POLICY

Mitigation cost estimates

Nature **493,** 79–83 (2013)

For more than ten years, international climate debate has focused on how to keep global warming below 2 °C. Despite many scenario analyses, cost estimates of achieving such a target remain a challenge, due to a number of poorly quantified uncertainties.

Joeri Rogelj worked with colleagues at the International Institute for Applied System Analysis, Laxemburg, Austria, to generate the cost distributions of limiting transient global temperature increase to below specific values. They did this by considering uncertainties in geophysical, technological, social and political factors. They found political choices that delay mitigation have the largest effect on the cost distribution, followed by geophysical uncertainties, social factors influencing future energy demand and, lastly, technological uncertainties surrounding the availability of options for greenhouse-gas mitigation.

They conclude that, as it is unlikely a global agreement on climate will be reached before 2020, national and local governments need to scale-up voluntary actions and choose policies that lower growth in energy demand well before then, to safeguard the potential achievement of the 2 °C target. *MC*

ADAPTATION

Preparing for droughts

Climatic Change http://doi.org/j6z (2012)

The intensification of extreme droughts from climate change raises concerns about how to respond to such events. Building adaptive capacity — the ability to prepare for stresses and changes or adjust and respond to their effects — can help to reduce drought impacts, but it requires a good understanding of governance and the institutional determinants of adaptive capacity.

Drought preparedness in the form of monitoring and early warning systems, impact assessment, and mitigation and response, is an important part of adaptive capacity. While at the American Association for the Advancement of Science, Washington DC, USA, Nathan L. Engle investigated drought-preparedness measures during recent extreme events in Arizona and Georgia. His empirical assessment found that adaptive capacity is highest when drought preparedness is managed at the local level, plans and monitoring are flexible, and the informational support system is comprehensive. Moreover, he highlights the importance of cross-sector collaboration, of considering climate change at planning stages, and of making boundary organizations accessible and active in water management and drought-planning efforts. *MC*

PALEOCLIMATE

Long-term relationship

Proc. Natl Acad. Sci. USA http://doi.org/j65 (2012)

Sea-level rise is a potentially significant consequence of climate change. Accurately predicting the magnitude of change is difficult, however, because current climate models are unable to resolve the dynamic processes that govern ice-sheet changes.

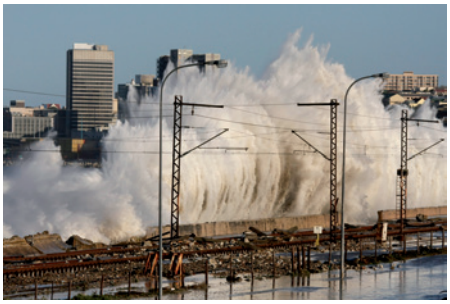
To overcome these challenges, Gavin Foster and Eelco Rohling, of the National Oceanography Centre Southampton, UK, use reconstructions of atmospheric carbon dioxide concentrations and sea level over the last 40 million years to define the relationship between the two more clearly.

Their work identifies a clear correlation between atmospheric carbon dioxide and sea level over geological timescales, suggesting that other variables — such as ocean circulation and topography — play a secondary role in the evolution of Earth's climate. Although the work focuses on very long timescales it has implications for the present, as they report that limiting greenhouse-gas emissions to meet the 2 °C warming target might still result in over 9 m of sea-level rise in the long-term. *BW*

NATURAL HAZARDS

Perception to action

Risk Anal. http://doi.org/j6x (2012)



© ISTOCKPHOTO/THINKSTOCK

Climate change is likely to enhance the level of risk posed by many natural hazards. These risks can be reduced through mitigation strategies and behaviours, provided people are motivated and able to do so. There is extensive literature on natural hazard risk-perception, which can inform thinking about adaptation to climate change.

A review by Gisela Wachinger from the Department of Social Sciences, University of Stuttgart, Germany, and co-workers considers the literature on perception of risk in relation to natural hazards. Personal experience of a hazard and trust — or lack thereof — in experts and authorities are found to have the most substantial impact on risk perception. Interestingly though, high risk perception does not necessarily translate into personal preparedness and risk-mitigation behaviour. Wachinger *et al.* provide three explanations for this disconnect: (1) individuals accept the risk, perceiving that benefits outweigh the potential impacts; (2) responsibility for action is believed to lie elsewhere; and (3) individuals lack the resources needed to change their situation.

Personal hazard experience and information from trusted experts and authorities certainly seem to enhance hazard perception. However, the factors that facilitate translation of risk perception into risk preparedness remain much less clear, despite many empirical studies into precisely this question. It seems that the key challenge ahead will be facilitating preparedness rather than just highlighting risks. *AB*

ATMOSPHERIC SCIENCE

Aerosol impacts

J. Atmos. Sci. http://doi.org/j63 (2013)

An understanding of recent variability in the Atlantic Ocean is needed to predict changes in the coming years, and the associated impacts on global weather patterns. Recent work has indicated that atmospheric aerosols were a primary driver of multi-decadal climate variability in the North Atlantic though the twentieth century. Evidence for this hypothesis is based on model simulations using the indirect effects of aerosols, which closely reproduced observations of North Atlantic basin-averaged sea surface temperature

A study by Rong Zhang at the Geophysical Fluid Dynamics Laboratory of the National Ocean and Atmospheric Administration, Princeton, USA, and colleagues, challenges this work by including additional oceanic parameters in their analysis. They show major discrepancies between the recently published simulations and observations in the North Atlantic for upper-ocean heat content, the spatial pattern of changes in sea surface temperature and subpolar sea surface salinity. Zhang *et al.* suggest that these differences are influenced and largely caused by aerosol effects, casting doubt on the claims that aerosol forcing is a prime driver of multi-decadal variability. *BW*

Written by Alastair Brown, Monica Contestabile and Bronwyn Wake.