Imperial College London

GCEE Grand Challenges

GEORGINA MACE CENTRE FOR THE LIVING PLANET

REPORT 2020
PROFESSOR VINCENT SAVOLAINEN

FOREWORD

This year has seen a major development. On 27 January 2021, after eight years of existence, our Grand Challenges in Ecosystems and the Environment Initiative has now formally become a Multi-Faculty Centre of Excellence: The Georgina Mace Centre for the Living Planet.

This new Centre is named after Professor Dame Georgina Mace FRS. Dame Georgina was one of the most prominent ecologists and conservation biologists of recent times. In 2000 she became Director of Science for ZSL and head of its Institute of Zoology. She moved to Imperial College London in 2006 as Professor of Conservation Science and Director of the NERC Centre for Population Biology. She moved to UCL in 2012, becoming Professor of Biodiversity & Ecosystems and the founding Director of the Centre for Biodiversity & Environment Research.

Georgina contributed to an astonishing range of scientific projects, global committees, and leadership or trustee roles in other organisations, including the Royal Society, the British Ecological Society, World Wildlife Fund, Royal Society for the Protection of Birds, the Natural History Museum and the Eden Project.

She pioneered the development of universal criteria for listing the world's threatened species in the International Union for the Conservation of Nature (IUCN) Red list. This led in 2002 to the global signatories to the United Nations (UN) Convention on Biological Diversity (CBD) committing to substantial reductions in the rate of biodiversity loss by 2010.

She led on biodiversity for the UN Millennium Ecosystem Assessment in 2005, which showed the alarming degradation of our planet. In 2012, she became one of the first members

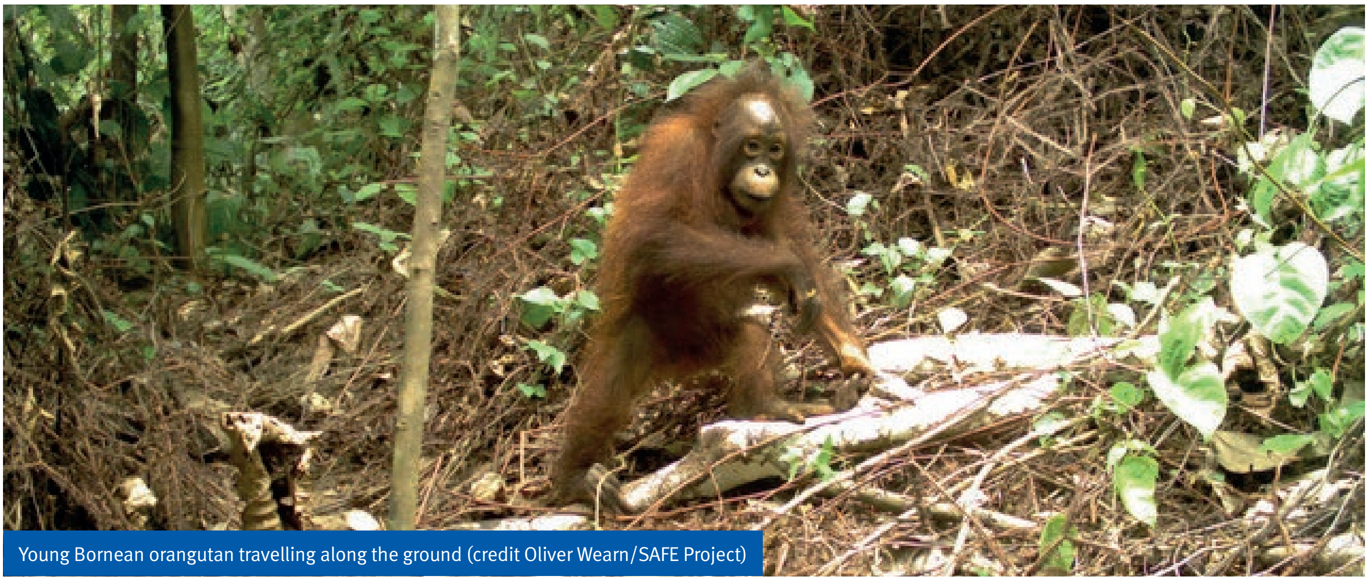
Professor Dame Georgina Mace FRS

£81M
of external grant income*

53
PhD students based at Silwood Park**

**This is the full list of grants won by Silwood Park's Life Sciences staff ending after 1 January 2020 and including subcontracts. It includes £45,113,391M won by Silwood Park's Life Sciences staff starting after 1 January 2020. The bulk of this is made of a large grant from the Bill & Melinda Gates Foundation to Prof. A. Burt and colleagues.*

***PhD Students enrolled through the Centre for Doctoral Training in Quantitative Method in Ecology and Evolution led by GCEE and Doctoral Training Programme in Science and Solution for a changing Planet co-led by GCEE, and other programmes*



Young Bornean orangutan travelling along the ground (credit Oliver Wearn/SAFE Project)

of The Natural Capital Committee, directly advising the UK government and leading in 2018 to an ambitious national 25 Year Environment.

Sadly, Dame Georgina died on 19 September 2020 at the age of 67. Full obituaries appeared in The Times, Guardian and Telegraph as well as in several scientific journals. Imperial also paid tribute to Georgina Mace; she was a much loved and respected colleague, and unanimously we are all delighted here to be able to cherish her memory with this new Centre.

Although we will update our Challenges in the coming months, our mission remains to (i) serving as a global hub for addressing key environmental challenges for humanity, (ii) carrying out internationally excellent science with a focus on finding solutions to these challenges in a collaborative manner, and (iii) acting as an interface between science, practitioners and policy makers. Professor Matthew Fisher from the School of Public Health, has also joined us as our Co-Director.

The launch of the Georgina Mace Centre for the Living Planet will be held on 31 August 2021 at Silwood Park; details will follow shortly. Please keep the date in your diary.

Professor Vincent Savolainen
Director

Professor Matthew Fisher
Co-Director

112
Masters students based at Silwood Park from 21 countries

143
peer-reviewed scientific publications, of which 21 were in leading *Nature* and *Science* journals***

1
outreach event****

Georgina Mace's work was instrumental in setting up the universal IUCN 'Red List' criteria for threatened species

***Nature, Nature Biotechnology, Nature Communications, Nature Ecology & Evolution, Nature Human Behaviour, Nature Plants, Science, Science Advances*

****Wildlife in Ascot*

COVID GRANTS

A new project to model the SARS-CoV-2 virus in raw sewage could help efforts to map the prevalence of COVID-19 in humans and potential animal hosts. The project is funded by the NERC COVID Response scheme. The project also aims to sample the virus in nearby freshwater ecosystems to assess the potential for the disease to be transmitted via raw sewage. There is indeed growing concern about the risks of faecal-oral transmission to humans and/or wildlife via sewage outflows and overspill. COVID-19 is typically characterised by respiratory symptoms such as persistent cough, but fragments of the virus are also detectable in the faeces of some patients for prolonged periods. This project provides the potential to not only monitor the prevalence of COVID-19 using sewage samples, but to also assess the risk that sewage poses as a potential route for onwards transmission of the disease.

PI Professor Vincent Savolainen and colleagues (Prof. Guy Woodward, Prof. Tom Bell, Prof. Nick Jones, Dr Emma Ransome) are working with the University of Nottingham (Dr Chris Coleman) and various companies to model and sample sewage and feed into efforts to provide community-level estimates of the disease prevalence. Together with collaborators in universities and research centres across the UK, the team will also develop models to provide an early detection system for low, medium, and high infection levels in different communities.

Additionally, the team is sampling rivers and animal faeces in the environment for the presence of the coronavirus, to assess whether and how sewage could be a source of new infections, either directly or through spillover into UK animal hosts, such as rodents, cats and bats.

Not all sewage reaches sewage treatment plants, particularly during storms, where overspill from drains can leach raw sewage into the environment. For example, 450,000 tonnes of raw sewage entered the Thames via this route in 2011, and overspill incidents occur about 60 times a year in the Thames Valley alone.

The team samples these events along the Thames and other routes where sewage overspill or outflow reaches the environment untreated. This will provide a measure of the risk of ‘live’ viral particles being in the environment downstream from sewage outflows, which is crucial for avoiding any disease transmission from activities like swimming or fishing in the river.

This assumption will be tested by another project led by Imperial researchers and awarded NERC funding. PI Dr Will Pearse and colleagues in the Department of Life Sciences at Imperial (Dr Tom Smith, Dr Mike Tristem), plus members of the COVID-19 Response Team, are assessing the response of the novel coronavirus to temperature and humidity, which are indicators of the virus’ seasonality. Their work has shown that environment affects SARS-CoV-2 transmission (*PNAS*, in press), but it is unclear whether emerging strains show similar responses. The team showed that, like other SARS-CoV-2 strains, lineage B.1.1.7 transmits more rapidly in colder and more densely populated parts of England. However, they also found evidence of B.1.1.7 manifesting a transmission advantage at warmer temperatures compared to other strains (Thomas *et al*, 2021). This implies that spring and summer conditions are unlikely to slow B.1.1.7’s invasion in Europe and across the Northern hemisphere - an important consideration for public health interventions.

Together, these two projects have received over £1 million in funding. They will help identify infection and potential infection hotspots, allowing authorities to provide more targeted intervention and management measures, such as social distancing and local restrictions on activities.

Sewage outflow

CHALLENGE 1: UNDERSTANDING BIODIVERSITY ORIGINS AND LOSSES

HERBIVORES AT THE HIGHEST RISK OF EXTINCTION AMONG MAMMALS, BIRDS, AND REPTILES

As a result of their extensive home ranges and slow population growth rates, predators have often been perceived to suffer higher risks of extinction than other trophic groups. Dr Will Pearse and colleagues looked at this extinction-risk paradigm by quantitatively comparing patterns of extinction risk across different trophic groups of mammals, birds, and reptiles. They found that trophic level and body size were significant factors that influenced extinction risk in all taxa. At multiple spatial and temporal scales, herbivores, especially herbivorous reptiles and large-bodied herbivores, consistently have the highest proportions of threatened species. This observed elevated extinction risk for herbivores is ecologically consequential, given the important roles that herbivores are known to play in controlling ecosystem function.

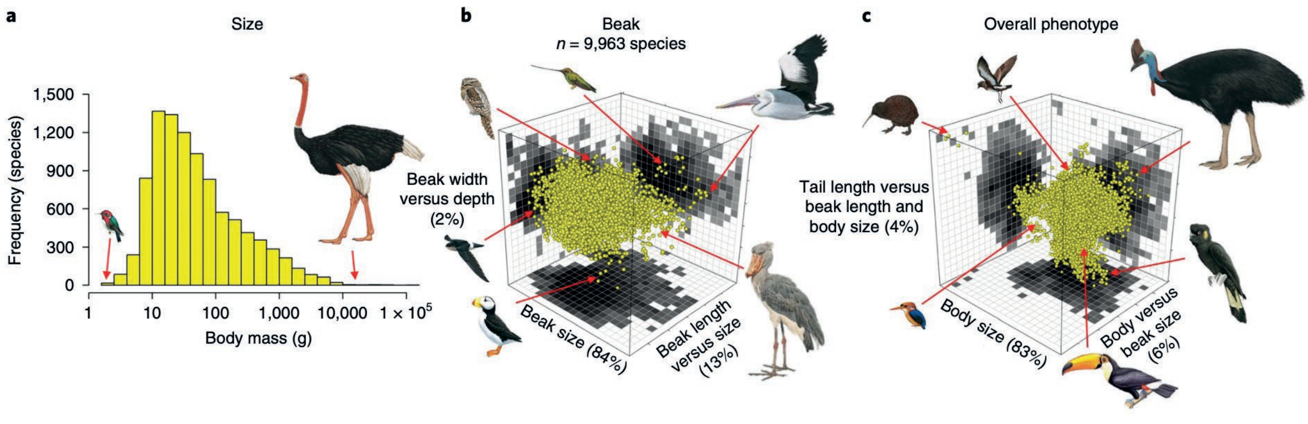
Science Advances 6:eabb8458 (2020)

An African elephant in Zimbabwe, one of the many charismatic and threatened herbivores

MACROEVOLUTIONARY CONVERGENCE CONNECTS MORPHOLOGICAL FORM TO ECOLOGICAL FUNCTION IN BIRDS

Animals have diversified into a bewildering variety of morphological forms exploiting a complex configuration of trophic niches. Their morphological diversity is widely used as an index of ecosystem function, but the extent to which animal traits predict trophic niches and associated ecological processes is unclear. Dr Joe Tobias and colleagues used the measurements of nine key morphological traits for >99% bird species to show that avian trophic diversity is described by a trait space with four dimensions. The position of species within this space maps with 70–85% accuracy onto major niche axes, including trophic level, dietary resource type and finer-scale variation in foraging behaviour. Phylogenetic analyses reveal that these form–function associations reflect convergence towards predictable trait combinations, indicating that morphological variation is organized into a limited set of dimensions by evolutionary adaptation. These results provide a global framework for exploring the origin, function and conservation of bird diversity.

Nature Ecology & Evolution 4:230 (2020)



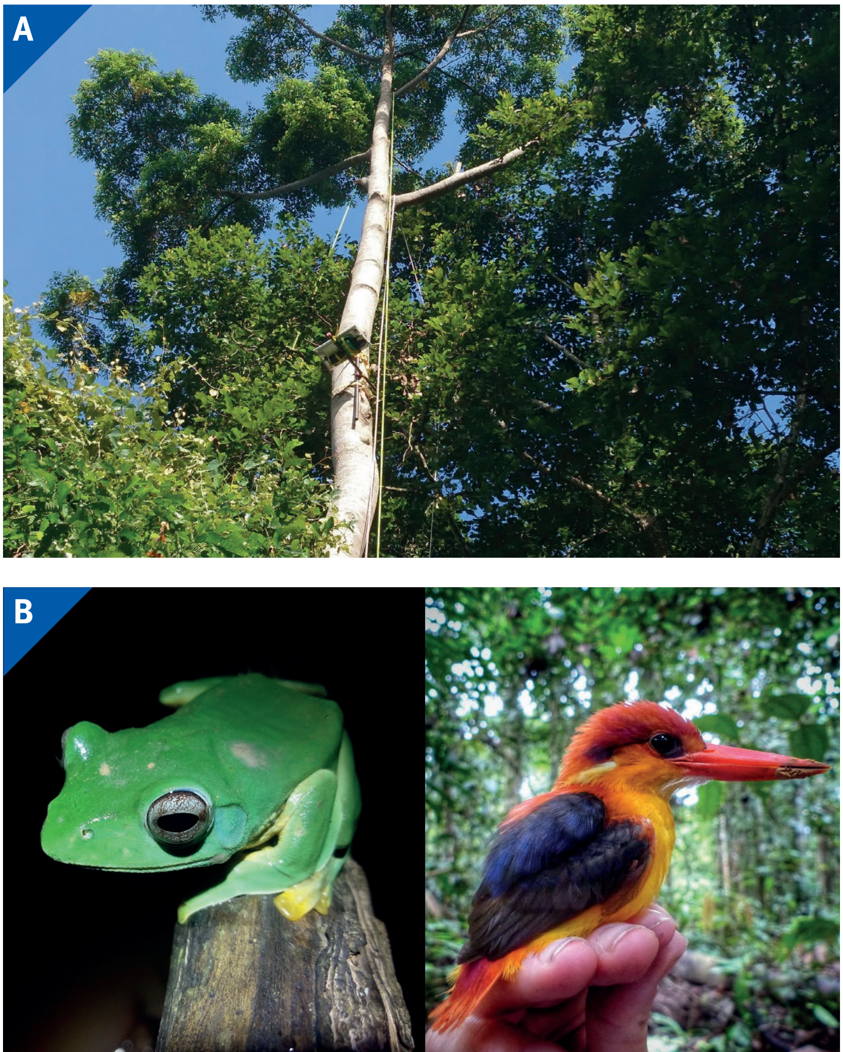
Birds not only vary widely in size from the tiny bee hummingbird to the ostrich (a), but also in body shape as shown by direct measurements of beak shape (b) and all other traits (c) taken from almost 10,000 species of birds. Crucially, this variation can tell us a lot about the ecological function of each species. (credit: J. Tobias)

GLOBAL PRIORITIES FOR CONSERVATION OF REPTILIAN PHYLOGENETIC DIVERSITY IN THE FACE OF HUMAN IMPACTS

Phylogenetic diversity measures are increasingly used in conservation planning to represent aspects of biodiversity beyond that captured by species richness. Dr James Rosindell and colleagues developed two new metrics that combine phylogenetic diversity and the extent of human pressure across the spatial distribution of species — one metric valuing regions and another prioritising species. They evaluated these metrics for reptiles, which have been largely neglected in previous studies. They found that regions under high human pressure coincide with the most irreplaceable areas of reptilian diversity. The highest priority reptile species score far above the top mammal and bird species, and reptiles include a disproportionate number of species with insufficient extinction risk data. Data Deficient species are, in terms of our species-level metric, comparable to Critically Endangered species and therefore may require urgent conservation attention.

Nature Communications 11:2616 (2020)

The Purple Frog (*Nasikabatrachus sahyadarensis*), found only in the Western Ghats of India, is one of many poorly-known and threatened species identified as priorities for conservation action by scientists at the Centre. The researchers estimated the evolutionary uniqueness of the world's terrestrial vertebrates and mapped their distributions to determine the potential threat of human encroachment on the most distinctive species. (credit: Sandeep Das, ZSL).



(a) Recording and analysing sounds of an ecosystem predict (b) its quality and biodiversity (credit: SAFE Acoustics)

CHALLENGE 2: NEW APPROACHES TO ENVIRONMENTAL MONITORING AND EVALUATION

CHARACTERISING SOUNDSCAPES ACROSS DIVERSE ECOSYSTEMS USING A UNIVERSAL ACOUSTIC FEATURE SET

Human pressures are causing natural ecosystems to change at an unprecedented rate. Understanding these changes is important, but we are hampered by the slow, labour-intensive nature of traditional ecological surveys. Prof. Rob Ewers and colleagues showed that automated analysis of the sounds of an ecosystem—its soundscape—enables rapid and scalable ecological monitoring. They used a neural network to calculate fingerprints of soundscapes from a variety of ecosystems. From these acoustic fingerprints they could accurately predict habitat quality and biodiversity across multiple scales and automatically identify anomalous sounds such as gunshots and chainsaws. Crucially, their approach generalised well across ecosystems, offering promise as a backbone technology for global monitoring efforts.

PNAS 117:17049 (2020)

CHALLENGE 3: ENGINEERING COMPLEX ECOSYSTEMS

A MALE-BIASED SEX-DISTORTER GENE DRIVE FOR THE HUMAN MALARIA VECTOR *ANOPHELES GAMBIAE*

Only female insects transmit diseases such as malaria, dengue and Zika; therefore, control methods that bias the sex ratio of insect offspring have long been sought. Genetic elements such as sex-chromosome drives can distort sex ratios to produce unisex populations that eventually collapse, but the underlying molecular mechanisms are unknown. Prof. Austin Burt and colleagues reported a male-biased sex-distorter gene drive (SDGD) in the human malaria vector *Anopheles gambiae*. They induced super-Mendelian inheritance of the X-chromosome-shredding I-PpoI nuclease by coupling this to a CRISPR-based gene drive inserted into a conserved sequence of the doublesex (dsx) gene. In modeling of invasion dynamics, SDGD was predicted to have a more rapid impact on female mosquito populations than previously developed gene drives targeting female fertility. The SDGD at the dsx locus led to a male-only population from a 2.5% starting allelic frequency in 10–14 generations, with population collapse and no selection for resistance. Their results support the use of SDGD for malaria vector control.

Nature Biotechnology 38:1054 (2020)

A close-up image of a male *Anopheles gambiae* mosquito (credit: A. Simoni)

Dr Jean Louis Konan and PhD student Agoh Charly Fernand from the Centre National de Recherche Agronomique in Côte d'Ivoire are part of the team who will be looking at drought tolerance in coconut palms (credit: V. Savolainen).

SYSTEMS THINKING CREATES OPPORTUNITIES FOR A CIRCULAR ECONOMY AND SUSTAINABLE PALM AGRICULTURE IN AFRICA

Palm agriculture has received strong criticism in recent years due to its link with deforestation, especially in Asia. In a new study led by Prof. Vincent Savolainen from Life Sciences and Dr Tilly Collins from the Centre of Environmental Policy, and co-authored by 17 scientists from Ghana, Côte d'Ivoire, and South Africa, they proposed that there is instead an opportunity for sustainable palm futures in Africa. Applying interdisciplinary systems thinking and circular production models, the scientists argued that food and economic security can be achieved sustainably by (i) promoting integrated production of nutritionally valuable insect and fungal protein using palm crop waste; (ii) increasing resilience and productivity of crop palms in the harsh tropical climates of sub-Saharan Africa; and (iii) promoting the development of palm plantations as biodiverse agroforestry ecosystems. This work led to securing an International Collaboration Award from the Royal Society to look for genes involved in drought tolerance in coconut palms.

Current Research in Environmental Sustainability 1:31 (2020)

CHALLENGE 4: PREDICTING AND MITIGATING ENVIRONMENTAL CHANGE

BACTERIAL ADAPTATION IS CONSTRAINED IN COMPLEX COMMUNITIES

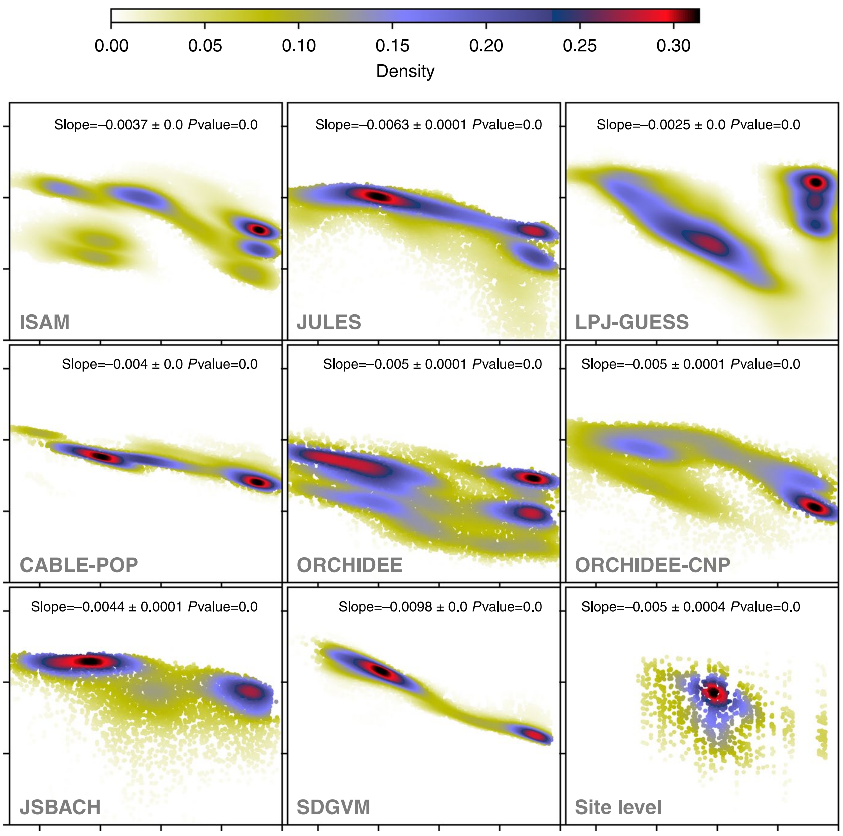
A major unresolved question is how bacteria living in complex communities respond to environmental changes. A fundamental challenge is to understand how the surrounding biotic community modifies evolutionary trajectories as species adapt to novel environmental conditions. Prof. Tom Bell and colleagues showed that community context can dramatically alter evolutionary dynamics using a novel approach that 'cages' individual focal strains within complex communities. They found that evolution of focal bacterial strains depends on properties of both of the focal strain and of the surrounding community. In particular, there is a stronger evolutionary response in low-diversity communities, and when the focal species have a larger genome and are initially poorly adapted. They saw how community context affects resource usage and detected genetic changes involved in carbon metabolism and inter-specific interaction. The findings demonstrate that adaptation to new environmental conditions should be investigated in the context of interspecific interactions.

Nature Communications 11: 754 (2020)

FOREST PRODUCTION EFFICIENCY INCREASES WITH GROWTH TEMPERATURE

Forest production efficiency (FPE) metric describes how efficiently the assimilated carbon is partitioned into plants organs (biomass production, BP) or—more generally—for the production of organic matter (net primary production, NPP). Prof. Colin Prentice and colleagues presented a global analysis of the relationship of FPE to stand-age and climate, based on a large compilation of data on gross primary production and either BP or NPP. FPE is important for both forest production and atmospheric carbon dioxide uptake. They found that FPE increases with absolute latitude, precipitation and (all else equal) with temperature. Earlier findings—FPE declining with age—were also supported by this analysis. However, the temperature effect is opposite to what would be expected based on the short-term physiological response of respiration rates to temperature, implying a top-down regulation of carbon loss, perhaps reflecting the higher carbon costs of nutrient acquisition in colder climates. Current ecosystem models do not reproduce this phenomenon. They consistently predict lower FPE in warmer climates, and are therefore likely to overestimate carbon losses in a warming climate.

Nature Communications volume 11: 5322 (2020)



This figure is based on the output from eight "state-of-the-art" global vegetation models. It shows how modelled carbon use efficiency (CUE) – the ratio of net primary production to photosynthesis – varies as a function of temperature. The bottom right-hand panel shows modelled CUE (all models) for grid cells where the data base has measurements. The other panels show CUE for all grid cells, one model at a time. All the models show CUE *declining* with temperature. This is because they assume that plant respiration increases with temperature – which is true in the short term, but not over periods longer than a few weeks. The data show that CUE *increases* with temperature. This may be because of the lower carbon cost of acquiring nutrients from warmer soils, where microbial activity is enhanced. Models that ignore these processes will continue to yield faulty predictions of climate-change impacts on the biosphere. (credit: C. Prentice)

BENDING THE CURVE OF TERRESTRIAL BIODIVERSITY NEEDS AN INTEGRATED STRATEGY

Increased efforts are required to prevent further losses to terrestrial biodiversity and the ecosystem services that it provides. Ambitious targets have been proposed, such as reversing the declining trends in biodiversity; however, just feeding the growing human population will make this a challenge. Prof. Andy Purvis and colleagues used an ensemble of land-use and biodiversity models to assess whether—and how—humanity can reverse the declines in terrestrial biodiversity caused by habitat conversion, which is a major threat to biodiversity. They showed that immediate efforts, consistent with the broader sustainability agenda but of unprecedented ambition and coordination, could enable the provision of food for the growing human population while reversing the global terrestrial biodiversity trends caused by habitat conversion. If we decide to increase the extent of land under conservation management, restore degraded land and generalize landscape-level conservation planning, biodiversity trends from habitat conversion could become positive by the mid-twenty-first century on average across models, but this was not the case for all models. Food prices could increase and, on average across models, almost half of the future biodiversity losses could not be avoided. However, additionally tackling the drivers of land-use change could avoid conflict with affordable food provision and reduces the environmental effects of the food-provision system. Through further sustainable intensification and trade, reduced food waste and more plant-based human diets, more than two thirds of future biodiversity losses are avoided and the biodiversity trends from habitat conversion are reversed by 2050 for almost all of the models. Although limiting further loss will remain challenging in several biodiversity-rich regions, and other threats—such as climate change—must be addressed to truly reverse the declines in biodiversity, the results show that ambitious conservation efforts and food system transformation are central to an effective post-2020 biodiversity strategy.

Nature 585:551 (2020)

DOMINANT BEE SPECIES AND FLORAL ABUNDANCE DRIVE PARASITE TEMPORAL DYNAMICS IN PLANT-POLLINATOR COMMUNITIES

Pollinator reductions can leave communities less diverse and potentially at increased risk of infectious diseases. Species-rich plant and bee communities have high species turnover, making the study of disease dynamics challenging. To address how temporal dynamics shape parasite prevalence in plant and bee communities, Dr Peter Graystock and colleagues screened >5,000 bees and flowers over an entire growing season for five common bee microparasites (*Nosema ceranae*, *Nosema bombi*, *Crithidia bombi*, *Crithidia expoeki* and neogregarines). Over 110 bee species and 89 flower species were screened, revealing that 42% of bee species and 70% of flower species had at least one parasite in or on them, respectively. Some common flowers (for example, *Lychnis flos-cuculi*) harboured multiple parasite species whilst others (for example, *Lythrum salicaria*) had few. Significant temporal variation of parasite prevalence in bees was linked to bee diversity, bee and flower abundance and community composition. Specifically, they found that bee communities had the highest prevalence late in the season, when social bees were dominant and bee diversity was lowest. Conversely, prevalence on flowers was lowest late in the season when floral abundance was highest. These results imply that efforts to improve bee health will benefit from the promotion of high floral numbers to reduce transmission risk, maintaining bee diversity to dilute parasites and monitoring the abundance of dominant competent hosts.

Nature Ecology & Evolution 41358 (2020)

The common eastern bumble bee (*Bombus impatiens*) foraging on clover in one of the field sites in upstate New York, USA (credit: P. Graystock)

SILWOOD PARK: AN OUTDOOR LABORATORY FOR THE SCIENCE COMMUNITY AT LARGE

THE SILWOOD PARK MESOCOSM FACILITY (SMF) IS NOW HOME TO 272 MESOCOSMS AND THREE SEPARATE EXPERIMENTS.

The core set of 96 mesocosms is funded by the NERC grant "Emerging Chemical Risks In The Environment (ERCITE)" and they continue to be warmed across a +8°C thermal gradient, with a subset of 32 ponds receiving doses of chemical mixtures every three months. A recent sampling campaign of all 96 mesocosms marked two years of pulse chemical dosing. Samples were collected for eDNA, microbial functioning and invertebrate community analyses with the aim to assess the impacts of emerging chemical risks to unearth the general rules by which emerging chemicals operate and alter freshwater food webs – from microbes at the base to apex predators. In July, we will build upon this experiment to integrate organic pollution which is currently the biggest pollutant of freshwaters in the UK. In collaboration with Prof. Andrew Johnson (who is leading the UKCEH "ChemPop" ERCITE project) we will explore the potential synergies between this longstanding dominant form of pollution with newly emerging chemicals and warming. Presently, there is a second set of 96 mesocosm integrated between the main set. These ponds are currently being colonised and therefore do not have any treatments imposed yet.

In addition to the main 96 mesocosms, there is a set of 32 ponds (also funded by NERC on the ERCITE project) which will be part of a global experiment with partners at University of Essex (UK), University of New Brunswick (Canada) and the Norwegian Institute for Water Research (NIVA; Norway). This experiment will aim to understand if the impacts of biocides are spatially consistent and is currently due to take place in the autumn term.

Lastly, Phil Marler (a PhD student funded by BBSRC and Unilever) will be conducting an experiment to assess the combined impacts of biocides, pharmaceuticals and organic pollution on freshwater ecosystems. Phil's PhD is supervised by Prof. Vincent Savolainen and co-supervised by Prof. Guy Woodward.

Members of the ERCITE team collecting samples from the Silwood mesocosms

FIELD EXPERIMENTS

In 2021 Silwood Park become part for two research groups creating sampling sites for the UK Biodiversity Fractal Network and the Bug-Network. The first network, steered by Dr. Will Pearse and with collaborators in Imperial College London and other institutions across UK seeks to study biodiversity homogenization establishing permanent sampling sites using a fractal design. Silwood will host one of several sites were core sampling of plants, insects, birds, and soil microbes will be sampled periodically. At the Silwood Park site, Dr. Cristina Banks-Leite is adding a novel dimension to the study using acoustic monitoring to biodiversity assessments. Finally, Silwood Park has joined the global collaborative research network, BugNet, run by Silwood's alumnus, Prof. Eric Allan from the University of Bern and colleagues from the Oeschger Centrefor Climate Change Research (Switzerland). We will join the project setting up a long-term exclusion experiment site that will help to assess the impact of invertebrate herbivores and pathogenetic fungi on plant communities and ecosystems. An analysis of the first two decades of grassland manipulation in the multifactorial experiment of Nash's field was published by Professor Mick Crawley and colleagues.

Ecology 101: e03009 (2020)

Audiomoths used to record bird and bath calls for biodiversity assessments (credit: C. Estrada)

Master students doing an insect survey along the green corridor stream (credit: J. Chan)

AN OUTREACH PLATFORM OPEN TO LOCAL COMMUNITIES

Since 2019 Silwood Park and Wildlife in Ascot are carrying out wildlife surveys along the green corridors that run across the Ascot and Sunninghill Parish and that connect larger natural reserves in Berkshire County. The aim of the surveys is to assess the quality of this part of the Parish's green infrastructure and propose ways to improve its value for wildlife and the community. This project is supported by a grant from the Ascot and Sunninghill Parish for the next few years. It is run by Dr Catalina Estrada at Silwood Park, and it gives students and staff the opportunity to get involved in local conservation initiatives with the general public. Also, as Silwood is the heart of the corridors, it creates a way to promote the value of Silwood campus as a natural reserve and refuge of wildlife both to the local authorities and the College. In 2020, students were able to run a winter bird survey along the corridors and survey mammals inside the Silwood Park campus.

GEORGINA MACE CENTRE PLAN & ASPIRATIONS 2021–2022

RESEARCH:

- Continue to produce outstanding science-based solutions to help resolve global challenges facing planet earth

  Re-focus the Centre's Grand Challenges around three topics:
  - Environmental Health for Sustainability and Biodiversity Conservation
  - Agritech for Food Security
  - Virtual Nature for Managing and Engineering Complex Ecosystems
- Explore potential links with the new campus Business Park owners, Newcore, who are planning to develop the Business Park into a Research and Development hub specialising in environmental and climate change research
- Host at least one national and/or international conference or workshop

TEACHING:

- Strengthen our portfolio of Masters courses and increase the number of students that join them, including plans to set up a new multidisciplinary Masters programme in the Agritech area that plays to both our existing strengths and also the emerging funding landscape in the UK and overseas, and to connect our teaching and research evermore closely.
- Develop short, international courses in the Centre's areas of expertise.

OUTREACH:

- Organise the Launch of the Centre on 31 August 2021, together with Bugs, Birds & Beasts Day

ENGAGE WITH US

The Georgina Mace Centre for the Living Planet is always looking to involve dynamic individuals with innovative ideas and a drive to tackle Grand Challenges.

Why not spend your sabbatical with us? We welcome applications from individuals in any related sector. Furthermore, we are eager to create new working relationships that unite different communities, industry and academia together, and would particularly encourage businesses to contact us.

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