







Wallace Inítíatíve

Ilace ative IMPALA: Implications of the Paris Agreement for Biodiversity and Conservation Planning





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- Background: species have preferred climates, their geographic ranges are constrained (on large scales) by the climate to their 'climate envelope'
- Assess climate change impacts on biodiversity at 1.5°C warming in terms of geographic range loss, and compare with impacts at 2°C warming
- Assess the corresponding risks to the Global Protected Area Network
- How could expansion of the network could assist biodiversity conservation under 1.5/2°C ?



Warren, R., Price, J., VanDerWal, J., and Graham, E. (2018) The projected effect on insects, vertebrates and plants of limiting global warming to 1.5°C rather than 2°C. Science.





Approach: Wallace Initiative climate envelope modelling



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Approach: Wallace Initiative climate envelope modelling



- Wallace initiative, led by Dr Jeff Price, is a pre-existing collaboration with Prof Jeremy VanDerWal at James Cook University, Australia
- 21 alternative regional climate model projections
- Baseline: 1961-1990 as in BEIS WPC work
- 120,000 plants, animals and insects
- Example: A comparison of potential climatic range change in Great Crested Newt between 1.5C and 2C.
- This shows how the website can be used to compare two policy scenarios.

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Key findings: climatic range loss in insects (n=31536)



- At 3.2°C warming (current pledges), range losses >50% projected in 49% insects
- At 2°C : in 18% insects
- At 1.5°C: in 6% insects
- When warming is limited to 1.5°C as compared with 2°C, numbers of species projected to lose >50% of their range are reduced by ~66% in insects
- Soundbite: Limiting global warming to 1.5°C avoids two thirds of the risks associated with warming of 2°C for insects.



Key findings: climatic range loss in insects (n=31536)



- Not all species lose 50% of their range
- Some lose far more and some far less
- A small number of species gain in range

Global annual mean temperature rise above pre-industrial _____ 1.5 ____ 2 ____ 3.2 ____ 4.5











Key findings: climatic range loss in vertebrates (n=12640)



- At 3.2°C warming (current pledges), range losses >50% projected in 26% vertebrates.
- At 2°C : in 8% vertebrates
- At 1.5°C: in 4% vertebrates.
- When warming is limited to 1.5°C as compared with 2°C, numbers of species projected to lose >50% of their range are reduced by ~50% in vertebrates.
- Soundbite: Limiting global warming to 1.5°C avoids half the risks associated with warming of 2°C for vertebrates





Key findings: climatic range loss in plants (n=73224)



- At 3.2°C warming (current pledges), range losses >50% projected in 44% plants
- At 2°C : 16% plants
- At 1.5°C: 8% plants
- When warming is limited to 1.5°C as compared with 2°C, numbers of species projected to lose >50% of their range are reduced by ~50% in plants
- Limiting global warming to 1.5°C avoids half the risks associated with warming of 2°C for plants





Proportion of species losing >50% their range by 2100



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- At 3.2°C warming (current pledges), range losses >50% projected in 49% insects, 44% plants, 26% vertebrates.
- At 2°C : in 18% insects, 16% plants, and 8% vertebrates
- At 1.5°C: in 6% insects, 8% plants, and 4% vertebrates.
- When warming is limited to 1.5°C as compared with 2°C, numbers of species projected to lose >50% of their range are reduced by ~66% in insects, and by ~50% in plants and vertebrates.
- Soundbite: Limiting global warming to 1.5°C avoids half the risks associated with warming of 2°C for plants and animals, and two-thirds of the risks to insects.















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- **IMPALA** Outputs
- Published: Smith P., Price J., Molotoks A., Warren R., and Malhi Y. Impacts on terrestrial biodiversity of moving from a 2°C to a 1.5°C target. Phil Trans Roy Soc A 376: 20160448 DOI 10.1098/rsta.2016.0456.
- Published: Warren, R., Price, J., VanDerWal, J., and Graham, E. (2018) The projected effect on insects, vertebrates and plants of limiting global warming to 1.5°C rather than 2°C. Science 360, 791-795 DOI: 10.1126/science.aar3646.
- Reports on impacts of climate change on individual protected areas >1x1 km globally at 1.5/2
- Analysis of protected areas, climate change refugia for biodiversity and land use completed, paper in preparation (earlier version submitted to PNAS).

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