EDITORIAL



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Essential outcomes for COP26

The UK Government is hosting COP26 in Glasgow between 31st October and 12th November 2021. It plans to make progress in four key areas which summarize as 'coal, cars, cash and trees' (Carbon Brief, 2021). The first two of these aims-to get agreement for the rapid phase out of coal, the most polluting of fossil fuels, and to ensure a rapid transition away for cars fuelled by fossil fuels—are very important, but are not directly related to the remit of Global Change Biology. The latter two aims-ensuring that the financial support of \$100 billion per year promised in 2010 by wealthy countries to developing countries finally gets delivered and ensuring that climate solutions adopted also co-deliver to nature—are squarely within the remit of Global Change Biology.

With respect to the 'cash' aim, this flow of finance is essential to allow poorer countries to adapt to, and to mitigate, climate change. We know that a vast proportion of the potential for natural climate solutions is located in the developing world (Griscom et al., 2020), so if we are to realize that global potential, developing countries must have the financial backing to ensure that this happens in an equitable and just way. Not all of this cash will be used for nature-based solutions, of course, but a proportion of it will be, and nature-based solutions would almost certainly not happen at the scale and speed required to help us meet net zero greenhouse gas emissions targets without this cash.

With respect to the 'trees' aim, the first thing to note is that nature-based solutions are about so much more than just planting trees (Seddon et al., 2021)! 'Trees' is just shorthand for nature-based solutions, but the broad variety of nature-based solutions available, beyond just tree planting, must be encouraged at COP26. The recent joint workshop report by IPBES and IPCC (Pörtner et al., 2021) demonstrated that we cannot successfully resolve either of the existential threats of climate change or biodiversity loss unless we tackle them both together. Mainstreaming nature into our thinking on climate action is essential, so encouraging all countries to include nature-based solutions in their nationally determined contributions to meet the goal of the Paris Agreement will be the first step in formalizing these considerations.

But not all greenhouse gas removal options available on land or in the oceans constitute nature-based solutions-nature-based solutions must also provide benefits to human well-being and biodiversity-so the way in which they are implemented is crucial. Parties to the COP should be encouraged to adopt international guidelines for nature-based solutions, such as those provided by IUCN (2021), or those suggested by the Nature-Based Solutions Initiative (NBSI, 2021), which are as follows:

- Nature-based solutions are not a substitute for the rapid phaseout of fossil fuels and must not delay urgent action to decarbonize our economies
- Nature-based solutions involve the protection, restoration and/ or management of a wide range of natural and semi-natural ecosystems on land and in the sea; the sustainable management of aquatic systems and working lands; or the creation of novel ecosystems in and around cities or across the wider landscape.
- Nature-based solutions are designed, implemented, managed and monitored by or in partnership with Indigenous peoples and local communities through a process that fully respects and champions local rights and knowledge, and generates local benefits.
- Nature-based solutions support or enhance biodiversity, that is, the diversity of life from the level of the gene to the level of the ecosystem.

COP26 provides the promise of progress for climate change and nature, and for kickstarting the urgently required transition from pledges to real-world action. Time is running out—so we watch with interest to see whether this promise can be converted into concrete action.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing not applicable—no new data generated, or the article describes entirely theoretical research.

- Pete Smith¹
- Linda Beaumont²
- Carl J. Bernacchi^{3,4,5}
 - Maria Byrne⁶
 - William Cheung⁷
- Richard T. Conant⁸
- Francesca Cotrufo⁸
- Xiaojuan Feng^{9,10}
 - Ivan Janssens¹¹

 - Hefin Jones¹²
- Miko U. F. Kirschbaum¹³
 - Kazuhiko Kobayashi¹⁴
 - Julie LaRoche¹⁵
 - Yiqi Luo¹⁶
 - Andrew McKechnie 17,18

- Josep Penuelas^{19,20}
 - Shilong Piao²¹
- Sharon Robinson²²
 - Rowan F. Sage²³
 - David J. Sugget²⁴
- Stephen J. Thackeray²⁵
- Danielle Wav^{26,27,28,29}
 - Stephen P. Long^{3,5}

¹Institute of Biological and Environmental Sciences, University of Aberdeen, Aberdeen, UK

²Department of Biological Sciences, Macquarie University, New South Wales, Australia

³Carl R. Woese Institute for Genomic Biology, University of Illinois, Urbana, Illinois, USA

⁴Global Change and Photosynthesis Research Unit, Agriculture Research Service of the United States Department of Agriculture (USDA), Urbana, Illinois, USA

⁵Departments of Plant Biology and of Crop Science, University of Illinois, Urbana, Illinois, USA

⁶Schools of Medical and Biological Sciences, The University of Sydney, Sydney, New South Wales, Australia

⁷Changing Ocean Research Unit, Institute for the Oceans and Fisheries, The University of British Columbia, Vancouver, British Columbia, Canada

⁸Colorado State University, Fort Collins, Colorado, USA
⁹State Key Laboratory of Vegetation and Environmental Change,
Institute of Botany, Chinese Academy of Sciences, Beijing, China
¹⁰University of Chinese Academy of Sciences, Beijing, China
¹¹Research Group Plants and Ecosystems, University of Antwerp, Wilriik, Belgium

¹²Department of Animal and Plant Sciences, University of Sheffield, Sheffield, UK

¹³Maanaki Whenua – Landcare Research, Palmerston North, New Zealand

¹⁴Graduate School of Agricultural and Life Sciences, The
University of Tokyo, Tokyo, Japan

¹⁵Biology Department, Dalhousie University, Halifax, Nova Scotia, Canada

¹⁶Center for Ecosystem Science and Society (ECOSS),
Department of Biological Sciences, Northern Arizona University,
Flagstaff, Arizona, USA

¹⁷South African Research Chair in Conservation Physiology, South African National Biodiversity Institute, Pretoria, South Africa ¹⁸Department of Zoology and Entomology, University of Pretoria, Pretoria, South Africa

¹⁹Global Ecology Unit CREAF-CSIC-UAB, CSIC, Barcelona, Catalonia, Spain

²⁰CREAF, Campus Universitat Autònoma de Barcelona, Barcelona, Catalonia, Spain

²¹Sino-French Institute for Earth System Science, College of Urban and Environmental Sciences, Peking University, Beijing, ²²Securing Antarctica's Environmental Future, Global Challenges Program & School of Earth, Atmospheric and Life Sciences, University of Wollongong, Wollongong, New South Wales, Australia

²³Department of Ecology and Evolutionary Biology, University of Toronto, Toronto, Ontario, Canada

²⁴Climate Change Cluster, Faculty of Science, University of Technology Sydney, Sydney, Australia

²⁵Lake Ecosystems Group, UK Centre for Ecology & Hydrology, Bailrigg, Lancaster, UK

²⁶Department of Biology, The University of Western Ontario, London, Ontario, Canada

²⁷ Division of Plant Sciences, Research School of Biology, The Australian National University, Canberra, Australian Capital Territory, Australia

²⁸Environmental and Climate Sciences Department, Brookhaven National Laboratory, Upton, New York, USA

²⁹Nicholas School of the Environment, Duke University, Durham, North Carolina, USA

Email: pete.smith@abdn.ac.uk

ORCID

Pete Smith https://orcid.org/0000-0002-3784-1124 Linda Beaumont https://orcid.org/0000-0001-6307-1680 Carl J. Bernacchi https://orcid.org/0000-0002-2397-425X Maria Byrne https://orcid.org/0000-0002-8902-9808 William Cheung https://orcid.org/0000-0001-9998-0384 Richard T. Conant https://orcid.org/0000-0001-7315-2476 Francesca Cotrufo https://orcid.org/0000-0002-6191-8953 Xiaojuan Feng https://orcid.org/0000-0002-0443-0628 Ivan Janssens https://orcid.org/0000-0002-5705-1787 Miko U. F. Kirschbaum https://orcid.org/0000-0002-5451-116X Kazuhiko Kobayashi https://orcid.org/0000-0003-4101-2975 Julie LaRoche https://orcid.org/0000-0003-4809-6411 Yiqi Luo https://orcid.org/0000-0002-4556-0218 Andrew McKechnie https://orcid.org/0000-0002-1524-1021 Josep Penuelas https://orcid.org/0000-0002-7215-0150 Shilong Piao https://orcid.org/0000-0001-8057-2292 Sharon Robinson https://orcid.org/0000-0002-7130-9617 Rowan F. Sage https://orcid.org/0000-0001-6183-9246 David J. Sugget https://orcid.org/0000-0001-5326-2520 Stephen J. Thackeray https://orcid.org/0000-0003-3274-2706 Danielle Way https://orcid.org/0000-0003-4801-5319 Stephen P. Long https://orcid.org/0000-0002-8501-7164

REFERENCES

China

Carbon Brief. (2021). PM urges action on 'coal, cars, cash and trees' ahead of COP26 climate summit. https://www.carbonbrief.org/daily-brief/pm-urges-action-on-coal-cars-cash-and-trees-ahead-of-cop26-climate-summit

Griscom, B. W., Busch, J., Cook-Patton, S. C., Ellis, P. W., Funk, J., Leavitt, S. M., Lomax, G., Turner, W., Chapman, M., Engelmann, J., Gurwick, N. P., Landis, E., Lawrence, D., Malhi, Y., Schindler Murray, L., Navarrete,

- D., Roe, S., Scull, S., Smith, P., ... Worthington, T. (2020). National mitigation potential from natural climate solutions in the tropics. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 375(1794), 20190126. https://doi.org/10.1098/rstb.2019.0126
- IUCN. (2021). IUCN global standard for NbS. https://www.iucn.org/ theme/nature-based-solutions/resources/iucn-global-standard-nbs
- NBSI. (2021). Nature-based solutions to climate change. Key messages for decision makers in 2021 and beyond. https://nbsguidelines.info/
- Pörtner, H. O., Scholes, R. J., Agard, J., Archer, E., Arneth, A., Bai, X., Barnes, D., Burrows, M., Chan, L., Cheung, W. L., Diamond, S.,
- Donatti, C., Duarte, C., Eisenhauer, N., Foden, W., Gasalla, M., Handa, C., Hickler, T., Hoegh-Guldberg, O., ... Ngo, H. T. (2021). Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change. IPBES Secretariat. https://doi.org/10.5281/zenodo.5101125
- Seddon, N., Smith, A., Smith, P., Key, I., Chaussson, A., Girardin, C., House, J., Srivastava, S., & Turner, B. (2021). Getting the message right on nature-based solutions to climate change. *Global Change Biology*, 27, 1518–1546. https://doi.org/10.1111/gcb.15513