Climate begets biodiversity emergency

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With current Paris Agreement pledges corresponding to 3.2°C of warming, instead of the UN goal of less than 2°C, our paper in Science shows that losses of geographic range of greater than 50% are projected in half of insects, 44% of plants, and a quarter of vertebrates.

Our results imply an enormous reduction in local species richness if there is no additional action beyond current Paris pledges. Our dataset is vast, we analysed more than 125,000 terrestrial species, including 30,000 insects (and annelid worms and fungi).

The atmosphere's sensitivity to human made CO2 might also be larger than scientists currently calculate, based on recent results from an inter-comparison of the main climate models.

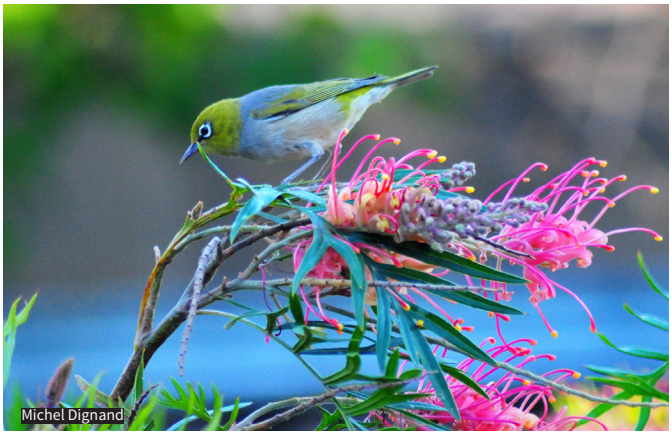
At 2°C, the numbers of species losing half their range falls to 18% insects, 16% plants, and 8% vertebrates. At 1.5°C, this drops to 6% insects, 8% plants, and 4% vertebrates. Insects are at the base of the food chain, they feed everything else. They enable pollination as well as being vital to the breakdown of waste organic material into fertile soils. Decline in insects is detrimental to ecosystem functioning and the delivery of ecosystem services to humans and other species.

Our projections do not take into account current land use, habitat loss, nor pesticide application. These have all contributed to the very large declines already seen in insect diversity in many regions. We also do not account for how land use might change in the future, whether ecosystems are lost or restored.

The IPCC report on 1.5°C warming highlights the potential of ecosystem restoration as a valuable tool in the portfolio of methods to use to achieve the goal of the Paris Agreement. Depending on the species planted, and where they are planted, this could benefit biodiversity.

In the Wallace Initiative, led by Jeff Price, we identify areas called refugia where biodiversity can largely persist despite climate change. Some refugia have already been lost to land use change but could become restored ecosystems.

With our results we inform conservation planners (and more generally, we can signpost best land use allocation) to specifically target climate refugia for ecosystem protection and restoration planning.



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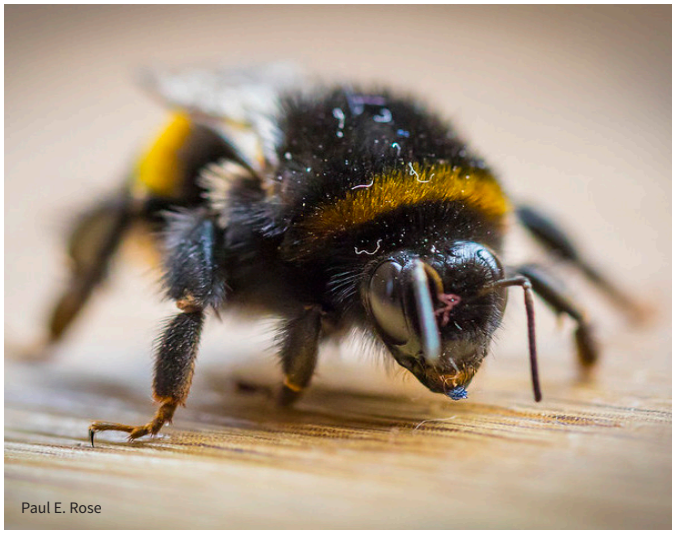

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We also incorporate the ability of species to move across the wider landscape to newly suitable habitats in order to adapt to a changing climate.

Our method and our research, started in the early days of the Tyndall Centre, are particularly timely because the UN has named the 2020s the 'Decade of Restoration' and the Convention on Biological Diversity is currently reviewing the outcome of its targets for 2020. These are 17% of every country's land area to be set aside for biodiversity. It is considering ramping-up the level of ambition to 30% of every country's land area.

Our work uniquely addresses the goals of both the UN Framework on Climate Change and the Convention in Biological Diversity. It also informs regional conservation planners. We are responding to the urgency call of the climate and biodiversity emergency.