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NATURE'S DEFENCES

When the Intergovernmental Panel on Climate Change released its assessment report on global warming in 2007, it was faced with a tough decision. In estimating how sea levels might rise in response to temperature, the panel had a wealth of factors to consider, such as how much the oceans will expand as they warm and how much water will be added from melting mountain glaciers and ice caps. But there was little information on the extent to which changes in the large ice sheets covering Greenland and West Antarctica could raise sea levels this century. After some consideration, the panel estimated a total sea level rise of 18 to 59 centimetres by the 2090s, a projection that excluded the contribution of the world's largest ice sheets on the basis that understanding was too limited "to provide a best estimate or an upper bound".

A number of recent studies suggest, however, that — without mitigation — sea levels could rise one to two metres by 2100 (see page 44). The approach used to derive these estimates, largely based on the assumption that melting increases in line with warming, has been criticized by some for its simplicity (see page 42). Nonetheless, the estimates are worthy of attention, given that they account for the rapid release of water locked up in Greenland and West Antarctica.

Though observations suggest that both ice sheets have increasingly been losing ice in recent decades, their contribution to future sea level rise remains as uncertain as ever. New projections that account for this potential loss can serve society well, however, by pointing to the need for preparedness.

As it stands, some of the regions most exposed to the threat of rising seas are the least ready to face it. A case in point is the US state of Florida, where coastal development continues almost unabated despite the fact that 70 per cent of Miami would be underwater with a 68-centimetre rise in sea level (see page 36). Arguably there will come a point, as sea levels rise, when Florida's policy of supporting radical measures to insure waterside properties — and continuously rebuild them — becomes economically unsustainable. In the long term, it will be equally unsustainable to fortify the coastline with hard defences, as the Netherlands has recently discovered (see page 39).

Eventually, some form of retreat might be necessary — for example, through laws to prohibit building close to the coast. Meanwhile, Florida can learn from its neighbouring state Louisiana, which — among other locations worldwide — is pioneering a soft approach to self-defence by restoring wetlands, beaches and natural floodplains. Known as ecological engineering, this strategy works with nature's own flood defences to build resilience. Ultimately, better projections are needed to determine the likely extent of future sea level rise. In the absence of such information, the best option is neither a strict policy of defence nor all-out retreat, but incremental adaptation.

OLIVE HEFFERNAN, EDITOR

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