

Rings of change

It remains unclear how global warming will affect the El Niño/Southern Oscillation (ENSO), in part because the instrumental record is too short to discern how ENSO activity has changed in the past. Now a 700-year-long ENSO record derived from the growth rings of kauri (*Agathis australis*) — a rare long-lived climate-sensitive tree from northern New Zealand — suggests that the twentieth century, although not unique, was the most ENSO-active century of the past 500 years. These results indicate that ENSO-related climate variability may increase in New Zealand with continued warming.

[Letter p172]



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Oil-sand costs and benefits

Canada's vast Alberta oil-sand deposits are estimated to contain 1.8 trillion barrels of oil (roughly seven times the proven reserves of Saudi Arabia). In a Commentary, Neil Swart and Andrew Weaver investigate the implications of continuing to exploit this resource, suggesting that it could contribute enough carbon dioxide to the atmosphere to induce around a 0.36 °C increase in global mean temperature. The authors argue that the economic benefits of the Alberta oil sands therefore need to be weighed against the need to limit global warming caused by carbon dioxide emissions.

[Commentary p134]

The other greenhouse culprits

Carbon dioxide is not the only greenhouse gas and, with the postponement of new carbon dioxide regulations at the Durban climate negotiations until 2020, policymakers are now focusing on some of

the other planet-warming pollutants to stay in the race to keep global temperature rise below 2 °C. Sonja van Rensen investigates the culprit compounds (such as black soot and fluorinated gases) on the watch list and the policy levers that are being employed in an attempt to control them.

[Policy Watch p143]

Climate-ecosystem regulation

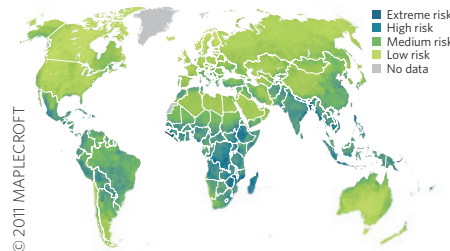
Terrestrial ecosystems regulate climate through both biogeochemical (greenhouse-gas regulation) and biophysical mechanisms (regulation of water and energy). However, policies aimed at climate protection through land management — including the REDD+ (where REDD is Reducing Emissions from Deforestation and Forest Degradation) programme and bioenergy sustainability standards — account only for biogeochemical mechanisms. Now a study combines work on quantifying the greenhouse-gas value of ecosystems with models of the effects of biophysical processes to produce an integrated metric of climate regulation services. The approach is used to quantify climate regulation values of natural and managed ecosystems across the Western Hemisphere.

[Letter p177; News & Views p151]

Adapting to corruption

At the international climate meeting held in Copenhagen in December 2009, the principle for an adaptation fund of US\$100 billion was established to help the world's poor avoid and/or cope with the consequences of climate change. Some of this money will soon begin to flow to poor and vulnerable countries, but, with the 20 countries expected to suffer the most from climate change also having among the worst corruption records, safeguarding this cash for its intended purpose is likely to be an exceptionally tough job, argues Anna Petherick.

[Market Watch p144]



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Extreme heat effects on wheat

An important source of uncertainty in anticipating the effects of climate change on agriculture is limited understanding

of crop responses to extremely high temperatures. This uncertainty partly reflects the relative lack of observations of crop behaviour in farmers' fields under extreme heat. Now a remote-sensing study demonstrates accelerated aging of wheat in northern India in response to extreme heat (>34 °C); an effect that reduces crop yields but is underestimated in most crop models. These results imply that warming presents an even greater challenge to wheat than indicated by previous modelling studies.

[Letter p186; News & Views p152]



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Forest-carbon policy

Complex ecological and social settings make the programme on reducing emissions through avoided deforestation, forest degradation and other forestry activities in developing countries (also known as REDD) a challenging policy to design. Now a Perspective advocates the advantages of a modular policy framework that is able to distinguish, and adequately compensate, the different outcomes of any forest-carbon initiative. This could provide an improved framework to promote and manage incentives for effective forest-carbon initiatives, offer better scope to find common ground in policy negotiations and allow faster adaptation of policy to an uncertain future.

[Perspective p155]

Meeting of minds

In 2001, British artist David Buckland founded Cape Farewell to bridge a communication gap between the science of climate change and the societal shift required to avoid or cope with it. In a News Feature, he describes the evolution of Cape Farewell (or should that be 'fare well') and highlights some of the artistic contributions that have flowed from it, illustrating why we need a cultural response to climate change.

[News Feature p137]