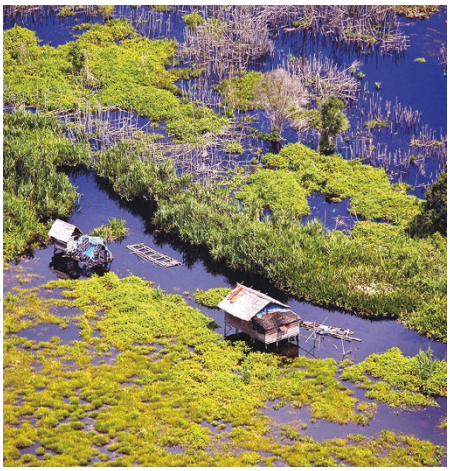
BIOGEOCHEMISTRY

Peat decomposition

Global Change Biol. http://doi.org/cc33 (2017)



AHMAD ZAMRONI/AFP/GETTY IMAGES

The temperature sensitivity of anaerobic decomposition of organic carbon in subtropical and tropical wetlands — a major natural source of global methane emissions — remains poorly represented in climate models. This is in part because experimental studies report variable carbon use efficiency (CUE) responses of the microbiota in response to warming, with reduced CUE equating to greater C losses to the atmosphere.

Debjani Sihi at the Wetland Biogeochemistry Laboratory, University of Florida, USA, and co-workers investigate the influence of the rate of temperature change on the relationship between temperature, CUE and soil organic carbon loss. They use two laboratory incubations, one with a large single-step temperature increase (10 °C within a day) and one with a similar magnitude, but a gradual temperature increase (0.1 °C per day for 100 days).

Warming rates are shown to affect thermal acclimation of microbial physiology with higher microbial CUE in treatments with slow warming rates. This resulted in relatively more microbial biomass carbon and enhanced soil C loss compared with rapid warming. The rapid warming treatment led to an overall greater radiative forcing, however, due to enhanced methane production. These findings tentatively imply that radiative forcing associated with anaerobic carbon processing could be lower *AB*

INTERDISCIPLINARY RESEARCH

Ecological impacts

Front. Mar. Sci. http://dx.doi.org/10.3389/fmars.2017.00308 (2017)

Understanding potential climate change impacts on ecosystems requires the inclusion and interpretation of climate model projections in ecological studies. However, this is a challenge for those without climate modelling expertise, suggesting a unified approach may be required. Rachel Cavanagh at the British Antarctic Survey, and co-authors from both ecology and climate modelling, highlight how to best use climate-model data for ecological insights. As an example, they consider the Southern Ocean and sea ice, as its changes will have implications for the biology of the region.

From a multi-model ensemble, a subset of eight models was chosen that reliably simulate present-day sea-ice extent and seasonality. Whilst the mean of this sub-set is similar to the model ensemble, they produce a narrower range of future ice changes. Greater precision in future sea-ice distribution allows for insight into ecological impacts and highlights how multidisciplinary evaluation and selection of climate models can enhance ecological studies. *BW*

CLIMATE MITIGATION

Adaptation in Africa

Ecol. Econ. **141,** 190–201 (2017)

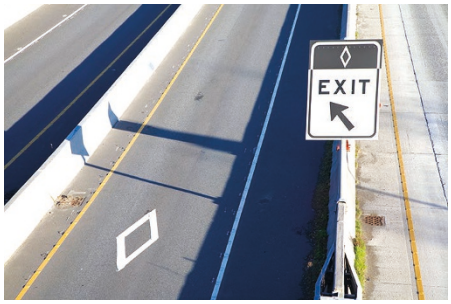
The impacts of anthropogenic climate change are projected to be particularly hard-felt in Africa, motivating the need for effective adaptation strategies. However, the absence of multi-level stakeholder engagement in decision making, alongside societal, political, economic, and technical challenges, has limited the ability to define, and thus implement, successful adaptation action. Ademola Adenle from Colorado State University, USA, and colleagues conduct 337 interviews across five stakeholder groups — multilateral and intergovernmental organisations, national governments, NGOs, research institutes and universities, and farmers — to outline the main issues facing climate change adaptation in Africa.

Across the various stakeholders, four key challenges were found: firstly, that observational and modelling data are inadequate; secondly, that existing adaptation strategies are fragmented, ineffective, and disjointed from policy; thirdly, that current projects are too narrow in scope and overlook fundamental issues; and fourthly, that funding is insufficient. In response to these issues, the authors propose a new framework to improve climate education, climate projections, climate governance, and climate finance: the so-called 4Cs. It is argued that this new roadmap will allow for better coordination, capacity, financing, management, and engagement of multi-level stakeholders, to deliver effective adaptation in Africa. *GS*

TRANSPORTATION

Expanding carpool lanes

Transport. Res. D **56,** 155–174 (2017)



GREEN STOCK MEDIA/ALAMY STOCK PHOTO

In the United States, the transportation industry accounts for a large proportion of total greenhouse-gas emissions. Road-based emissions — those associated with passenger and other vehicles — have grown rapidly in recent decades, necessitating the implementation of policy measures to help combat anthropogenic climate change, but also reduce air pollution. High-occupancy-vehicle (HOV) lanes are one such strategy, and aim to reduce the number of vehicles on the road by encouraging carpooling. Roxana Javid from Savannah State University, USA, and colleagues develop a multiple regression model to quantify the environmental benefits of a modest expansion in HOV lanes across the United States.

In response to increased HOV lanes, many densely-populated states are found to have considerable potential to reduce CO_2 emissions; for example, in the District of Columbia, New York, New Jersey, Maryland, California, Massachusetts and Hawaii, reductions could reach 1–4.5%. The smallest reductions are projected for the sparsely populated northern Great Plains. In total, up to 1.83 million tons CO_2 could be saved annually, representing 0.23% of US passenger car-related CO_2 emissions. Thus, increased HOV lane infrastructure offers a means to mitigate, at least partially, vehicle emissions. *GS*

Written by Alastair Brown, Graham Simpkins and Bronwyn Wake.