects and earthworms, say scientists, who predict that the same phenomenon may be underway today. During the Palaeocene-Eocene thermal maximum, temperatures soared for a period of about 100,000 years, as did atmospheric carbon dioxide concentrations.

Jon Smith of the Kansas Geological Survey and colleagues analyzed trace fossils left behind by burrowing insects in the Bighorn Basin, Wyoming, before, during and after this ancient warming episode. During the period of peak warmth, the average body size of burrowing creatures was significantly smaller than during cooler periods. The authors infer that the hot, dry climate brought — on by the spike in atmospheric carbon dioxide levels — suppressed adult body size, probably by shortening lifespans and altering patterns of juvenile development. In addition, say the authors, high CO_2 levels may have lowered the nutritional value of plants favoured by insects for feeding, thereby limiting growth.

The team points out that if modern insects respond similarly to climate change, body size could already be decreasing. Living organisms could be compared with museum collections and archaeological specimens to monitor such changes, they say.

Alicia Newton

EARTH SCIENCE

Refining the future

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Biogeosci. **6,** 2099-2120 (2009)

Global climate simulations have traditionally assumed that limitless nutrients are available for new plant growth, which can temper warming by absorbing CO_2 from the atmosphere. New research now questions that assumption and suggests that warming over the next century could be higher than anticipated.

The new study, by Peter Thornton of Oak Ridge National Laboratory, Tennessee, and colleagues, is the first to successfully incorporate the nitrogen cycle and its interactions with the carbon cycle into a fully coupled global climate — model that is, one that includes the ocean and the atmosphere. Simulating the climate over 230 years, the researchers found that, compared with a regular simulation, carbon taken up by terrestrial plants was two to three times lower in a high-CO_2 world owing to ni trogen-imposed restrictions on plant growth. But warmer temperatures also encouraged decomposition, freeing up nitrogen in the soil and increasing carbon uptake. This latter effect was insufficient to offset nutrient limitations on plant growth, however, resulting in an overall reduction in new vegetation.

The authors suggest that inclusion of the nitrogen cycle in other climate models would narrow the uncertainty in estimates of future carbon dioxide concentrations.

Anna Armstrong