THE NICHE

Your magazine from the British Ecological Society

NIGHT LIGHTS

What does artificial light do to organisms across the globe?

Doorstep nature
Decorations created by gastropods

With ears underwater
Recording the soundscapes of aquatic life

BES awards
Celebrating this year's winners

LOBED ARGIOPE SPIDER DEVOURING A PIONEER WHITE BUTTERFLY *(BELENOIS AUROTA)*

RUSTAQ, OMAN

DR SS SURESH, BES MEMBER

Submit your amazing photos to: theniche@britishecologicalsociety.org

THE NICHE

WINTER 2022

Want to contribute to The Niche?
We welcome all ideas.
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BRITISH ECOLOGICAL SOCIETY

NEWS & VIEWS

FEATURES

YOUR SOCIETY

UK Centre for Ecology & Hydrology

COMMUNITY

COMMUNITY

WELCOME

This issue we're touching on the senses – sight and sound. As the nights draw in (for those of us in the northern hemisphere), we cosy up indoors and the high street Christmas lights get turned on – what effect are our lights having on the natural world? Octavia Bradley explores how organisms are reacting to light pollution and proposes an interdisciplinary approach to solving the problem (p20).

To sound, and the weird and wonderful noises that lurk beneath the water. Hydrophones uncover soundscapes that are as diverse and intricate as anywhere on Earth. Ecological sound artist David de la Haye has created an album using recorded soundscapes from the UK's north-east coast (p26).

Christmas comes early for ecologists in the form of our Annual Meeting which is happening in Edinburgh this year. Some of you may be reading this in Edinburgh, in which case do find me around the BES stand to say hello! If you can't make it this year you can follow online and read a summary of the action on p8.

Looking ahead to 2023 I would love to hear from you about what you would like to see in The Niche. The BES is your Society and this is your magazine, so please get in touch. For now, happy reading and see you in the New Year!

Kate

Kate Harrison, Editor
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NEWS & VIEWS

WHAT IS ECOLOGY FOR?

This year the BES has embarked on a project thinking through the priorities for ecological research in the UK. So far, this has involved a community-wide online consultation and a workshop held in October at the BES offices in London. The workshop involved academic researchers but also stakeholders from NGOs, funders and national and devolved governments. There will be further stages in this process, including a consultation workshop at the BES Annual Meeting in Edinburgh in December. I'll write more about the outputs of this process in a future editorial, but for now I want to pick up on one point of discussion at the London workshop that particularly struck me: namely, what is ecology for?

To expand on this, another way of phrasing the question is whether ecology is primarily a normative or non-normative science. A normative science is one that is primarily driven by a particular set of values or ethical system, with an implicit goal of achieving an improvement in its focus of study. Medicine is a good example of a normative science: it is largely driven by the value of improving human health, while of course making lots of fundamental science advances in our understanding of the human body along the way. Standing in contrast are non-normative or descriptive sciences. Astronomy is a good example here: it is driven by sheer interest in understanding the workings of the universe. Of course, it still has many potential benefits and potentially profound consequences, ranging from technological spin-offs to fundamentally shaping our understanding of our place in the cosmos, but the science agenda and priorities are not shaped by these values.

The answer to my question is of course obvious: the science of ecology has both normative and non-normative components and the dualistic split implied in my question is unnecessary. Most sciences sit at various points on the continuum between applied medicine and cosmology, and indeed various sub-disciplines and practitioners within any particular scientific field would place themselves at various points along this continuum.

THE SCIENCE OF ECOLOGY CONTAINS A STRONG FUNDAMENTAL DISCOVERY COMPONENT, SEEKING TO UNDERSTAND THE RULES AND MECHANISMS OF HOW COMMUNITIES OF LIVING THINGS EVOLVE, ASSEMBLE, INTERACT, AFFECT COLLECTIVE ECOLOGICAL AND BIOPHYSICAL PROCESSES AND RESPOND TO CHANGE. BUT IT ALSO CONTAINS A STRONG VALUE-LADEN SENSE OF APPLICATION, SEEKING TO PROTECT, MAINTAIN AND RESTORE ECOLOGICAL SYSTEMS UNDER PRESSURES OF LOCAL AND GLOBAL CHANGE

Undoubtedly these latter aspects have become stronger as the pressures of the biodiversity crisis become more acute, and as calls to find solutions become more intense. Probably the position of the science of ecology as a whole on the normative-discovery (or medicine-astronomy) spectrum has shifted over time, and is now increasingly value-laden.

Asking this question of what ecology is for might seem like a case of intellectual navel-gazing. But how we frame the discipline can have real-world consequences. If we as a community frame the priorities for ecology as a set of known problems to be solved, this could, at least in principle, cascade on to influencing potential agendas and frameworks for funders that end up shaping the practice of ecology to meet those goals.

CONVERSELY, IF WE FRAME THE PRIORITIES FOR ECOLOGY AS A SERIES OF THINGS THAT NEED TO BE UNDERSTOOD, OF KNOWLEDGE GAPS TO BE FILLED, THAT COULD CASCADE ON TO SIMILARLY SHAPE FUTURE PRACTICE

There is certainly a middle ground in this. Often framing questions around problems or challenges, such as nature recovery, can provide a focus of development and advancement of theory. Discovery, theory and application are more often in synergy than in tension. For example, there is so much we still don't understand about the ecology of soils: there is much to discover in terms of fundamental ecology, and these discoveries will have practical implications in informing ecosystem restoration.

But there must always be room for wonder and the sheer joy of discovering the mysteries of the living world. I have just finished *An Immense World* by Ed Yong, a book I can heartily recommend for your Christmas lists. It deals with how animals sense and perceive the world and how different their experiences are from (the very limited) human sensing of the world, whether through sight, sounds, sonar or electric fields. I finished the book with an overwhelming sense of how much remains to be discovered and understood about even the organisms that we see every day around us. There is mystery and wonder everywhere we look, if only we know how to look and how to understand. In that sense, ecology sits right next to astronomy in shaping our deep understanding of our place in the universe, and of who we are.

Yadvinder Malhi
President of the British Ecological Society

YOUR ANNUAL MEETING

The BES Annual Meeting is recognised as Europe's largest and most welcoming conference, bringing together over 1,200 ecologists from around the world.

This year's event is taking place in Edinburgh, 18–21 December.

The scientific programme includes an exceptional array of talks and posters from ecologists from around the world, tackling some of the most urgent problems of our lifetime, and exploring and understanding species and ecological processes in some of the most remote regions of the globe. Community ecology, Macroecology, behavioural ecology and soil ecology are some of the topics that will be being covered by around 480 speakers.

World-renowned plenary speakers, including Patricia Balvenera from the University of Mexico, Rattan Lal from Ohio State University and Rob Freckleton from the University of Sheffield will be covering the breadth of ecology, from promoting innovative soil-saving techniques to the role of biodiversity in human well-being. Patricia Balvenera, presenting virtually from Mexico, will be sharing the main results of the Intergovernmental Platform on Biodiversity & Ecosystem Services (IPBES) Values Assessment - involving 90 scientists from 50 countries over 4 years – and will reflect on the role of the ecologist in addressing the biodiversity crisis.

Mat Williams, Scottish Government's Chief Scientific Adviser for Environment, Natural Resources and Agriculture (ENRA) will be welcoming delegates to Scotland and discussing the networks of knowledge needed to build and support agile policy making and effective decision making to meet environmental goals.

Each day will also feature thematic sessions that provide a high-profile forum for the discussion of timely and innovative topics proposed and run by the ecological community. This year the sessions carry us through global diversity patterns using DNA from museum collections, to ecological forecasting, to making 30x30 work for biodiversity conservation.

During lunch, delegates can develop skills, discover strategies for career progression, and explore new ways of thinking with a choice of amazing workshops. Why not discover how drawing can be applied as a research tool? Or defining the next policy priorities for ecology? Or even how to design your own school outreach activity?

Delegates should also make time to chat with exhibitors who will be sharing their expertise and latest developments.

The poster sessions at the end of each day are the perfect opportunity to explore the work of others in a relaxed environment, and if you're looking to directly meet others working in your field, you'll want to head to one of our 19 Special Interest Group's social events, which are open to anyone, even (especially) if you've never come across them before.

While there are so many learning opportunities at the BES Annual Meeting there are also moments to reflect. One of the benefits of the Annual Meeting being a larger conference is that there are plenty of spaces in the conference centre to take yourself away from the buzz. While sessions are in motion, the exhibition hall quietens down, giving you the chance to take a rest and reset before the next activity begins.

One of the things that makes the Annual Meeting so popular is our dedication to making everyone feel welcome. We understand that for some this will be their first ever conference and won't know where to begin, so our online list of tips for anyone "attending your first conference" outlines everything, from before you arrive to days after you've left. Our Freshers' Function on the first day of the conference allows newcomers to begin their networking journey together before stepping into the first big social event that is our Welcome Mixer. We understand that not everyone finds it easy to navigate large conferences, so in recent years we have put on a smaller mixer for anyone who finds large conferences overwhelming – you can still network, but with a more manageably sized crowd.

On the back of their name badges, all delegates can find Conference Bingo, which includes tasks like "ask three questions to poster presenters" to enable you to have a conversation starter if you feel nervous asking questions, or "tweet about your favourite talk" to give you the confidence to get involved in the online conversation. Finally, having recognised that ecology is just one part of the shared experience of our delegates, we have incorporated networking opportunities like socials for our Advancing LGBTQIA+ Diversity, Equality & Representation (ALDER) and Racial and Ethnic Equality and Diversity (REED) networks, to bring together the community.

Finally, we are constantly adapting our conference to meet the current needs of our delegates. This can be something as small as adding space on the name badges for pronouns, to something much larger like elements of the programme available online so anyone around the world can access the incredible research being shared at the Annual Meeting.

For everyone already here, we hope you are as excited as we are for everything that the next few days have in store for you. For anyone who couldn't make it this time, we'll see you next year in Belfast, 12–15 December 2023. ✺

© ALICIA SOLANA-MENA, MEME

Collared female elephant with her young calf

ASIAN ELEPHANTS PREFER HABITATS ON THE BOUNDARIES OF PROTECTED AREAS

New research has found that Asian elephants prefer habitats on the periphery of protected areas, rather than the areas themselves. The findings come from the most comprehensive analysis of Asian elephant movement and habitat preference to date.

In the Sundaic region of South-eastern Asia, where the research took place, Asian elephants are endangered and live in highly fragmented forests, only 10% of which are formally protected. One of the main threats to elephants is conflict with humans as they venture into increasingly human dominated landscapes.

These pressures might suggest the elephants would prefer areas deep within protected forests, but the study, which analysed the movement and habitat preferences of 102 Asian elephants and recorded over 600,000 GPS locations, found that the majority of elephants spent more than half of their time outside of protected areas.

The researchers found that elephants preferred slightly disturbed forests and areas of regrowth. However, protected areas still played an important role, with the elephants' biggest preference being for areas within three kilometres of protected area boundaries.

Dr Benoit Goossens from Danau Girang Field Centre and Cardiff University, a lead author of the study said, "Our results show that elephant conservation strategies need to be realistic and acknowledge the nuances of elephant habitat needs and preferences, integrating holistic human-elephant coexistence approaches outside protected areas."
(*Journal of Applied Ecology* doi.org/gq28qp)

FLOWER STRIPS AND HEDGES COMBINE TO BOOST BEES IN ORCHARDS

Researchers at the University of Freiburg have found that hedges and perennial flower strips are complementary in supporting wild bees in orchards by providing continuous resources over the growing season.

The research examined wild bee populations in intensively farmed orchards. Crops like apples rely on pollination, but wild bees are often rare in these environments because of a low availability of flowers as nectar and pollen sources throughout the growing season.

The researchers found that the flowering times of hedgerows and perennial flower strips complement each other to provide wild bees with resources over a longer time period, boosting their diversity and abundance, and in turn benefitting apple farmers.

Wild bee species were found to visit flowering hedges early in the season from March to June, whereas they visited perennial flower strips later in the season from June to August in the first year of planting, and from April onwards in subsequent years.

Based on the findings, the researchers recommend that farmers plant a network of perennial flower strips in combination with flower-rich hedges to support wild bees.

Dr Vivien von Königslöw, lead author of the study, said: "For enhancing wild bees in intensive agricultural landscapes one should provide a network of perennial flower strips and some well-maintained hedges to create a continuous flower offer over the entire growing season."
(*Journal of Applied Ecology* doi.org/gqv8g7)

© MATTHEW HASENJAGER

Vivien von Königslöw sweep netting wild bees

KEEPING TO A BEAT IS LINKED TO REPRODUCTIVE SUCCESS IN MALE ROCK HYRAXES

A behavioural study conducted in Ein Gedi Natural Reserve, eastern Israel, has linked reproductive success in male rock hyraxes to their ability to maintain rhythm during courtship songs.

You only need to look at the adoring fans of famous musicians to realize being rhythmically skilled is a desirable trait. In male rock hyraxes, singing frequency and rhythm could be seen as indicators of individual quality by potential mates – signalling information about their health and suitability as a partner.

Dr Vlad Demartsev, who collected the data for this study during their time at Tel Aviv University, said "We have been studying hyraxes for the past 20 years and have previously found several patterns in their songs that are common features of human language and music.

"Their songs have regional dialects so individuals living in proximity sing more similarly to each other. They tend to sing in crescendo (getting louder as the song progresses) and reach peak complexity towards the end of their songs, maybe to keep the audience engaged and listening to the signals."

Publishing their findings in the *Journal of Animal Ecology,* the researchers showed that, while singing, hyrax males keep a stable isochronous rhythm, with sounds occurring at regular intervals.

Rhythm plays a crucial role in the communication of some animals. "One assumption is that rhythm has evolved so that animals that call in groups can better synchronize their songs – like musicians in a band or singers in a choir," explains Dr Demartsev.

However, unlike many other animals known to communicate through song, hyraxes usually sing alone.

Since certain physiological ailments may have a negative effect on the ability of hyraxes to produce precise, rhythmic calls, the researchers suggest male hyrax courtship song rhythm could be an indicator of health and suitability as mates to prospective female partners.
(*Journal of Animal Ecology* doi.org/jc3z)

Male rock hyrax singing

© AMIYAAL ILANY

THE ROUTE FORWARD FOR INCREASING ETHNIC DIVERSITY IN THE ENVIRONMENT SECTOR

As part of our mission to foster a strong and diverse ecological community, the British Ecological Society has committed to an action plan, along with 40+ other environmental organisations, to cultivate a welcoming workplace environment where people of colour can thrive.

The plan, laid out in the route map by environmental umbrella group, Wildlife and Countryside Link, details the key steps environment organisations must take over the next five years to increase ethnic diversity in the environment sector.

After farming and agriculture, the environment sector is the second least diverse field in the UK. People of colour make up only 4.81% of environmental professionals compared to 12.64% of the overall UK workforce.

In 2021 and 2022 the Wildlife and Countryside Link, alongside diversity and leadership experts, Full Colour, surveyed over 2000 environmental professionals, collecting qualitative and quantitative data on racism and ethnic diversity in the environment sector.

Their findings revealed that the sector holds a huge appetite for change, yet experiences ongoing issues with a lack of action and implementation. To turn this appetite into action, the route map identifies four core areas to address, including improving workplace culture, transparency, action on racism, and organisational plans and practices.

On the BES' commitment to the route map, Yadvinder Malhi, President of the BES said "The environment sector lags behind in ethnic diversity and fails to make use of the passion, talents and perspectives that the diverse communities of the UK can provide in tackling our ecological and conservation challenges. The LINK report lays a clear route map for how this can be improved. I am pleased to see the BES embedded in this drive for change and firmly committed to a more diverse future in every sense"

Learn more about the BES's commitment:
www.britishecologicalsociety.org/increasing-ethnic-diversity-in-the-environment-sector/

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SCIENTISTS STUDY TOURISTS TO PROTECT GREAT APES FROM DISEASE TRANSMISSION

Researchers are protecting great apes from diseases by studying the behaviour and expectations of tourists who visit them.

Humans are great apes, and this close genetic link makes non-human great apes (bonobos, chimpanzees, eastern gorillas, western gorillas and orangutans) vulnerable to our infectious diseases.

In a recent study conducted during the early stages of the COVID-19 pandemic by an international team including the University of Exeter, NOVA University Lisbon and Ugandan NGO Conservation Through Public Health, almost 1,000 tourists or potential future tourists visiting wild great ape habitats in Africa completed an online questionnaire.

Visitors and tourists were asked about their actions on previous visits, their willingness to comply in future and what factors should be promoted to increase their willingness to follow recommendations.

The survey found willingness to comply with disease prevention measures like wearing a facemask varied depending on factors such as nationality, expectations about the visitor experience and whether people thought specific disease-risk measures were effective. Compared to other disease mitigation measures, visitors were less willing to wear a facemask during trekking, be vaccinated against COVID-19 (which, at the time the survey was conducted, had only just started being administered to very high-risk groups), or quarantine after international travel before visiting great apes.

Believing that each specific measure was effective in preventing disease was key to respondents' willingness to follow that specific recommendation.

Dr Kim Hockings, from the Centre for Ecology and Conservation on Exeter's Penryn Campus in Cornwall, said "In the face of growing threats from future pandemics, we must minimise disease transmission while ensuring that tourism and research promote long-term support for the conservation of great apes and their habitats as well as maximising benefits for local communities." (*People and Nature* doi.org/gqrmjv)

THE IRREPLACEABLE ROLES OF CROCODILES AND RELATIVES ARE AT RISK OF BEING LOST

Over half of all crocodilians are threatened with extinction. Research published earlier this year in *Functional Ecology* highlights the vital and unique ecological roles we stand to lose alongside these endangered animals.

In this study led by ZSL, researchers investigated the diversity of crocodilian ecological roles by creating a database of characteristics that link to species function in their environment, such as skull shape, body size and habitat use.

The study revealed several unique and surprising ecological functions, from the burrowing of the critically endangered Chinese alligator which provides shelter to other species, to the Philippine crocodile that eats invasive apple snail pests.

Alarmingly, the researchers found that up to 38% of these diverse ecological functions that crocodilians provide for the environment are at risk of being lost.

The study also identifies the crocodilian species most in need of conservation action. Out of the ten species with the most unique ecological functions, six are Critically Endangered and are so depleted that they are considered functionally extinct in most of their historical range.

Phoebe Griffith, ZSL PhD student and lead author of the research, said "There are around twenty-eight species of crocodilian, and they've evolved to be surprisingly different to one another. Quantifying the diverse ecological roles of these species is an important factor in understanding and conserving global biodiversity and looking at the scale of what we are set to lose if these key players disappear." (*Functional Ecology* doi.org/gqmc5t)

© PHOEBE GRIFFITH

Philippine crocodile in rice field

NESTBOXES: THE SIMPLE CONSERVATION STRATEGY SAVING THREATENED ROSEATE TERNS

© BRIAN BURKE

Over the last couple of decades, one major population of Europe's roseate terns has seen phenomenal growth thanks to a simple conservation strategy employed by wardens on Rockabill Island.

Ireland is home to the majority of Europe's roseate terns with 85% of these terns' European population hosted on Rockabill, a tiny island no larger than a football pitch. In an attempt to rescue the population from steep declines, every year for the past 33 years, BirdWatch Ireland conservation wardens have provided the terns with secure nesting spots by placing hundreds of wooden nest boxes across Rockabill Island.

Since the project started in 1989, the number of breeding pairs has increased tenfold, with chicks hatched and fledged on Rockabill going on to boost other important roseate tern colonies.

The wardens and researchers made the most of the island's limited space by assembling roseate tern 'apartment blocks' - protecting these birds from bad weather & predators. Analysis of data collected over the past 15 years showed that these nest boxes helped the roseate terns have much greater success in raising their young, with more eggs hatched and more chicks surviving to fledge into juveniles when they were born in the nest boxes.

Dr Darren O'Connell, co-author of the research article, said, "It is fantastic to have found that over three decades of a hard manual slog by BirdWatch Ireland wardens was more than worth it."

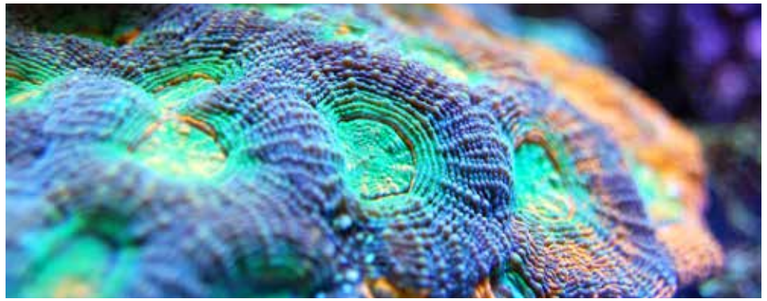
"What seems like a simple conservation strategy is proving to be very effective by having a really positive impact on roseate tern breeding."

Many of the nest boxes have even been decorated and constructed by students at Balbriggan Community College, opening the eyes of many young people in the local community to the importance of conserving biodiversity. (*Ecological Solutions and Evidence* doi.org/gqpnb4)

© BRIAN BURKE

ECOLOGISTS USE THE LATEST DENTAL SCANNING TECHNOLOGY TO STUDY YOUNG CORAL

Inspired by a trip to the dentist, Dr Kate Quigley, a senior research scientist at the Minderoo Foundation, presents a new method for monitoring coral size and growth that reduces surveying time by 99%.



Following a trip to the dentist, Dr Kate Quigley was inspired to give dental imaging equipment a new use in the field of marine ecology – scanning and measuring coral

Coral reefs are among the Earth's most productive ecosystems, providing essential nutritional and protective services to people across the globe. These important ecosystems have suffered serious declines over recent decades – spurring a flurry of research around their basic biology and restoration. Understanding the critical life stage of juvenile coral allows scientists to predict ecosystem changes, the impacts of disturbance and their potential for recovery.

However current coral scanning and surveying methods can be laborious and lengthy.

Dr Quigley remarked on the similarities between coral and our teeth – both being calcium-based and requiring measuring tools that can withstand wet surfaces. "One day, I was at the dentist, and they rolled out this new scanning machine. I knew immediately that it was something that could apply to scanning very small corals given corals and teeth actually share many similar properties. The rest is history!"

Using dentistry scanning machinery to scan and build a model of each individual coral took on average less than three minutes compared to over four hours with previous methods.

Whilst this is a massive step forward in reducing the time involved in monitoring and studying small marine animals, 3D scans still need to be processed manually, slowing down analysis. Kate hopes that the next avenue for this research is to create an automatic analysis pipeline from scanning to measurement, potentially using AI. (*Methods in Ecology and Evolution* doi.org/jhgh)

THE NEW PHYTOLOGIST FOUNDATION – OUR DIVERSITY PARTNER FOR #BES2022

We are delighted to announce that New Phytologist Foundation are sponsoring the registration and travel to the BES Annual Meeting 2022 for seven early career ecologists from under-represented ethnicities and low-income backgrounds.

BES Senior Development Manager Paul Bower said, "I would like to thank New Phytologist Foundation for their support. Attending your first Annual Meeting is an important step to starting a career in ecology. Please get in touch if you would like to follow their lead in 2023 and sponsor registrations at future BES meetings, symposia and workshops".

For all BES sponsorship, fundraising, advertising and exhibition queries contact:
Paul Bower
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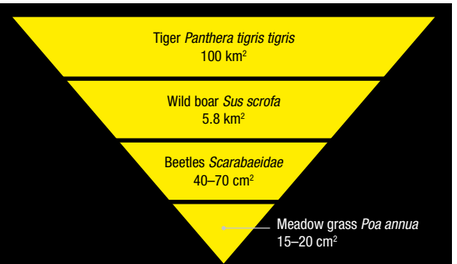
Tel: +44 (0) 20 3994 8246

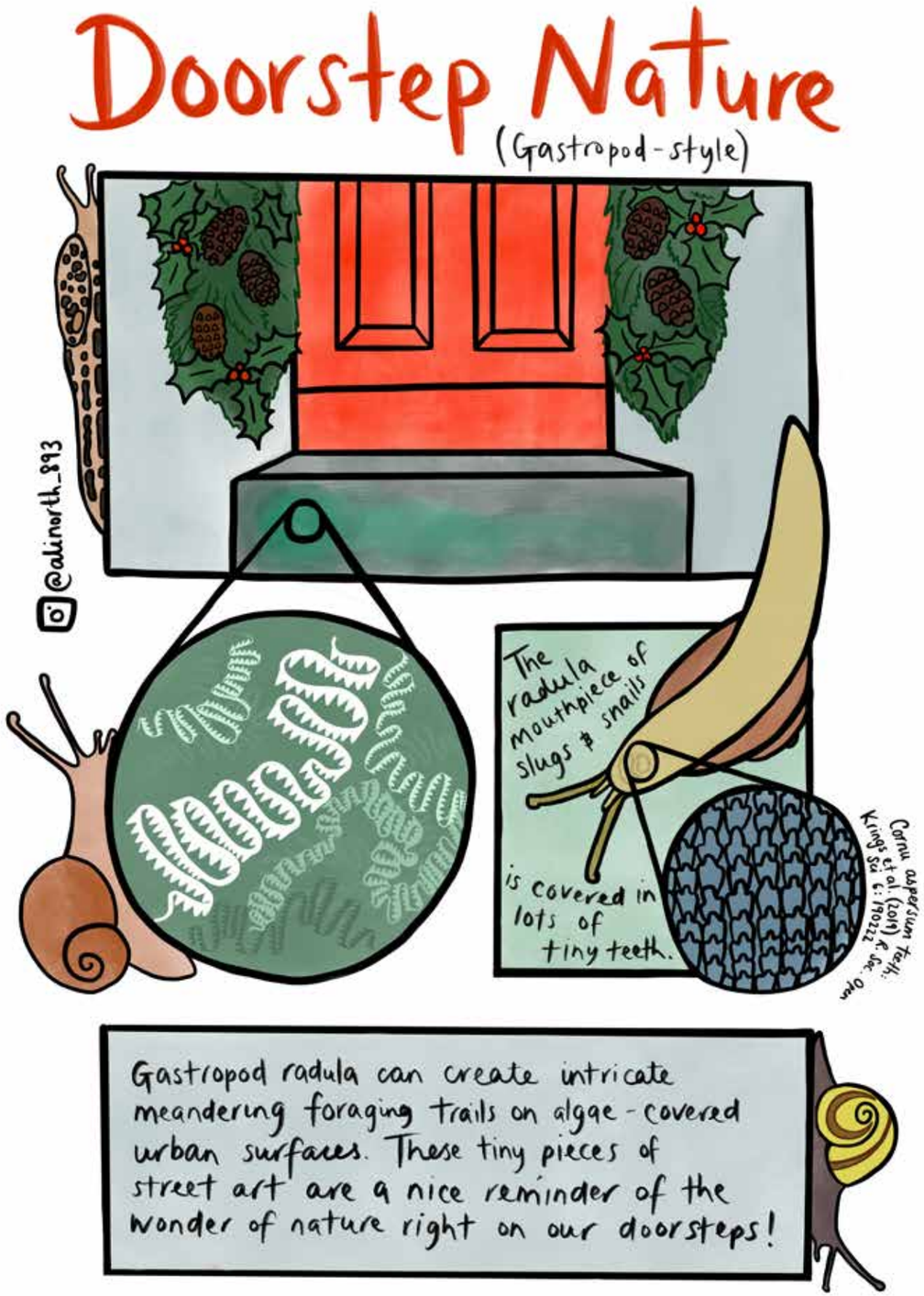
Diversity Partner
New Phytologist Foundation

RESOURCE AREA PYRAMID

We're all familiar with ecological pyramids representing biomass, energy and populations, but MSc ecology students specialising in ecological informatics from the Digital University of Kerala have found a new perspective – an inverted resource area pyramid. The pyramid is based on the area used by individuals in each trophic level. This simple visualization could help conservation efforts by demonstrating how much space certain species need, and how human activity can impact their resources.

The students welcome feedback on their idea, please contact course tutor Dr Jaishanker R Nair jrnair@duk.ac.in





TOOLKIT

HOW TO WRITE A REVIEW OR LONG-TERM STUDY ARTICLE

As *Journal of Animal Ecology* welcomes proposals and ideas for long-term studies in animal ecology and review articles from early career researchers (https://bit.ly/SManton), Commissioning Editor Rob Salguero-Gómez shares some top tips to help anyone, at any career stage, write these article types.

Ecology is a broad discipline. One of the ways in which we communicate the diversity of systems we examine is via peer-reviewed publications. In recent decades, the publication arena has diversified to accommodate this range of systems, questions, and findings. To illustrate the increase in diversity of publication types, I encourage you to pick up a manuscript published in any of the BES journals from the 1970s and compare it to a 2022 publication. You will notice quite a few changes in length, formatting, writing, and reporting style, make-up of tables and figures and the diversity of article types.

The BES has a remarkable portfolio of seven journals that together cover a wide array of article types; each targeting a different dimension of the theoretical, empirical, methodological, applied, and managerial themes of ecology. And they offer a wide array of article types, from the standard research article (the more classical intro, methods, results, and discussion type of papers), to other types that offer a more flexible format to better fulfil their specific roles. Examples include the *Practical Tools* of *Methods in Ecology and Evolution*, or the *Policy Direction* of *Journal of Applied Ecology*.

During my tenure as the Commissioning Editor of *Journal of Animal Ecology*, I have witnessed an incredible amount of variation in submissions of some of these article types. My purpose here is to focus on effective reviews (but also see the excellent piece on writing a review by Sayer 2018) and long-term studies in animal ecology. These article types have a unique value in the ecological literature. Reviews provide an integrative description of an ecological topic and have become so important that they are present in all BES journals. Long-term studies, on the other hand, exclusive to *Journal of Animal Ecology*, have the very specific role of integrating a series of findings into a much larger, comprehensive narrative.

REVIEWS

1. **One big idea per review:** reviews that offer a cohesive narrative around a single idea generally do a better job at guiding their readers from beginning to end. Reviews with multiple, largely unconnected ideas result in confused, lost readers.

2. **Structure:** feel free to throw away the "Intro-Methods-Results-Discussion" format. Instead, use the great flexibility that this article type provides to engage with the most interesting bits of your research up front. Set the stage, and tell us the different parts of the story in a way that is most meaningful.

3. **Community citation support:** you know your field of research very well. However, you are likely not the only expert. Support your review with citations of your own research, your research group, but also cite broadly across the discipline and from other research groups – even (or particularly!) if their views differ from yours. Reviews that offer confronting views on a given topic allow readers to observe the landscape in a more holistic manner.

4. **Literature reviews are perfect for reviews:** the first chapter in a PhD is often a literature review. This is not by coincidence. Supervisors routinely encourage their students to read extensively to know the state of the art in their disciplines. With a bit of tweaking, those lit reviews can be turned into successful reviews. All that is required is that synthetic outlook. These might make excellent contenders for the Sidnie Manton Award at JAE.

5. **Where to next?** So you have written about the life and miracles (and findings) of an area of research. That is, you have allocated significant efforts to the past and the present. What about the future. Given the momentum that your area of research has gained, the emergence of sister disciplines, new technologies, interdisciplinary approaches, and pressing societal needs, where should that discipline go to next… and how? A prospective view is key to a successful review.

LONG-TERM STUDIES IN ANIMAL ECOLOGY

1. **Long-term is all relative:** this year the long-tail tit study at Wytham Woods has achieved a remarkable 75 years. There are other remarkably long studies that span multiple decades too (Clutton-Brock and Sheldon 2010). However, *Journal of Animal Ecology* does not adhere to the Merriam-Webster definition of 'long-term' being at 10 years or more, or even the US National Science Foundation's six years threshold. As in all things ecology, the relevant point of temporal replication relates to the lifespan of the study organism or the overall turnover of the system. A few years of monthly data on mites is also long-term. Do not wait until you have a million generations in your data to write a long-term study paper!

2. **Explain the motivation of the study up front:** your research will have inevitably taken twists and turns along the acquisition of long-term data in your system. However, behind the different lines of research that you have conducted, there is still a common motivation. What is it? Explain it up front, and remind the reader along the various sections of your paper how different bits have contributed to that vision so that you tell a cohesive story

3. **Share the behind-the-scenes story:** rarely does somebody wake up one day and think "I'm going to commit the rest of my academic life to studying this system". Long-term studies start by the humble accumulation of a few data points, the confluence of a stubborn person (or few people), and a couple of prayers to the gods of funding. Share the original motivation and explain how the research questions might have changed along the way.

4. **Prospective view:** similar to the review, you have explained all the work that was done with the long-term study, the key insights that emerged from it, and have painted a synthetic picture with all those pieces of the puzzle. That's not necessarily the end! With the advent of new technologies, and potentially in confluence with other data, what are the next exciting areas of research that one could address with this long-term study?

5. **Make your data open:** all BES journals require, as a condition of publication, that the data and scripts supporting the results in papers published in its journals be archived in a publicly accessible repository. This action is part of the move towards open access in ecology and will ultimately result in a full reproducibility of our science. Make your glorious long-term dataset open because it will fuel the discipline, and often results in further opportunities for collaboration!

The BES is particularly supportive of its junior members. Each BES journal has an annual award for their best publication by an early career researcher. In the case of *Journal of Animal Ecology*, in addition to the Elton Award, we also recognise the excellence of our ECRs (<5 years PhD, with reasonable exceptions being considered) via the **Manton Award**. Are you an ECR with ideas for a review or long-term study? Submit your proposal using this link https://bit.ly/SManton by 17 February 2023. Your proposal will be assessed against the following key criteria: a well-balanced overview of an exciting topic, novel insights that advance animal ecology, and provide future directions for research. I am always happy to discuss ideas via email or in person. On that note, hope to see you at the BES Annual Meeting in Edinburgh!

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PRACTITIONERS + SOCIO-ECONOMISTS + CONSERVATION SCIENTISTS

USING COMPUTER GAMES TO GAUGE PASTORALISTS' ATTITUDES TO LION CONSERVATION

Reconciling conflicts between wildlife conservation and other human activities is a complicated issue. Rebecca Sargent and colleagues worked in Tanzania where African lions impose severe social and financial costs on the communities that live alongside them. The team asked pastoralists from eight villages to play a new computer game about lions and livestock protection. Players could choose to protect their livestock using various options such as 'spearing lions', 'scaring lions', and 'providing lion habitat'. Each choice offered different point scores and costs, and different rates of success. They found that the preferred option was to use non-lethal scaring methods and that incentives worked best when given to individuals, rather than the group. The games were well-received and quickly understood, offering a practical and engaging approach for conducting community surveys and encouraging discussions. (*People and Nature* doi.org/jj27)

© BECCA SARGENT

Maasai pastoralists playing the lion game in Ruaha, Tanzania

Who was involved in this project?

This project involved a big team of people and it's hard to know how they would define themselves! I would say we had a mixture of socio-economists, biological modellers, and conservation scientists and practitioners.

How did you find working with a group from different disciplines?

It was a fantastic experience working across such a diverse set of disciplines. This research was completed as part of my PhD and at each stage I needed to learn about a different aspect, from designing the game, to implementing the surveys, to figuring out the statistics. This wouldn't have been possible without the support of an interdisciplinary team, and of course the players who participated and shared their stories.

What have you learnt from other disciplines that you would apply to ecology?

Coming from a zoology background I learnt a lot about different social science methods and about the value and importance of qualitative data to help interpret and contextualise results. I also learnt about more practical aspects of working with people, including considerations of ethics and safeguarding, and facilitating discussions. This definitely taught me a lot of useful skills which can be applied in many different areas of my work.

Were there any surprising discoveries from this research?

It was an interesting experience introducing the game to local pastoralists, who I think found the idea quite bizarre. However, everyone was eager to play and we ran sessions in a variety of locations, sometimes surrounded by livestock, sometimes on a riverbank with pied kingfishers flitting past. What was perhaps not surprising was that players preferred individual bonuses rather than those that were shared by the community. This could have implications for the way in which conservation incentives are provided.

What advice would you give to anybody embarking on an interdisciplinary project?

To be patient and persevere when learning new techniques, and to be open to different perspectives. I think it's also really important to be able to ask for help when needed. That's the great thing about having an interdisciplinary team… if there's something you're struggling with or is not your area of expertise, it's likely that someone else will have an idea or know the solution.

What non ecology paper would you suggest our members read and why?

If you are interested in learning more about using games in conservation research, this is an excellent introduction: Redpath, S.M., *et al.* (2018) Games as tools to address conservation conflicts. *Trends in Ecology & Evolution*, 33(6), pp.415-426. ✺

Becca Sargent is a lecturer and conservationist at Bristol Zoological Society, UK. Her research interests include animal behaviour, human-wildlife interactions, and community-based conservation. Her current work focusses on sustainable livelihoods and drivers of illegal hunting in the Philippines.

@RK_Sargent

MAPPING 35 YEARS OF PRESCRIBED FIRE HISTORY

Erin Rowland-Schaefer and **Elizabeth Bach** present a visual record of the long fire history of Nachusa Grasslands, a tallgrass prairie restoration site in Illinois, USA.

Fire has played a significant role in the development and management of tallgrass prairie ecosystems since before European colonization. While historically, fire was used by Indigenous communities to manage the movements of bison, today, Indigenous communities and other managers apply prescribed fire to support the conservation of tallgrass ecosystems that have been anthropogenically impacted. Fire helps to prevent the spread of invasive plants that are not fire-adapted, as well as to prevent the encroachment of woody vegetation.

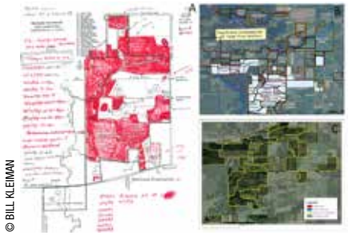
Given the importance of fire to management in modern tallgrass prairies, we set out to digitize the long-term fire management history of a restored tallgrass prairie preserve: Nachusa Grasslands. Nachusa Grasslands is a 1600 ha preserve owned and managed by The Nature Conservancy in northern Illinois, USA. This project sprung from a combination of circumstance and necessity.

We initially identified these maps as a project that would help support the scientists and managers working at Nachusa and across The Nature Conservancy. Many researchers are studying the impacts of prescribed fire on the preserve, so we wanted to provide an accessible, digitized record of the fire history across the landscape to support the work of others. Additionally, this was a project that was initiated during the spring of 2020, so being able to conduct work virtually became critical.

As we worked to produce these maps, we realized that these data would be beneficial to publish open access. Making fire management data open access is helpful to conservation and restoration practitioners. Land managers put a lot of work into training, planning and performing safe prescribed fires.

We began with the archival records of prescribed fire on the preserve. For the earliest years, these were in the form of hand-drawn maps and annotations. In later years, we were able to pull from digitized maps generated for annual reports. These images were imported to ArcGIS Pro and georeferenced, meaning that we identified points on the images and matched them to the same points on the map. Thankfully, the preserve boundaries and roads were visible on all historical maps, which gave us consistent points to reference.

Once the image was georeferenced, it overlaid the digital map of the preserve and we were able to hand-trace the images to create a digital record of the preserve's fire history. This resulted in a full map package containing layers for each fire season (typically running from November to April) in the preserve's 35-year history.



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An example of a hand-drawn prescribed fire record from 1986 and the process of digitizing a map

© DEE HUDSON

Staff and volunteers conduct a prescribed burn at Nachusa Grasslands

Our examination of this fire history told us a little more about the patterns of fire on the preserve over time. The proportion of the preserve burned has increased dramatically over time, outpacing the growth of the preserve as a whole. This reflects increased capacity through trained volunteers and staff, equipment, and the ability to burn larger units. We are also eager to integrate this dataset into future work, both to specifically examine prescribed fire, as well as to study the impacts of prescribed fire on different taxa.

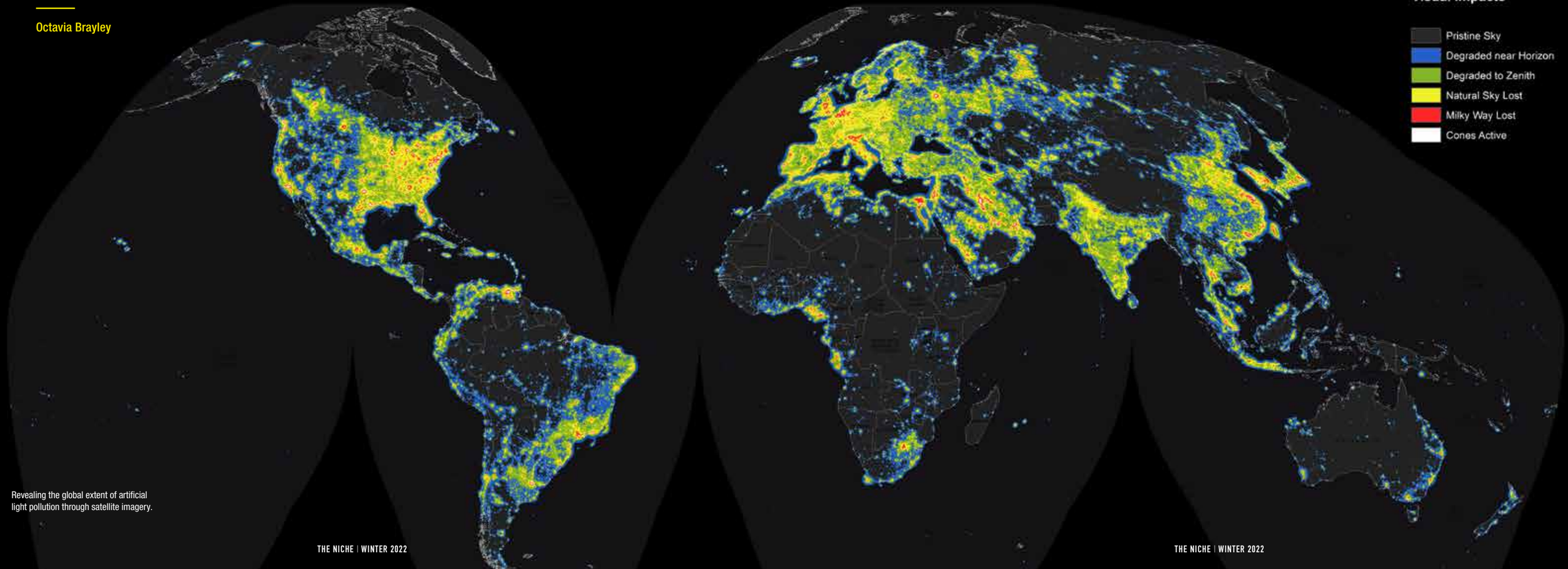
We hope that by making this fire history data public it will encourage scientists to be similarly open in sharing analyses that can inform management decisions. ✺

Mapping fire history and quantifying burned area through 35 years of prescribed fire history at an Illinois tallgrass prairie restoration site using GIS
Ecological Solutions and Evidence
doi.org/jh3r

ILLUMINATING

the problems of light pollution

Octavia Brayley



Revealing the global extent of artificial light pollution through satellite imagery.

THE NICHE | WINTER 2022

Before the creation of the carbon filament light bulb in 1879 by Thomas Edison, the world was relatively dark. After the invention of the electric bulb, artificial light quickly became an essential part of human existence and has been important in the development of our societies and cities. But like a lot of human inventions, artificial light has become so widespread across the world that it is causing biological problems for organisms.

Although the term 'light pollution' has been used for well over two decades, it wasn't accurately defined until 2004 by Travis Longcore and Catherine Rich, who divided the term into two branches, "astronomical light pollution" where the view of the night sky is reduced, and "ecological light pollution" where the natural light patterns are altered in marine and land environments. Even still, and surprisingly, light pollution was not recognised as a worldwide concern until 2009 during the UN's International Year of Astronomy. Since then, many scientific studies have been carried out to investigate the effects of this technology on various animal species around the world.

THE EFFECTS OF LIGHT POLLUTION ON ORGANISMS

Light pollution has been increasing in its abundance by 6% each year and it is also incredibly widespread, affecting 80% of the habited surface of the Earth, with its prevalence highest in marine areas. All animals, including us, have internal biological clocks that are used to time a range of important behaviours, such as sleep, migration, activity, and reproduction. These are not visible clocks, but ones that are generated in the brain and are controlled by various hormones, called 'circadian rhythms.' For these rhythms to function effectively, the brain requires a predictable change in natural light, directed through our eyes, over a 24-hour period as the sun rises and sets, which is why it is essential for organisms to be exposed to natural light patterns.

Many marine organisms carry out a process called diel vertical migration, where they rise to the surface of the water at night to feed (often on plankton that has gathered in the upper water layer during the day for photosynthesis), and then sink to the lower depths during the day to avoid large predators. A study carried out in Lake Waban in Massachusetts, USA, studied *Daphnia*, a small planktonic crustacean or water flea, and found that they swam two metres lower than the normal maximum height of diel vertical migration and simultaneously, 10-20% less of the fleas migrated at all. This means that *Daphnia* are likely accessing less food and residing in the colder waters for longer, reducing their energy, which could decrease their growth and reproduction rates. Diel vertical migration also helps with nutrient cycling in the ocean, allowing the nutrients to move from the surface water to the lower depths, and back to the top again, which is important for the health of many other marine creatures – something that could also be impacted if there is reduced migration.

Insects make up the largest group of animals on the planet, with over 1 million described species, yet numbers are worryingly on the decline around the world, with studies estimating that 40% of species are at risk of extinction, termed the "insect Armageddon". There are many reasons for this decline, but it is undisputed that human activity is the main cause, with increasing land use,

industrial pollution, climate change, and pesticide use being some of the major contributors. We know that insects are affected by light pollution, but it's difficult to quantify how much of a global impact this is having on their numbers. Diurnal insects – ones that are active during the day and the night – use sunlight as a cue to begin migration, such as monarch butterflies (*Danaus plexippus*) that are found in the UK and US. Other insects such as African dung beetles (*Scarabaeus satyrus*) use celestial cues from stars and polarisation signals for orientation and for foraging. Light pollution may disrupt these signals, which could alter the behaviour of insects and reduce their chances of survival. Furthermore, insects are often attracted to artificial light sources which attract various species into small areas, making it difficult for insects of the same species to find each other to mate. This is also seen in fireflies (*Photinus pyralis*) which use bioluminescent flashes to locate and attract mates. A study found that artificial light decreases the number of flashes per minute produced by a species of dark-active firefly (*Photuris versicolor*) and reduces the activity of courtship behaviour thus, disrupting mating and reproductive success.

My own research on light pollution led me to the muddy beach of Clevedon, near Bristol, UK. Here, I collected about 30 shore crabs (*Carcinus maenas*) every couple of weeks and took them back to my lab at the University of Bristol. After months of exposing the crabs to different light regimes and analysing their behavioural patterns, I was able to show that their activity levels increased when exposed to artificial light and their circadian rhythms were disrupted; instead of showing patterns of peak activity at night (a normal routine for nocturnal animals), high levels of movement occurred throughout the day and fluctuated regularly. Although my evidence supported my hypothesis, the reasons behind their undefined activity levels can only be theorised. For example, melatonin is an important hormone that is released at night to induce sleep, and the presence of artificial light may have decreased its production. Further, I suggest that increased movement may also be a deliberate behaviour to try and 'escape' and seek refuge from the light source as they are in a disorientated state, which could make them vulnerable to predation. Although I did not carry out long-term experiments it can be predicted that the increased activity levels may lower the crab's energy to carry out important behaviours such as foraging for food or finding a mate, leading to an overall reduction of health and organism numbers. How this might affect the wider ecology and the other species in the environment is not yet known.

POLARISATION VISION AND POLARISED LIGHT POLLUTION

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Unpolarised image (top) versus the same image with a polarised filter applied (bottom).

Some animals can detect a form of light that we as humans do not have the ability to see, called polarisation, which can be a beneficial adaptation in environments that are monotone in colour, or where increasing contrast and decreasing glare is important, for example, on mud flats. Light that travels directly from the sun generates waves that are scattered in all directions, but if this light is reflected off the surface of water or roads, or if it comes directly from the stars, the waves travel in only one direction, resulting in polarised light. Although most vertebrate eyes, including humans, are not sensitive to polarisation, many invertebrates use this source of light for a multitude of behaviours, and this has been studied in insects and crustaceans. For example, many crustaceans rely upon polarised light more so than colour vision and some use polarisation vision for communication. Mantis shrimp (*Odontodactylus scyllarus*) use the polarised structures on their carapaces (their hard upper shell) to communicate with other individuals of the same species, perhaps important for sexual signalling and the identification of members of the same species. Polarisation is also used in breeding behaviour, for example, dragonflies (Odonata) use polarisation to differentiate between 'dark' and 'bright' water sources to lay their eggs and breed. The dung beetle, *Scarabaeus zambesianus*, uses the celestial polarisation pattern to roll its dung along straight paths which enables them to avoid competition and territorial fights from other individuals. Similar behaviours have been studied in ants which use celestial polarisation to calculate the number of steps needed to return to their nest.

Polarised light pollution occurs when polarised light is reflected off manufactured objects such as dark buildings or smooth roads. This disrupts the normal polarised light patterns that some animals use for various behaviours. Polarisation signals coming from artificial sources such as asphalt roads, cars, oil spills, or glass windows can be mistaken by aquatic insects like dragonflies for bodies of water, possibly reducing their chances of mating and could cause death due to exhaustion and dehydration if they were to remain in these areas for long periods of time, termed the "polarisation captivity effect". Polarised light pollution doesn't just affect insects; some species of water birds such as the brown pelican (*Pelecanus occidentalis*) have been found injured and unable to take off when they have landed on asphalt roads. Marine animals are also at risk; plastic is another source of polarised light pollution. It's thought that sea turtles are mistaking the plastic for their preferred food, jellyfish, resulting in damage to their internal organs as well as reducing their ability to eat and digest other food sources, reducing their growth in the long term.

An example of how plastic bags can look a lot like a jellyfish. The familiar shape and movement of the garbage, combined with the addition of polarised light pollution, can cause significant harm to sea turtles.

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WHAT CAN BE DONE?

Light pollution has been a lesser-known environmental concern to the scientific community until very recently, and it is this which makes resolving this issue even harder; all the light sources are already out there in our communities. A "world atlas" of artificial light was first created in 2001 to quantify the amount of light pollution around the world using high-resolution satellite images. The current map uses modelling and software packages to monitor other indicators of light pollution including effects on celestial polarisation by counting the number of visible stars in the night sky.

Although light pollution around the world is now being measured, the levels and type of light pollution and its associated effects on the surrounding habitats still need to be continuously monitored for mitigation strategies to be proposed. This requires an interdisciplinary approach and should include collaborations with scientists and policy makers from a range of fields, including engineering, ecology, biochemistry, physics, and biology. This is essential to educate both the scientific community and the public about the extent and associated impacts of light pollution on the world's organisms, hopefully contributing towards effective conservation and preservation of many different species. Therefore, I propose the idea of a worldwide light pollution association which would bring scientists and citizens together from many fields and would create annual reports on both the current measuring of light pollution and the associated effects on organisms globally. These annual reports should also propose strategies to reduce any negative effects on organisms and should be communicated with local governments and authorities. And individuals can also play a part in tackling light pollution; remember to switch lights off at home when they're not necessary, especially at night! ✺

THE AUTHOR

Octavia Brayley is a PhD student at the University of Birmingham where she is researching Antarctic entomology and climate change. Alongside her research, Octavia is also a science tutor, STEM ambassador, Education Officer for the UK Polar Network, and a naturalist lecturer on international cruise lines.

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WITH EARS

UNDERWATER

Soundscapes of the life aquatic

David de la Haye

Fizzle. Crack. Pop. Grind. Buzz. Rattle. Scrape.

The richness of underwater sounds is surprising. Popular culture portrays life beneath the waves as muffled, based on human perspective. But listening through a hydrophone uncovers soundscapes that are as diverse and beautifully intricate as anywhere on Earth.

I began making aquatic recordings around 2016, fascinated by the organic noises that emerged as if produced by some secret, underwater synthesiser. From this point I became increasingly interested in acoustic ecology, or ecoacoustics, the study of sounds in the environment. Broadly speaking, it categorises three types of sound. Geophonic sounds emerge from the landscape itself; think wind, rain, movement of tectonic plates. Biophonic sounds are any produced by living organisms, whilst Anthrophonic ones comprise the by-products of human activity; think sonar, jet engines, the seemingly ubiquitous 'urban roar'. The three are not mutually exclusive. They coexist in a shared sonic territory; the soundscape.

In 2021, I was commissioned by Sound and Music, the national agency for new music, as part of their 'Composer-Curator' scheme. I proposed to explore Sunderland's underwater soundscapes and curate a series of events for the United Nations' 'World Water Day'. Docklands and intertidal mudflats on the UK's north-east coast; the marina and estuary of the River Wear; the rock-pools of Roker and freshwater ponds dotted through a once heavily industrialised landscape. These places were patiently recorded over the course of nine months to produce a creative bedrock for outputs that included a sound installation, a zine publication, and science-art discussions. Additionally, the field recordings became the springboard for a new album, *With Ears Underwater*.

The creative process began by anonymising and sharing the audio files with a trio of experimental musicians. The purpose was to inspire a unique repertoire which could be used for solo and collective improvisation. The mystery aquatic recordings were later revealed to be the sounds of invertebrates, molluscs, amphibians, fish, and even plants.

The opening track 'Water Bugs and Factories', was recorded near to Nissan's manufacturing plant and introduces the hidden soundscape of a pond where aquatic invertebrates stridulate against a background urban hum. 'The Pond Listener' is an entirely improvised piece of music, the sounds of cello, saxophone and percussion forming an uncannily accurate representation of a true submerged soundscape. Later in the album, the crackle of limpets and seaweed are filtered through the body of a cello. Nearby, the reed player has a go at disguising himself, sonically, within reeds of a freshwater marginal zone.

The 'Six-Limbed Drummer' presents an entomological conversation between drum kit and invertebrate whilst 'Plant Based Patterns', featured in *The Wire* magazine's playlist, explores the mesmerising rhythms of aquatic plants as they produce life-sustaining oxygen.

The concept of 'deep listening' was established by American composer Pauline Oliveros in the 1970s. It was originally conceived as a play on words, as the artist lowered microphones into sewer networks to enable a city listening experience that was literally 'deep'. The concept grew and now plays a pivotal role in listening practices associated with the sonic arts. It foregrounds listening as an active process. We cannot close our ears; we are always *hearing*, an evolutionary mechanism that kept humans alive as they slept. *Listening*, however, requires intent, combining physiological processes with mindful focus. It generates a feedback loop, for one cannot listen deeply whilst also creating noise themselves. As Gordon Hempton, acoustic ecologist and musician, states: "The logic is simple; if a loud noise, such as the passing of an aircraft, can impact many square miles, then a natural place, if maintained in a 100% noise-free condition, will also impact many square miles around it"[1].

The constant thrum of stridulating insects that permeates throughout bodies of freshwater is unexpected. The listener conjures visions of an imaginary rainforest, far removed from the colliery villages of North East England. The strident song of the water boatman becomes a gateway to exotic experiences. We don't need to travel half-way around the globe. The frontier of acoustic ecology can be found, quite literally, on our doorstep.

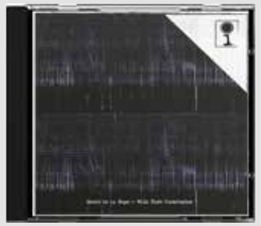
The underwater sounds presented on this album are often closely recorded, and this intimate style continues throughout the production values. Microphones are positioned inches away from the instrument being recorded, so that the friction between coarse bow hair and wooden cello bridge is magnified to convey the grating of radular tongues scraping on craggy rocks. Everything is mixed binaurally, a type of spatial audio technology, to produce an immersive headphone experience, a romanticised version of an aural adventure beneath the waterline.

The recordings are primarily an artistic exploration of interconnectedness beyond human senses but they also become a document of aquatic soundscapes. Passive acoustic monitoring describes the method of making sound recordings whilst the recordist is present. In many situations the mere presence of a human can have an affect on the soundscape as creatures avoid detection by potential predators. In recent years, particularly it seems after the 'global quieting'[2] encountered during the pandemic, there has been growing interest in remote audio technologies which can be deployed discretely and left to gather acoustic data autonomously. An additional advantage is that they can capture sounds over much longer durations than we could in person, revealing temporal changes in the soundscape. The shift from autumnal oranges to wintry greys becomes as vivid in sound as it does in colour.

Producing vast quantities of data, software is often employed to search for audio patterns using artificial intelligence, giving rise to increasing bioacoustic research efforts. Individual species can be studied using acoustic identification alone, helping us to understand behavioural patterns, abundance, and distribution. But this is only possible if we know *what* is producing the sound in the first place. Somewhat surprisingly, many underwater sounds, especially in freshwater habitats, have gone largely undocumented.

With Ears Underwater is intended as a piece of ecological sound art[3], not a scientific document. But my approach is to revel in the wonder and disbelief offered by commonplace habitats such as ponds and rock-pools. The field recordings are largely unprocessed. Listening to these spaces reveals something about our world that is at once mystifying and terrifying; how can a puddle of water sound so *alive?* It is awe-inspiring and curiosity-driven research, exploring the liminal zone of limnological studies. Civilisations throughout history have looked up at the Milky Way and been stricken by a sense of wonder; how small our existence is in the cosmos. Looking down into a body of water we see reflected a microcosm that is equally unbelievable. It is tangible, yet unchartered.

Facts and figures about decreasing biodiversity have become daily features of news feeds. I believe that the trend towards ecological art is driven by a need to better relate and empathise with our shared ecosystem. *With Ears Underwater* is an emotive musical response to aquatic species. Instrumental improvisations flow freely in a conversational style to create an interspecies dialogue that goes beyond the water surface. Next time you visit a body of water, whether that be at a nature reserve, on a paddle-board, or an urban pond, take a moment to stop and listen. Deeply. Imagine what it would be like to hear with ears underwater. ✺



With Ears Underwater features Mark Carroll on cello, Adam Stapleford on drums/percussion, and Graeme Wilson on tenor sax.

All improvisations were recorded live. Performances to date have included British Science Week, BBC New Music Show, and an installation for UN World Water Day.

The album is released on New Jazz and Improvised Music Recordings (NEWJAiM)

Available as digital download and limited edition gatefold CD: https://newjazzandimprovisedmusicrecordings.bandcamp.com

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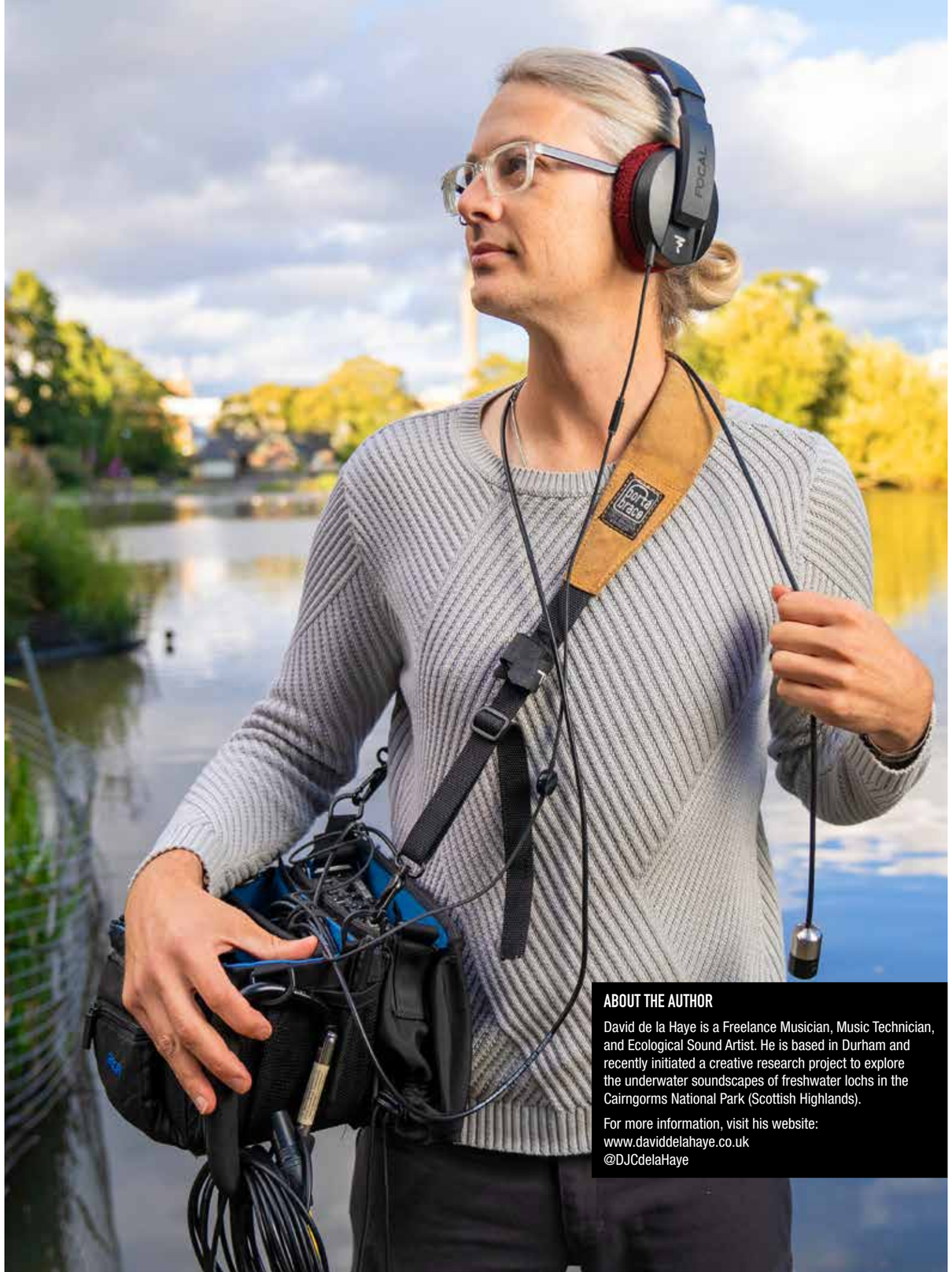
[2] https://www.science.org/doi/10.1126/science.abd2438

[3] 'Ecology and Environmentalism in Contemporary Sound Art' by Jonathan Gilmurray



ABOUT THE AUTHOR

David de la Haye is a Freelance Musician, Music Technician, and Ecological Sound Artist. He is based in Durham and recently initiated a creative research project to explore the underwater soundscapes of freshwater lochs in the Cairngorms National Park (Scottish Highlands).

For more information, visit his website:
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YOUR SOCIETY

NOTICE BOARD

CLIMATE CHANGE GROUP

The Climate Change Ecology SIG and Ecological Genetics Group SIG organised a three day online workshop in September on '**Climate Change Genomics: Vulnerability, Adaptations and Applications**' (#ClimGen22). The workshop brought together leading academics and applied scientists in the field of climate change genomics and early career researchers from around the world to discuss methodological innovations, best practices, how to move the field forward and how to manage biodiversity to encourage adaptation to climate change. The workshop included presentations from 19 invited speakers and 27 submitted presentations, as well as group and panel discussions, and was attended by more than 150 participants from around the world.

Prizes for best student presentations were awarded to Matthew DeSaix from the Colorado State University, USA, for their presentation on 'Highlighting forecasting uncertainty due to novel climate conditions in genetic-environment association models', and to Courtney Gardiner from Stellenbosch University, South Africa, for their presentation on 'Predicting the fisheries of the future: applying genomic tools and distribution models to commercially exploited fishes in the south-eastern Atlantic'. Award prizes were sponsored by the Journal of Animal Ecology.

MACROECOLOGY GROUP

With the new academic year, things are ramping up in the BES Macro SIG. Firstly, we have changes within the committee. Catherine Sheard (University of Bristol) has joined us as Deputy Chair, Helen Phillips (NIOO-KNAW and Saint Mary's University) is now Communications Secretary, Rhys Preston-Allen (Imperial College London) joins as Social Media Secretary, and Tanaya Nair (Oxford University and University College London) starts in the newly created position of Master's ECR representative! The committee is not only planning the Macro SIG social for the BES Annual Meeting in December, but plans are also underway for our Macro conference in July 2023 - being held at Birmingham University. To keep up-to-date with these events, as well as others held throughout the year, you can follow the SIG on twitter (@BESMacroecol), as well as joining the mailing list via the SIG's BES webpage.

MOVEMENT ECOLOGY GROUP

BES MOVEMENT ECOLOGY SIG MEETING 2022

UNDERSTANDING ANIMAL MOVEMENT IN HUMAN-ALTERED LANDSCAPES

UNIVERSITY OF GLASGOW

Local organizing committee: Colin Torney, Grant Hopcraft, Melinda Boyers, Rita Ribeiro, Cyrus Kavwele and Majaliwa Masolele

MoveSIG external organisers: Luca Börger, Holly English, William Kay

It may have taken two years longer than planned but the Movement Ecology SIG (MoveSIG) are happy to report that we finally went ahead with our long anticipated annual meeting in Glasgow – in person (and yes, they are going back to being annual!). Between 7–8 September 2022 we were delighted to welcome at the University of Glasgow over 70 participants from 10 different countries to discuss and present the latest developments in the field, with plenty of inspiring coffee and lunch breaks in the Hunterian Museum of Zoology, under the general theme of "**Understanding animal movement in human-altered landscapes**".

Over the two days we enjoyed 6 Plenary Talks, 2 Thematic Talks, and 24 regular talks and poster contributions, covering everything from master's project results to reflections on whole careers in the field, highlighting the talent and enthusiasm of movement ecologists across career stages. The talks included contributions covering a large breadth of taxa and environments, from terrestrial to aquatic/marine and aerial study species, including mammals, birds, reptiles, fish, and insects. Also presented were methodological contributions on novel methods to model and quantify animal movements; applied projects on how to manage and conserve mobile animals in human dominated landscapes; the COVID-19 Bio-Logging Initiative to study human–wildlife interactions during the COVID-19 anthropause; and the brand-new global tag registry proposal.

Lively discussions continued after the talks at the pub and over dinner, and all enjoyed the opportunity to have non-digital interactions. We are continuing these conversations amongst participants after the meeting, aiming towards a review capturing some of the thought-provoking discussions and musings on future directions outlined during the meeting, hoping to emulate the success of similar initiatives after our previous annual meetings.

All this would not have been possible without the outstanding work done by the local organizing committee at the University of Glasgow, led by Colin Torney and Grant Hopcraft, aided by two postdocs, two graduate students and five student volunteers. We are so grateful to our hosts at the University of Glasgow for providing such a wonderful venue and making the workshop such a success. If you would like to help us host one of our future meetings, please get in touch!

SPECIAL INTEREST GROUPS

Our volunteer groups form communities around the many different areas of ecology and organise meetings and events throughout the year.

To join one of our groups and hear more about their events and activities, please head to our website, or give them a follow on Twitter.

AGRICULTURAL ECOLOGY GROUP

@bes_aeg

Facilitates knowledge exchange between both ecologists and academics working in agricultural systems and those working in the food system in the widest sense including conservationists, farmers, social scientists and policy makers.

AQUATIC ECOLOGY GROUP

@BES_AquaEco

Brings together all areas of aquatic ecology to promote and facilitate interdisciplinary working.

CITIZEN SCIENCE GROUP

@BESCitSci

Provides a forum for sharing details of current citizen science in ecology, and as a community to foster and support creativity in research via citizen science.

CLIMATE CHANGE GROUP

@BESClimate

Fosters a vibrant community of ecologists who are all working on climate change issues. This includes a full range of climate change impacts, adaptation and mitigation and related topics, relevant to ecology.

CONSERVATION ECOLOGY GROUP

@BESConservation

Provides a platform for facilitating exchange between theoretical ecologists, applied ecologists and practitioners interested in conservation issues.

ECOLOGICAL GENETICS GROUP

@BES_EGG

Develops the community of ecologists working on ecological genetics issues and provides a forum for discussion on ecological genetics.

FOREST ECOLOGY GROUP

@BESForests

Stimulate discussion on all aspects of forest ecology, in biomes from boreal to tropical, including both natural and managed systems.

INVASION SCIENCE

@BESInvasionSci

Provides a network to connect researchers and practitioners both nationally and internationally, who work in the field of invasion science.

MACROECOLOGY GROUP

@BESMacroecol

Provide a forum to unite researchers who work in, or are influenced by, macroecology, facilitate inter-disciplinary collaboration and showcase methodological advances.

MICROBIAL ECOLOGY GROUP

@BES_Microbial

Guide the synthesis of research investigating the role of microbes in organismal and ecosystem function, achieved through regular meetings and workshops.

MOVEMENT ECOLOGY GROUP

@BES_Move_SIG

Provides a platform for facilitating exchange and collaborations in the wide-ranging, cross-disciplinary field of movement ecology research.

PALAEOECOLOGY GROUP

@BES_Palaeo

Improves exchange between palaeoecology and ecology to encourage more integrative use of long-term ecological data.

PARASITES & PATHOGENS GROUP

@ParasiteSIG

Provides a forum for parasite and pathogen ecologists and evolutionary biologists to make and maintain contacts and exchange and discuss ideas.

PEATLANDS RESEARCH GROUP

@BES_Peat

Forum for exchange of information between ecologists, conservationists, land managers, policy makers, and others interested in peat and peatlands landscapes.

PLANT ENVIRONMENTAL PHYSIOLOGY GROUP

@PEPG_SIG

Advance and promote the science and practice of plant environmental physiology.

PLANTS SOILS ECOSYSTEMS

@BESPlantSoilEco

Promote research on plant-soil interactions and their role in ecosystems through workshops, symposia, and events.

QUANTITATIVE ECOLOGY GROUP

@BES_QE_SIG

Provides a forum to advance quantitative ecology and support quantitative skills development for all ecologists.

TEACHING AND LEARNING GROUP

@BES_TLSIG

Supports those who teach and learn ecological sciences, in the classroom, field and lab.

TROPICAL ECOLOGY GROUP

@BES_Tropical

Promote and facilitate communication and interaction between tropical ecologists, practitioners and policy.

PROMOTING A MORE DIVERSE AND INCLUSIVE PROFESSION

A 2017 report by the Policy Exchange highlighted that the environmental professions in the UK were the second least diverse occupation of the 202 occupations measured (agriculture was the least diverse) and in the intervening 5 years very little appears to have changed. CIEEM's 2021 member survey on diversity and inclusion evidenced disproportionately low numbers of individuals from non-White ethnic backgrounds, lower socio-econmic backgrounds and those with disabilities. Indeed, attend any CIEEM event and there is little visible evidence of a diverse industry.

This needs to change and CIEEM is fully committed to supporting this change. Following our 2021 publication of our research on barriers to black and minority ethnic people entering our profession, CIEEM's Governing Board committed to a 5 year programme of funding to support Equity, Diversity and Inclusion (EDI) work. We have also been joined by a number of industry partners committing funding and time to take this work forward.

We have been particularly pleased to welcome our new part-time EDI Engagement Officer, Lea Nightingale. Lea will be working with Secretariat colleagues and CIEEM members to help us make our organisations and businesses more diverse and inclusive, identifying and removing practices that create barriers, raising awareness and promoting open discussion and sharing of ideas.

We will also shortly be launching a major communications outreach project to reach young people and career changers from backgrounds and communities that are under-represented in our profession and highlight the career opportunities available.

GREEN JOBS FOR NATURE

Linked to our EDI work, but also as an initiative to try and increase future capacity in the profession, we have launched a new Green Jobs For Nature website, www.greenjobsfornature.org. This is a new online resource that is a key part of a new campaign to make careers geared towards restoring and replenishing our natural environment more visible and achievable for all those thinking about their future work.

Whether a potential career changer or a young person thinking about what the future of their job might look like, we want to make it much easier to find out about the kinds of roles that exist, what they do, and how to get them.

An important feature of the new website is the dozens of job profiles representing people working in a wide range of roles and across a number of employment sectors including eNGOs, private and public sectors and academia. If you are currently working in a role that will benefit the natural environment you can help us by filling out and submitting your own job profile.

The website signposts to a number of other sources of information and support to help people on their journey, including suggestions of what to study at school and how to find relevant degrees or vocational qualifications to help get you get that first job.
The next step of our campaign will be, with the assistance of our members, working with STEMLearning to deliver an outreach programme into schools and colleges, with a particular focus on communities currently under-represented in our profession as part of our EDI work described above.

COP15

As you read this the much-delayed 15th Conference of the Parties to the United Nations Convention on Biological Diversity (CBD COP15) in-person conference is just about to start, following the virtual meetings held last year.

CIEEM has official Observer organisation status and it will be interesting (and probably concerning) to see exactly what sense of urgency there is from world leaders and governments whose attention is largely focused on economic problems and the rising cost of living for many in different parts of the world.

Previously we had published a position statement on COP15 calling for greater political leadership and commitment. It is important not to lose hope that our politicians will see the imperative for sustained and collaborative action sooner rather than later.

Sally Hayns CEcol MCIEEM, Chief Executive Officer
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cieem.net

EXPANDING THE UK'S NETWORK OF LONG-TERM ECOLOGICAL EXPERIMENTS

Throughout 2022, ECT has used this column to highlight recent long-term ecological field experiments (LTEs) added to its national register. We close the year with a focus on the most recent addition – the Wicken Fen Vision grazing experiment located a few miles north of Cambridge in East Anglia on floodplain grassland and scrub. Begun in 2007, it is the first LTE to join ECT's network from that region, and it builds upon a long history of environmental research on the wider Wicken Fen Nature Reserve that has been conducted over many years by the National Trust and its partners. It was added to ECT's network in May 2022 by lead researcher Francine Hughes from Anglia Ruskin University in Cambridge, bringing the number of *currently active* LTEs on our national register to 36.

The experiment is linked with the Wicken Fen Vision project located on a part of the nature reserve undergoing landscape-scale habitat restoration ('rewilding') from former arable agriculture, where degraded peat soils overlay clays and chalk. The Wicken Fen Vision area is grazed by herds of free-roaming, minimally managed highland cattle and Konik horses and covers 479 hectares. A smaller area within it of 119 hectares has been subject to a consistent natural regeneration and low-density grazing approach with no seeding or planting. It is in this area that the long-term grazing experiment was established 15 years ago, and provided an unusual context for understanding how habitats might develop on highly modified lowland peat soils over time. There are seven grazing exclosures across the 119-hectare area, with paired grazed and ungrazed plots associated with each one for analysis of the effect of grazing versus no grazing on the development of vegetation across the site.

For the first ten years to 2017, botanical surveys of vascular plant species were conducted annually and will subsequently be undertaken every five years thereafter. Data from this year's first five-year survey are yet to be published, but the first ten years of the experiment have demonstrated a very clear divergence through time between grazed and ungrazed areas (Stroh *et al*, 2021). This is largely attributed to significantly greater canopy height and light and fertility values within the grazing exclosures. Species richness proved much higher in grazed compared with ungrazed areas, and species assemblages separated throughout the first decade of study. It seems clear so far that extensive free-roaming grazing has had significant impacts on both vegetation structure and species richness, but it is notable that effects varied across the 119-hectare study site because of differing historical land use and peat condition, and also the different times at which three sub-areas went into 'natural regeneration' from arable use (1953, 1993 and 2006).

One key aspect for ECT in 'championing' LTEs involves promoting them as ecological research 'platforms' for others to use, and the Wicken Fen grazing experiment is already a prime example of this. Since their inception in 2007, the grazed and ungrazed areas have been used extensively by other researchers looking at topics ranging from ground beetle assemblages, to soil seedbanks and the effects of soil moisture content on vegetation development. For more information and to gain access to the LTE, see:

https://www.nationaltrust.org.uk/wicken-fen-nature-reserve/features/wicken-fen-vision

Ben Sykes Executive Director, ECT
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ecologicalcontinuitytrust.org

FREE-TO-USE TERRESTRIAL, FRESHWATER AND ATMOSPHERIC SCIENCE DATA

The UK Centre for Ecology and Hydrology (UKCEH) provides environmental monitoring, modelling and data for the UK terrestrial, freshwater and atmospheric science communities. This work, enabled by national capability funding from the Natural Environment Research Council, supports UK researchers to meet national strategic needs and to stay at the forefront of environmental science globally.

Much of this work is currently delivered through UK-SCAPE (UK Status, Change and Projections of the Environment), a five-year programme led by UKCEH, and now nearing completion, which has been designed to provide data, models and knowledge-based resources to the research community. The programme is also working towards a more integrated understanding of the dynamics of our environment, recognising that land, soil, water, air and biodiversity are deeply interconnected systems.

UKCEH makes the data collected available without charge for non-commercial uses and provide tools and APIs to enable use of the data. The decision to make data freely and without barriers means that when datasets are downloaded, academic and non-commercial users are not required to provide details of their organisation or how they intend to use the data. This benefits users but presents a challenge for UKCEH, since we need to be able to demonstrate where and how our data are being used.

To help us to understand how our datasets are being used, we surveyed attendees at last year's BES Annual Meeting in Liverpool. The majority of the nearly-200 responders understood the importance of citing third-party data, but many conceded that it may not always be done correctly. The survey revealed that the most popular components of the UK-SCAPE programme are Land Cover Map (53% of respondents), Biological Records Centre (47%), the UK Butterfly Monitoring Scheme (35%), the UKCEH Countryside Survey (28%) and the Environmental Change Network (18%). Datasets collected through these activities have been available for over 20 years and cover wide geographic and habitat ranges.

LAND COVER MAP

The first Land Cover Map of the UK was released in 1990 following a 10-year programme of image analysis and ground surveys. It was another 10 years before the next version was released. UKCEH has since developed a novel approach using Google images, which has allowed new datasets to be produced for 2017–2022. It uses machine learning to allocate land use types. Each year, we deliver a suite of datasets including vector land parcels, and raster data from 10m to 1km resolution. Providing that suitable imagery is available, there is scope to produce an annual time-series of land use change maps dating back to 1990.

SPECIES OCCURRENCE AND TRENDS

The datasets provided through the Biological Records Centre underline the breadth of UKCEH species monitoring. Professor Helen Roy of UKCEH says, "The number and diversity of species that we collect across the UK is world leading and the contributions of volunteers in achieving this are inspiring." The datasets maps trends for 5,000+ species. The methods for data collection are varied and range from citizen science (there are more than 70,000 active contributors) to increasing use of technology, such as moth traps that use AI for identification. These records underpin many initiatives, from tracking invasive non-native species to understanding long-term trends in insects, including pollinators.

UKCEH COUNTRYSIDE SURVEY

The Modular Analysis of Vegetation Information System (MAVIS) can be used to guide habitat creation. The RSPB are applying this at Wharton, Cumbria to create wetlands from farmland. The UKCEH Countryside Survey data within MAVIS stretches back to 1970s and has been used to describe, protect and better-manage the UK landscape.

INTEGRATING DATA

During the five-years of delivering UK-SCAPE, new tools have been developed to bring existing datasets together. For example, by analysing and combining data from the National Plant Monitoring Scheme, the UKCEH Countryside Survey, and Natural England, we can now address questions such as, "What species would be at this location if the habitat were in good condition?"

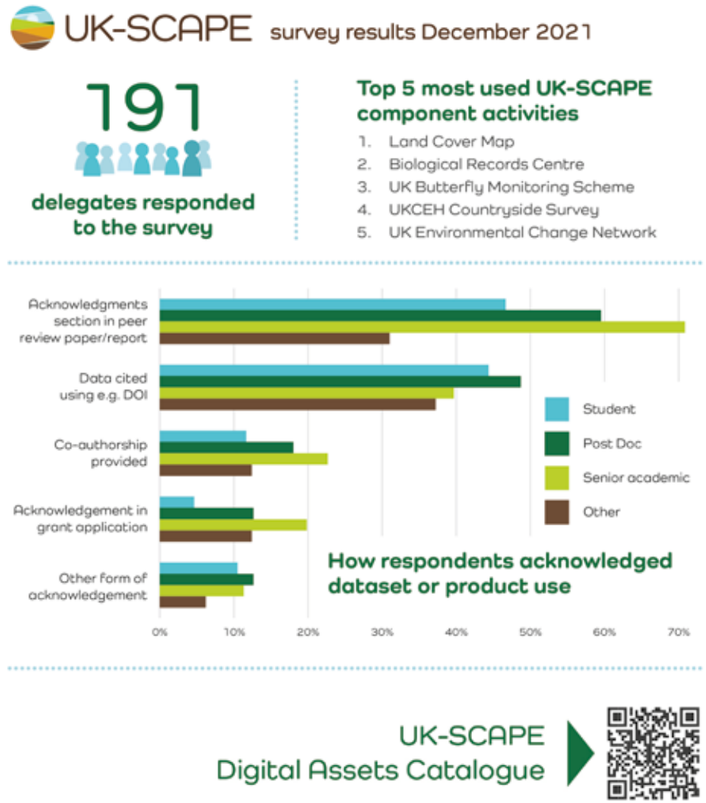
Feasibility studies have also been completed that should lead to new and exciting data in the future. An example of this is the DNA analysis of water samples that could one day give rise to a Freshwater DNA Archive. The ambition is that water samples collected in the past – by the EA and other regulators – could be analysed retrospectively. This would lead to a national scale time-series dataset of the distribution of organisms, identifying the presence and spread of environmental pathogens – for human, plant and animal health.

There are over 200 UK-SCAPE datasets, which you can browse at https://catalogue.ceh.ac.uk/ukscape/documents.

The datasets can also be obtained directly from the Environmental Information Data Centre at https://eidc.ac.uk, which houses more than 1,700 datasets. Each entry in the catalogue provides clear descriptions, and the all-important correct citation is also provided. Please help to ensure that datasets receive the credit they deserve by citing them correctly.

To see the full range of science infrastructure used to create the data, visit the UKCEH research infrastructure catalogue www.ceh.ac.uk/our-science/science-infrastructure

UKCEH will be exhibiting at the BES Conference in Edinburgh in December. We would be very interested to learn how you are currently using UK-SCAPE data, and to understand your data needs for the future, and look forward to seeing you there.



Eleanor Blyth, Head of National Capability Integration and Outreach, UK Centre for Ecology & Hydrology

BRITISH ECOLOGICAL SOCIETY AWARDS 2022

This year we recognise eleven distinguished ecologists and groups whose work has benefited the scientific community and society in general.

This year, honorary membership, the highest honour given by the society, has been awarded to three distinguished ecologists based in three different continents: Anne Magurran, Margaret Palmer and Richard Hobbs, representing the global membership of the BES.

The BES REED Ecological Network are named this year's Equality and Diversity Champions. Established in 2020 by a small group of early career ecologists from under-represented and marginalised ethnicities, the network has gone from strength to strength and now deliver highly successful workshops on allyship.

The winners will be presented with their prizes at the awards ceremony during the Annual Meeting in Edinburgh. Congratulations to all involved!

HONORARY MEMBERSHIP

Honorary membership is the highest honour we can give and it recognises an exceptional contribution at international level to the generation, communication and promotion of ecological knowledge and solutions.

ANNE MAGURRAN

University of St Andrews

Anne Magurran is a world leader in measuring biodiversity and has studied fish communities throughout her career to explore this topic, as well as the evolution of biodiversity, and the role of predation in the evolution of social behaviour.

Anne is a professor at the University of St Andrews, where she is the university's most cited female scientist. Globally, she is the second most cited female ecologist and evolutionary biologist. Anne is also an international counsellor and advisor on issues of conservation related to biodiversity and engaged in the UN Convention on Biological Diversity and in the World Economic Forum in 2018.

"The BES was the first society I joined, and helped set me on the path to a career in ecology, so I feel very privileged to be awarded Honorary Membership.

"I hope colleagues and friends around the world will feel part of the award, recognise the importance of their own contributions to ecology, and will be inspired to continue asking important and interesting ecological questions."

HONORARY MEMBERSHIP

MARGARET PALMER

University of Maryland

Margaret Palmer is a Professor at the University of Maryland and an international leader in restoration ecology.

Margaret is known for her work at the interface of science and policy. She co-designed and now directs a national synthesis centre (SESYNC) that has championed new approaches to fostering research collaborations between social and natural scientists on problems at the interface of people and the environment.

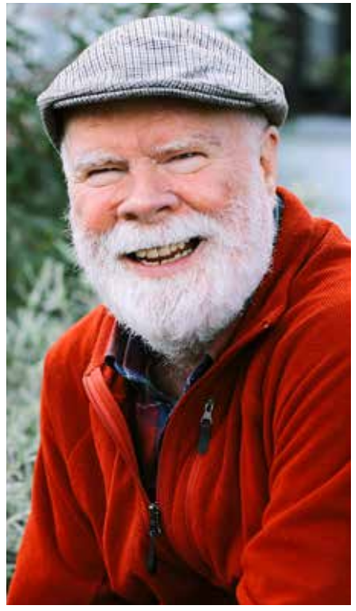
"This is a great honour, and it rightly belongs to the very smart students, collaborators, and intellectual communities that have surrounded me throughout my career. Perhaps the most rewarding path in my career has included brainstorming with and learning from international communities of environmental, social, and legal scholars to advance the sustainability of coupled human-natural systems, and this honour is certainly theirs as well."

HONORARY MEMBERSHIP

RICHARD HOBBS

University of Western Australia

Richard Hobbs is a Professor at the University of Western Australia where he heads up the Ecosystem Restoration and Intervention Ecology Research Group. Throughout his career, Richard has made outstanding contributions to the science of ecology, conservation and restoration.



Richard is a Fellow of the Australian Academy of Science and a Distinguished Fellow of the Institute of Advanced Studies.

"I joined the BES during the first year of my PhD in 1977 and attended the winter meeting in Lancaster that year. My first paper was published in *Journal of Ecology*. Later, I contributed regular essays to the *Bulletin* from Australia, under the title "From our Southern Correspondent.

"So, the BES has been an important part of my life throughout my career. I'm incredibly honoured to be given this award, and humbled to be joining such an amazing group of ecologists. It's particularly rewarding for me to be recognised by the society with which I 'grew up' professionally."

MARSH AWARD FOR ECOLOGY

This prize is awarded for an outstanding current research record which is having a significant impact on the development of the science of ecology or its application.

KATE JONES

UCL

Kate Jones is Professor of Ecology and Biodiversity at University College London (UCL), and the Director of the People and Nature Lab in UCL's new campus in the Queen Elizabeth Olympic Park.

Over the course of Kate's career she has made key advances in modelling and forecasting zoonotic disease outbreaks in humans, breaking down traditional barriers between ecology, climate change and public health to inform global policy.

"I'm absolutely delighted to receive this award. Healthy ecosystems are critical for all human endeavours, and ecology is moving centre stage as the foundation to address the pressing issues of our time such as pandemics, climate change, and food security. Over the course of my career, I have seen the BES grow into such a brilliant, vibrant, and inclusive society which I am so proud to be part of. This honour from BES means the world to me."

MARSH AWARD FOR CLIMATE CHANGE RESEARCH

This prize is awarded for an outstanding contribution to climate change research.

KATHLEEN TRESEDER

University of California, Irvine

Kathleen Treseder is Professor of Ecology & Evolutionary Biology at the University of California, Irvine. Over her career she has made many significant contributions to our understanding of how soil fungi mediate ecosystem responses to climate change. Her overarching goal is to improve predictions of future trajectories of global change, by incorporating feedbacks governed by fungi.

"I am surprised and grateful to win this award. My lab's mission is to improve predictions of future climate change so we can help society mitigate and adapt to it. I see this award as a sign that we have indeed helped."

MARSH AWARD FOR ECOLOGISTS IN AFRICA

This prize aims to celebrate the significant scientific achievements of African ecologists and raise their profile in the UK.

PERPETRA AKITE

Makerere University

Perpetra is one of Uganda's leading entomologists and experts in butterflies. She has made important advances in improving knowledge around insects in Uganda, contributing to assessing and mapping key ecologically sensitive species in the country. She even has a moth named after her.

Perpetra is also passionate about passing on her knowledge to younger generations and takes part in a great deal of outreach activities at both school and university level. Her goal is to encourage more young people – especially African girls – to begin a career in science.

"I am so honoured to receive the award, and feel very proud to represent women in ecology from Uganda. This award is simply the right landmark at this point of my ecological career, and I am deeply grateful to the BES for this recognition.

"Ecological excellence is not just about filling up library shelves, but being able to share that information with others. This award will provide me with a platform for relatable professional anchoring and mentorship for the coming generations of female ecologists, who can easily relate to a local achiever while in pursuit of their own ecological careers."

FOUNDERS' PRIZE

This prize commemorates the enthusiasm and vision of the Society's founders. It is awarded to an outstanding early career ecologist who is starting to make a significant contribution to the science of ecology.

CHRIS CLEMENTS

University of Bristol

Chris Clements works on the interface between experimental ecology and conservation biology, with his research focusing on developing and testing early warning signals of population collapse, with a view to predicting regime shifts prior to their occurrence. To do this he and his group synthesise information from mathematical models, small-scale experimental systems, and long-term wild population data.

"The BES is such an institution that it's hard to express how honoured I feel. Receiving this has really motivated me to continue to do the research I love, as well as making me very thankful to all the people who have helped get me here – fantastic supervisors, collaborators, and now my own students and lab group members.

"The BES has been central to all of this – I've been attending the annual meetings since I was a student, and they've significantly shaped my research, network of collaborators, and the opportunities I've had."

BES AWARD

This award is made in recognition of exceptional service to the Society.

YVONNE BUCKLEY

Trinity College Dublin

Yvonne Buckley is Professor of Zoology at Trinity College Dublin and has spent time in Ireland, the UK and Australia throughout her research career. Yvonne is a population ecologist who applies fundamental ecology to pressing challenges for the environment and society.

"The ecological community of the BES is full of people I look up to and admire so I am absolutely delighted to be recognised in this way. I have had many opportunities throughout my career to work with amazing people. These connections and collaborations have been crucial to the work I've done, so I'd like this award to reflect their achievements too."

ECOLOGICAL ENGAGEMENT AWARD

This award recognises an ecologist who has bridged the gap between ecology and other groups.

LYNN DICKS

Cambridge University

Lynn Dicks is a Lecturer in Animal Ecology at the University of Cambridge. A key part of Lynn's work focusses on how farmers can benefit from ecosystem services. Lynn and members of the Cambridge Agroecology group work with farmers to co-design research projects and gather data on how they manage their systems with the overall goal of understanding how we can reduce impacts on wildlife in realistic commercial contexts.

"It feels fantastic to get this recognition for my efforts, over many years, to engage a range of stakeholders in conversations about how and why we should care for biodiversity.

"I owe this award to the many people who've taken time out of their busy working lives in NGOs, government departments and businesses, to join these conversations. Ecological research in real working landscapes, linked to real-world policies, simply wouldn't be possible without their engagement, so thank you to all of them!"

EQUALITY AND DIVERSITY CHAMPION

This award honours and celebrates those who have made significant, innovative and cumulatively outstanding contributions to enhancing the practice of equality and diversity in the ecological community.

BES REED ECOLOGICAL NETWORK

The REED (Racial and Ethnic Equality and Diversity) ecological network was initially founded by Reuben Fakoya Brooks and then established by a small group of early career ecologists of under-represented and marginalised ethnicities in 2020. The network seeks to drive positive change for a more inclusive and representative community of ecologists.

The group have developed a highly successful workshop on allyship that challenges what it means to be an effective ally, focussing on individual and organisational learning.

On receiving the award, Reuben Fakoya Brooks, founder and Chair said, "I was extremely taken aback when I had received the notification that I had won the award, but in all honestly I felt rewarded for getting up and taking the first step of a staircase that had not yet been scaled! There is still much more to be done and I feel like we as a network are just at the beginning.

"Like many awards, they often highlight the individual without giving true representation to the team behind the person. I'm receiving this reward along with vice-chair Bushra Schuitemaker, the committee and all the network members. We are all equally pleased about being rewarded with such a notable accolade!"

REED ECOLOGICAL NETWORK

MARSH ECOLOGY BOOK OF THE YEAR

This is awarded to a book published in the last two years that has had the greatest influence on ecology or it's application.

PETER THOMAS

Trees

Collins New Naturalist Library 2022

Peter has been involved in research on trees for more than 40 years, covering all continents that have trees and everything from ecophysiology to community ecology. Trees being the world's longest-living and biggest land organisms creates interesting ecological problems that never fail to fascinate. No matter what subject Peter teaches, students always know that trees will come into it in some way, and his long-suffering family have endured many lengthy journeys just to see a particular tree. Peter joined the BES as an MSc student and has been actively involved with the Society in a variety of ways from *Bulletin* editor (pre-dating *The Niche*) to trustee and was given the BES Prize in 2015.

"So much has happened recently in the tree world - from new understandings of how trees work, to questions such as whether planting more trees will save us from climate change (it won't) and whether trees act altruistically by communicating via the wood wide web of soil fungi (they don't). All this new information needed to be examined and explained in a way that is accessible to anyone.

After so much loving care spent in crafting a book, it's wonderful to have it recognised in this way. This is the third New Naturalist to win the Marsh Award (the other two being on birds by Ian Newton) and it highlights the impact these books have in making detailed and complex ecological knowledge accessible in an interesting way. The award will hopefully encourage more non-scientists to read these books and find out more about the world around them."

COMMUNITY

MEMBER STORIES

DIEGO MENDEZ

#Conservation
#Raptors
#Neotropics

I am a conservation biologist from Bolivia specialized in raptors. I have been studying the Andean condor – one of the largest flying birds and the most threatened vulture in the Neotropics – for ten years. I joined the BES because to me it is what a solid scientific society needs to be.

What inspires me… A difficult call! The fact that ecologists can study systems and phenomena of which people are part of, in a way no other researchers can. I mean, what other science merges a so-diverse arrangement of approaches and disciplines with life as the main axis?

Significant experiences… In February 2021 I led the assessment of the worst case of Andean condor poisoning in Bolivia and one of the worst in history; thirty-four condors died then, a devastating 0.5% of the estimated global population. This event marked a turning point in Andean condor research and conservation in my country.

Outside of ecology I like… Sports in general, football in particular… Watching, not playing, haha!… And if it comes to playing, table tennis. I'm a watches and bonsai aficionado.

My favourite organism… Another difficult call! I will go with the blue whale and cacti in general, because they are so cool and take life to the limits.

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HANNAH ROMANOWSKI

Instagram @peakwildlife

#Diet
#Insects
#ClimateChange

I joined the BES after I graduated, during a period of career uncertainty. I wanted to remain connected to ecology and the research being done. Since then I have completed a masters in environmental policy and started a PhD in trophic ecology, linking insect populations to higher trophic levels.

What inspires me… The incredible diversity and evolutionary strategies of nature. Each time I walk out of my front door, it inspires me how well adapted and specialised species are. I have more recently gained a lot of inspiration from the local wildlife that I admit I took for granted; the garden birds, house spiders or the foxes of London.

Significant experiences… Going out to Borneo as a student on the Tropical Biology Association field course was a very significant time in my life and career. It was my first experience of research, and undoubtedly what inspired me to continue in ecology and develop my career in research.

I would tell my younger self… When you feel like you don't deserve to be where you are, you're wrong. I still tell myself this every day.

My favourite organism… Bats are my favourite group of organisms. During the summer months I see them almost every day and yet they remain so inconspicuous and mysterious to us, it makes an encounter extra special. I particularly love the noctule bat, our largest species in the UK. When it flies high above the canopy I imagine they're keeping an eye out for the researcher sat alone in the dark woodland.

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BRILLIANT BIRDING IN THE NORTH EAST

Caitlin Thomas, Jack Walker, Sammy Mason, Alexa Roditi, BES Engagement Team

Blackbirds, blue tits, and black-headed gulls – these are all birds that you may see in your everyday life but not take much notice of.

However, pupils in the North East are connecting with their local feathered friends with the help of teachers and environmental educators who are getting them outside and transforming their schools into green spaces. Welcome to Module 3 of the BES Connecting Schools to Nature Project!

A NEW GENERATION OF BIRD WATCHERS

Since the launch of the project in January 2022, we've engaged with over 10,000 students through a combination of our in-person workshops and online activities that have focused on mammals, invertebrates, and birds as well as the green transformations of their schools. The most recent phase of this project has focused on familiarising students with the range of bird species that inhabit their local communities. Pupils have been spending time outside, strengthening their connection with nature, and learning about local bird species. To make their playground a bird watcher's paradise, we supplied each school with a bird house and bird feeding station. Pupils were equipped with binoculars and FSC ID Guides and were assisted by our team of fantastic project volunteers. Pupils were encouraged to report their findings to bird citizen science projects such as the RSPB Big Schools Bird Watch.

THE RESOURCES AND ONLINE PLATFORM HAS BEEN MY FAVOURITE PART. THE CHILDREN HAVE LOVED USING IT AND OFTEN ASK WHEN THEY CAN GO ON DURING THEIR FREE TIME.

Victoria Mills, Laurel Avenue

The pupils were able to continue their engagement with birds and other wildlife when inside the classroom or at home using our online 'Encounters' platform. It hosts a range of quizzes and activities that can be completed to achieve a series of badges for the individual, and the whole school. The Encounters platform aims to keep students actively engaged in nature-based learning in order to encourage a long-term connection and participation in nature.

GOING GREEN

As well as getting to know their local bird populations, pupils have also been encouraged to think about how they can transform their school into a more wildlife-friendly environment. Throughout the project pupils and teachers were encouraged to design their ideal 'green school'. During this phase of the project, each participating school was provided with up to £400 for their own green transformation equipment. Schools have made lots of great changes to their grounds using this money, including making mini ponds, wormeries and bug hotels. Implementing these resources into school grounds will help schools continue with their commitments to connecting pupils to nature; bringing benefits to pupils and wildlife for years to come.

WE HAVE SPENT MUCH MORE TIME IN THE WILDLIFE GARDEN, WHICH WAS HARDLY USED BEFORE AND WE HAVE A VISION FOR IT, ONE WHICH WE HAVE STARTED WORKING ON.

Stephanie Wilkinson, Wolsingham Primary

NEXT STEPS

As the period of in-school workshops comes to an end, the focus turns to our Encounters platform and wider legacy materials. Our aim is to further develop the platform to become a standalone resource that can be rolled out more widely, equipping teachers with everything they need to continue their nature connection journeys. We'll also be improving and disseminating all the resources made throughout the project, including lesson plans, activity ideas, and 'how to' guides for green transformations. ✺

CONNECTING SCHOOLS TO NATURE IN NORTH EAST ENGLAND PROJECT

Working with partners MammalWeb Ltd and SMASH-UK, we will improve school children's connection with nature, deliver green transformations to schools in disadvantaged areas, and help create the 'Environmental Educators of tomorrow' through the training and codesign of the project with teachers and ecologist volunteers. The project runs until March 2023.

This project is funded by the Government's Green Recovery Challenge Fund. The fund was developed by Defra and its Arm's-Length Bodies. It is being delivered by The National Lottery Heritage Fund in partnership with Natural England and the Environment Agency.

If you would like to take part or support the project in any way, please get in touch with outreach@britishecologicalsociety.org

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CAREERS Q&A

PROFESSOR ZENOBIA LEWIS

School of Life Sciences
University of Liverpool

@Zen_of_Science

Briefly describe an average day

Busy! During term time it usually involves running – sometimes physically, always mentally – from lecture to tutorial to meeting with eleven billion emails to answer in between. Out of term time things are a little less fraught; occasionally I – shock horror – even get to think about science.

What has your career pathway been to date?

Pretty standard for an academic. Undergraduate, PhD, post-doc, research fellowship, academic position. I never quite envisaged it happening like that to be honest though, and never really aimed to be an academic. In the beginning it was my love of animals that led to my reading a degree in zoology. Twenty-five years later, I still haven't left university!

What do you love most about your job?

Working with students. It's such a joy when you see that lightbulb moment. And learning about animals. As noted above, I didn't see myself turning it into a career.

Who have been your role models or mentors?

I'm blessed to have had, and to continue to have, amazing role models and mentors throughout my career – there are too many to name all of them. Shout-outs though, to Nina Wedell, Trish Moore, and Rhonda Snook, all amazing evolutionary biologists and trailblazers for women in science – I'm lucky to have them as friends and mentors. I'm also not sure I'd be where I am today if not for my undergraduate tutors; John Grahame taught me how to think like a scientist, and Ian Hope gave me a kick up the backside at a point when I really needed it.

Have there been any big changes in your field since you started?

Sorry to be a bit negative, but the commercialisation of Higher Education, and the associated league tables, metrics, REF-TEF-KEF. The attachment of scores and/or £ signs to everything we do is relentless, disheartening, and having seriously detrimental impacts on staff and students alike. On the more positive side, it is great that equality, diversity, and inclusivity, are increasingly becoming embedded in academia. In some ways we are only just getting started, and there is still much work to be done. But at least we have (finally) recognised that the sector is not accessible to all, and we need to do something about it.

What's your one top tip for those who would like to follow a similar career?

You can't do everything, even if academia tries to tell you you can and should. Work out your strengths, and what gives you the most satisfaction, and focus your energies there. ✺

Zen is a regular speaker at our summer schools and Chair of Education and Careers Committee

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ARCTIC RESEARCH AS A QUEER ECOLOGIST

Chris Fohringer, ALDER Network co-chair

During my PhD training I aimed to answer where, when and why moose, reindeer and the Sámi reindeer herding communities that depend on them are affected by different intensities of land use and climate change. Most of my research involved extensive fieldwork, in particular including animal captures for GPS-collaring and sample collection as well as liaising with local and Indigenous stakeholders in the Arctic.

Based on my fieldwork in extreme environments I want to share my experience as a queer ecologist to break heteronormative stereotypes that persist and ultimately poison the most rewarding and fun time any ecologist could have. As the stereotype of an Arctic explorer (being a straight white bearded male in a fur coat) endures, it creates a toxic environment for people who do not conform to that. I was lucky enough to have an open-minded team of colleagues joining me in the field but on several occasions, situations arose that made me uncomfortable, not allowing me to bring my full self into the job. Assumptions were among the most frustrating things that I had to deal with, from assuming pronouns, to asking whether I had a girlfriend, to stereotyping my sexual orientation.

Imagine undertaking fieldwork where you had to either deny you had a partner, for fear of your project being cancelled, or to lie about the gender of your partner. Or even worse, your supervisor jumps in, avoiding the topic on your behalf. Imagine being at a meeting where people stop talking to you, just because you mention your partner's name. Imagine you are being asked to join men's or women's sauna socials after a long day in the cold or being asked to move sleeping quarters because colleagues were uncomfortable with your presence. Imagine being told on fieldwork that you look straight, and this should be taken as a compliment, or being told that it is a shame that you are not sexually available. These are things I had to put up with repeatedly during fieldwork because I am queer. And I kept quiet to "keep peace" or not make anyone (but myself) uncomfortable.

I know that my negative experiences were minor compared to what I know other LGBTQ+ peers, especially those that are trans, intersex, BIPOC or disabled, have to endure. Calling bullies out in the field can be problematic as the success of a project typically depends on harmonic teamwork. I often used to 'straight-act' and not stand up for myself or others when faced with discrimination. However, by feeling anxious about calling out discrimination and by not suppressing parts of my identity during work that demands high focus, at times I ended up feeling dispirited, frustrated, even traumatised.

Making queer people feel unwelcome during fieldwork leads to a lack of their perspectives and bias towards heteronormative approaches in ecological research. It took me a long time to embrace my own queerness, in particular at work, and I am still unlearning many of the heteronormative and patriarchal norms that continue to dominate and suppress holistic ecological research in many ways.

Despite having been very critical about my lived experiences and struggles as an LGBTQ+ researcher here, I want to add that the discrimination I have been facing was minor enough to not kill the joy I get from conducting fieldwork. Thanks to many supportive colleagues and through meeting other queer ecologists and allies in the field and at international meetings I feel more confident and prouder about my queerness than ever before. I can now be the role model to queer students and colleagues that I missed having. By joining the ALDER Network and Pride in Polar Research (@PridePolar) last year I now feel particularly encouraged to make queer ecologists, and those that aspire to be one, feel safe and proud to be their gorgeous selves. ✺

BRITISH ECOLOGICAL SOCIETY

Sign up the ALDER Network's mailing list or join the committee by contacting **alder@britishecologicalsociety.org**

NEW BEGINNINGS

Reuben Fakoya-Brooks

REFLECTIONS FROM THE FOUNDER & CHAIR OF THE REED ECOLOGICAL NETWORK

When you witness your theory formulate into something tangible, it tends to always coincide with a period of sentimentality. It has been 2 years 5 months and 15 days (as of me writing this article) since I pitched the idea of the REED Ecological network to the BES.

From conception, I had always envisioned a space that created opportunities for ethnic minorities in the ecological sector. A space that acted as a conduit for networking and progressing one's own career. This summer, this aspiration came in the form of three REED members being accepted onto PhD programs, as a direct result of scholarships advertised via partner organisations.

Part of me feels like my self-imposed mission has been accomplished? Picking fruit from a tree I, at one stage, thought was impossible to grow. It has been fulfilling, but also in some sense stifling. What I mean by this is that the curse of success is the reluctance to change. The ethos I have attempted to install and deem vital to the longevity of the network: a collectivist approach, with each member as important as the other, fulfilling the requirements of the roles that were voluntarily or electively chosen; was now prone to the precursors of authoritarianism.

Bushra (the vice-chair of the network) has always been a strong advocate for change and when she told me at the end of summer "Right, our time is up" (paraphrased) it unusually coincided with this sense of 'accomplishment'. Maybe not so coincidental, but the sign of a person much wiser than myself aware of the right time to change.

As the end of the year approaches and my third BES annual meeting comes on by, I reflect on my first anxiety inducing chairing of the then BAME Ecological Network. I can't help but be proud at what the network has become.

How am I feeling? A sense of a new beginning. ✺

FROM CONCEPTION, I HAD ALWAYS ENVISIONED A SPACE THAT CREATED OPPORTUNITIES FOR ETHNIC MINORITIES IN THE ECOLOGICAL SECTOR

REED ECOLOGICAL NETWORK

We want to enable, empower and ensure this network is led by the community it serves.

We are inviting anyone who would like to get involved to get in touch with the Head of External Affairs directly. Please email Karen Devine (karen@britishecologicalsociety.org) to join the mailing list.

britishecologicalsociety.org/reed

Donald Pigott (kneeling) examining a peat core on Tarn Moss, Malham c. 1957. His first wife, Margaret, is immediately on his left.

PROFESSOR DONALD PIGOTT

1928–2022

In a time of increasing specialisation, few British plant ecologists have been as influential on such a broad front as Professor Christopher Donald Pigott, who has died at the age of 94.

He served the *Journal of Ecology* as editor of the *Biological Flora of the British Isles* and published 18 papers of his own in it over 66 years. Donald was a champion of a rigorous experimental approach that could address clearly defined questions. This inevitably involved detailed studies of individual species (autecology). His early pursuit of an understanding of climatic limitation led to him being a pioneer of the systematic mapping of individual species distributions. He was also co-director and a leading light of the National Vegetation Classification (NVC), a 16-year phytosociological project involving four universities that led to a comprehensive and systematic catalogue and description of the plant communities of Britain. Other prominent contributions included considerable scientific support for the growing environmental conservation movement, and for forestry as an academic discipline. Not least, his influence can be followed in the scientific achievements of the many doctoral students whom he trained, most notably Professors Philip Grime FRS and Paul Jarvis FRS.

As a member of a distinguished generation of Cambridge botanists that emerged after the Second World War, Pigott's roots were deeply embedded in British plant ecology. He was the last surviving ecologist to have demonstrated his research in the field (experiments on sheep grazing in Padley Wood, Derbyshire) to Sir Arthur Tansley FRS, who had been the first president of the BES and founding editor of the *Journal of Ecology*. Donald was editor of the *Biological Flora* series (a feature of the *Journal of Ecology* since 1941) in its formative years, relinquishing the post in 1975 after more than 20 years. He contributed to the series as author and illustrator for longer than anyone else, publishing his first species account (*Thymus* spp.) in 1955, and his last (*Tilia platyphyllos*) in 2020 at the age of 92. He also served on BES Council in the 1970s, perhaps a more demanding role in the days before the Society had paid staff. He was joint editor of the *New Phytologist* for a number of years from 1961 until his duties as foundation chair of biology in the new University of Lancaster became too onerous.

Donald went up to Emmanuel College, Cambridge in 1946 and took a first in 1949. His phenomenal botanical knowledge was noticed by Dr Max Walters (a future director of the Botanic Gardens there), who became a lifelong influence and friend. Having been awarded a government research studentship and a Shell Scholarship in geology, he changed his intended research topic but was allowed to keep the Scholarship nevertheless! At the suggestion of Walters, Donald spent the summer of 1949 first in Uppsala and then Helsinki, where he was the guest of Jaakko Jalas who was part of the group mapping the distributions of vascular plant species in Europe. This influenced his PhD work at Cambridge, carried out under the supervision of Professor (later Sir) Harry Godwin FRS, on the cytotaxonomy of British *Thymus* species. He made distribution maps on the Fenoscandian model with small black circles located on the military km grid. Maps based on the 10 x 10 km squares of the National Grid were adopted for the first *Atlas of the British Flora* in 1962 and have now become a ubiquitous mapping standard.

While in Cambridge Donald had been exposed to the developing field of palynology. He became interested in extant species whose pollen had been identified in the Late Glacial by Godwin. An example of this was Jacob's Ladder (*Polemonium caeruleum*) which was still native at its southern limit, on wet, north-facing limestone cliffs in Derbyshire. Appointment to a lectureship at Sheffield in 1951 afforded the opportunity to study the contrasting climates of north- and south-facing cliff faces. To his surprise the north-facing shade temperatures in the growing season matched those of southern Greenland. He complemented this with a similar study of Dwarf Thistle (*Cirsium acaule*) at its northern limit, where it was restricted to the south-facing limestone slopes. Much of his subsequent work over many years has been an elegant elucidation of mechanisms of climatic limitation in terms of its proximal causes. Trees and forestry have featured strongly in this research both before and after he retired. Donald and his second wife Sheila travelled widely in Europe, North America and China to meet fellow scientists, to visit herbaria, but most importantly to observe lime species in the field. Donald became an undisputed international authority on Lime trees: his *Lime-trees and Basswoods: a Biological Monograph of the genus* Tilia, published by Cambridge University Press in 2012, is recognised as the definitive treatment. Sheila did much to help Donald bring this monograph to press. Their garden in Cartmel boasts some 20 Lime trees, with species from around the world, including one of Donald's own naming, *Tilia concinna* Pigott

In 1964, appointed head of the biology department at Lancaster University, Donald and Dr Derek Ratcliffe, Chief Scientist of the Nature Conservancy Council, instigated a project to classify plant communities, with the aim of underpinning scientific nature conservation and developing a proper understanding of vegetation ecology. The product was eventually published in five volumes (edited by John Rodwell) by Cambridge University Press; it is now the basis for most vegetational surveys in Britain and likely to remain so for a long time.

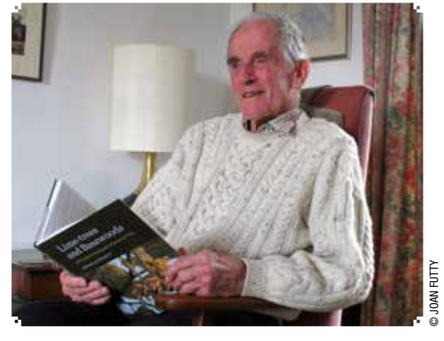
Donald espoused important conservation causes. After the notorious construction of Cow Green reservoir in Upper Teesdale was proposed in 1964, he was an expert witness to the parliamentary select committee that the Bill was referred to, having been the author of the only major study of the plant communities of the area (published in the *Journal of Ecology* in 1956). As the waters rose, he led an emergency ecological investigation into the relict populations of rare plants on the sugar limestone and mitigation of the threats to them. Much valuable information accrued but, sadly, the destruction could not be averted. Nevertheless, the controversy was a turning point in the sense that subsequently more weight was given to environmental issues in major construction projects.

The final phase of Donald's remarkable career began when he succeeded his mentor Max Walters as Director of the Cambridge Botanic Garden in 1984. He returned to a Professorial Fellowship at his old college, Emmanuel. Tenure at the Gardens was dominated by a long war of attrition to preserve the gardens as an important independent resource for teaching and research. Laboratory scientists had designs on its funding and saw its future more as a recreational amenity. Ultimately, he prevailed but always regretted the toll it had taken on his own research.

Donald will always be remembered first and foremost for his work on *Tilia*, and not least for his vital role in bringing the National Vegetation Classification to a successful conclusion. His broader contribution to plant ecology has been, and will continue to be, considerable through his many papers and his influence on distinguished graduate students. In this his strength lay in acute observation of the countryside and its plant communities as a starting point to experimental approaches. Anyone fortunate enough to have been in the field with him will testify to his inspirational insights.

We extend our condolences to Sheila, his daughter Julia Hoggard and their families. We also thank Sheila and Julia very much for their considerable help in the preparation of this obituary. ✺

Anthony Davy and John Lee



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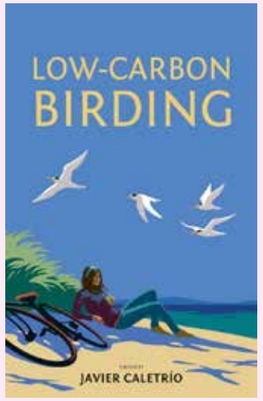
READ | WATCH | LISTEN | VISIT



READ

LOW-CARBON BIRDING

Ed. Javier Caletrio
Pelagic Publishing 2022
£16.99

If ever there was a book for our time, this is it. Javier Caletrio has called out the practice of fossil-fuelled twitching for what it is; a gross hypocrisy. He has started a revolution, a sustainable movement that is likely to be more rewarding for those that practice it than the stressful pursuit of ticks via long, polluting journeys. A growing number of birders are joining the new social media community of #lowcarbonbirding and #patchbirding spurred on by Javier and the 28 other authors in this book. Expect to be inspired, educated and entertained, as well as challenged!

This is not a collection of short stories from birders heroically pursuing rarities on foot, bike, bus, or boat. It is so much more than that. With contributions from across the age and diversity spectrum, men, women, professional and amateur ornithologists, this book calls us to question whether birdwatching has become the domain of the rich middle classes. In the UK, 15% of people make 70% of flights, most of which are frequent leisure trips. If these people reduced their carbon footprint to the EU average, it would reduce emissions by a third and significantly increase the chances of limiting warming to 1.5 °C. This sentence in particular struck a chord: "The same urgency we demand in addressing the plight of endangered species and habitats should inform efforts to change our own carbon-intensive lifestyles".

There are great adventures here. Having made a boat/bike trip to the Netherlands this spring, in which I encountered the enigmatic Hawfinch, I really enjoyed reading about Steve Gale's discovery of a massive roost of birds in Surrey during the invasion of winter 2017/18. This culminated in a count of 600 birds, a total immersion in "white noise of *tiks* and *sips*", and observations of behaviour, such as bill touching, that few have witnessed. As Steve says: "If we were all to take a longer look, closer to home, just what would be discovered"? It's that clarion call that inspired me to unfurl the OS map of my home area and go in search of willow tits that might have been overlooked.

Readers might be thinking that their wildlife tourism supports global conservation. And they would be right, in some places, for some people, and some species. But is this sustainable, given pandemics, avian flu, the imperative to quickly reduce emissions, and the paradigm of "fortress conservation" that has seen 10 million people evicted from their homeland? Again, it's not about shelving international travel completely, but certainly about reducing it considerably, and choosing carefully. After all, as Amanda Bourne covers in her chapter on the Pied Babbler of the Kalahari, not a single breeding attempt was made across 15 years of research when temperatures exceeded 38 °C, as they are predicted to do regularly in the future. The fact is, the birds we travel to see won't be there unless we act now.

Read this book, and then talk to your friends about the issues it so eloquently raises. Research shows that half of the people we speak to will fly less as a result.

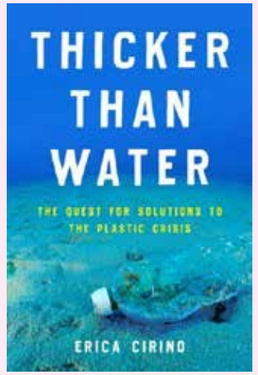
Simon Bates

GET INVOLVED

If you have read an interesting book, from any genre, that touches on ecological research or concepts, then write us a review!

If you are promoting an event, have created a documentary or film, or know of any interesting ecological events coming up then please let us know about it.

For further details email Kate:
kate@britishecologicalsociety.org



READ

THICKER THAN WATER

Erica Cirino
Island Press 2021
£18.95

Thicker than Water provides a fascinating insight into the plastic crisis and its potential solutions. Although the subject inevitably makes for challenging reading, it is made engaging and palatable by personal stories. In particular, Cirino is a keen sailor and joins scientists on a yacht studying plastic in the North Pacific Gyre. Her adventures reveal some alarming truths.

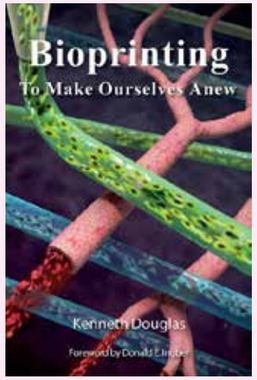
For example, degrading plastic releases potent greenhouse gases such as methane, particularly when exposed to sunlight. Plastic bags are some of the worst culprits, along with smaller, more weathered plastic fragments (it is thought that microplastics have a large surface area from which gas can escape).

She also describes the extent to which promises of recycling have been used to ease consumer conscience while simply hiding the problem. Plastic manufacturers, she argues, even add numerical codes to plastics that cannot readily be recycled simply to mislead consumers. Perhaps most alarming is the extent to which rubbish that's been labelled as recycling is shipped to nations who are unequipped to recycle it. This is how plastic from the Western world ends up being dumped in rural communities in Africa, Southeast Asia and elsewhere.

Inequalities are also evident in the location of factories producing plastic, with poorer communities disproportionately affected by industrial by-products of plastic manufacture. She gives shocking insights into the environmental racism that has led to high rates of cancers and other health problems affecting predominantly black communities living close to manufacturing plants in America.

Solutions form a key part of her book, which covers everything from plastic alternatives to better recycling. She even raises the possibility of engineering a micro-organism to consume plastic. Of course this comes with risks, in particular Cirino highlights the possibility of it escaping and damaging plastics we rely on. She therefore offers wise words to understand the full range of consequences before embracing anything that promises to be a quick fix. She ends with the hope of a move towards a circular economy, sharing positive stories that show what can be done.

Rebecca Nesbit



READ

BIOPRINTING: TO MAKE OURSELVES ANEW

Kenneth Douglas
Oxford University Press 2021
£16.99

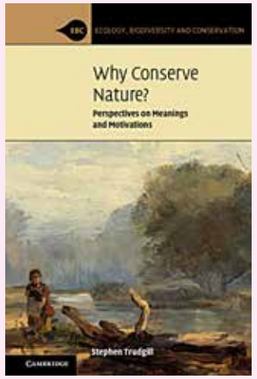
There have been some pretty unusual and interesting books reviewed in *The Niche*, but this one probably takes the biscuit. Bioprinting is about using a form of 3D printing to create living human tissue – everything from replacing damaged cartilage to joining severed nerves to growing new kidneys. 3D printing in medicine first proved useful in creating models of patients to allow surgeons to visualise what they were up against. This developed into bioprinting with living material, where cellular aggregates and non-cellular biomaterial could be laid down and allowed to grow together to form new living tissue. By laying down successively different layers, complex layers and whole organs become possible. This is all at the proof-of-concept stage and the whole thing obviously becomes more complicated with the need to add in nerves and vasculature. But reading through the various chapters on different aspects of the human body it is obvious that growing whole organs or repairing damaged tissue is within our grasp. The real value lies in using cells from the patient so that rejection problems are so much less.

If all this sounds a bit complicated and out of our field, there is help at hand. This book is aimed at a lay audience, is very readable even by a tree ecologist like me, and is written with humour, making the whole thing a really good, fascinating read.

Even so, why would an ecologist be interested in this? Well, in the future it is going to be possible to grow tissues, for example, for endangered species being bred in captivity, potentially saving individuals of almost extinct species. As it becomes easier and cheaper, it may be possible to more easily patch up rarer animals in rescue centres, maybe even treating injured hedgehogs that need more than traditional veterinary care. And what about plants? Individual plants may not always be as important as an individual snow leopard or human – you can just grow another. But what about charismatic giant trees that are irreplaceable in any meaningful human time scale, and which are increasingly threatened by global change. Could we use bioprinting to repair General Sherman, the world's biggest tree, if it becomes diseased or damaged?

The potential applications to wild animals and plants are endless, but to even imagine what might be possible, we need an idea of what might even be feasible. So read this book about repairing humans and imagine.

Peter Thomas



READ

WHY CONSERVE NATURE?

Stephen Trudgill
Cambridge University Press 2022
£39.99

This was always going to be something of a personal view. Trudgill was one of the first authors I used extensively when I started work and now this latest (and last – sadly, he died just before publication) was going to be a return to work I'd not seen recently. The opening pages seemed at first to be going in a direction that was both unfamiliar and lacked the clarity I'd come to expect. However, it soon became clear that this was going to be a significant dive into a somewhat neglected area (neglected by many; not by the author whose extensive bibliography highlighted what could be found). To be fair, the title doesn't help because to many, and I've been guilty of this, the answer is obvious. We *need* to conserve nature; end of conversation. However, the answer is not obvious either to the author or now, the reader. There is a very good reason why we need to question everything we think we know about value and put it in a context that seems increasingly more necessary than before. Decision making is not just numbers and data; it's about narrative and feeling. Contrary to popular opinion, science is as much about emotion as equations.

Economists are supposed to know the price of everything and the value of nothing. Are we the same? How do we see nature and how should we see nature? In tackling this, we are led through 3 sections dealing with experience, imagination, and self-in-place. Let's start with experience. Meaning matters, not just definitions but the deeper meaning and connection with "nature" however that might be defined (and since we are dealing with a personal view, that's up to the beholder!). It's not just definition but perspective – is "destruction" of nature, greed, or just a need for survival? How we see something is deeply connected to our own narrative which in turn is a socially constructed entity comprised of facts, evidence, experience, and values. In short, we are looking for a philosophy of meaning. The author refers to this as psychogeography – the perception of and reaction to space and place. From discussions of ways of seeing we move to climate change where this focus is very much in evidence in current debate. How do we see those who disagree with us, particularly "deniers"? Is that even a useful word? Does blame play a meaningful part in conflict resolution? If we take this case study to heart then we must conclude that narrative trumps situation and that a more nuanced approach is needed. The key lesson as we move on is that we need to accept emotions and feelings more and put all reactions into careful context.

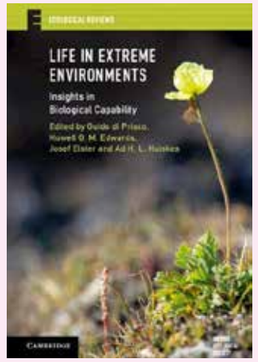
The second section looks at nature in the imagination. Taking the text as a whole, this is the one most likely to be familiar to readers. However, to get to the exploration of the way in which nature has been depicted in art and literature, we first need to consider how it has been depicted in ecological science. What words do we use in our daily musings about nature and what do they mean? It's not a question of why but of how; words are judgemental and how we use them, even in ordinary conversation, matters. We talk about balance or stability or disturbance as if these are somehow removed from usual meaning. Why should any ecosystem be balanced and what does it mean anyway? More importantly, is such a state actually possible (or necessary)? Once we have finished considering our words, we can see how others have represented nature. The range of examples the author has gathered is impressive.

Part three turns back more to the first section but with the emphasis on personal reflections. There is a reflexivity, we are told, between us and nature. Loss of place is damage to ecosystems and our psychology. The two chapters comprising this discussion take aim at this central point from opposing sides. One looks at sense-making from a personal perspective with numerous references to poetry (both quoted and as the author's own reflections) and the importance of nature to the human soul and the restorative power it possesses. The other one looks at the scientific side – the actual space for nature be it in cities, gardens, nature reserves, seascapes etc. We are asked to consider if this is any less emotional and, if so, how? What do we conserve and why?

Finally, we need to make sense of this investigation and plot a course forward. The fourth section (and final chapter) considers why we should conserve nature. In keeping with the rest of the book, there are no easy answers. Nuance is all. There is a sense we should conserve but that it needs to be carried out with reasons that are defensible. If we are keeping biodiversity, what part are we keeping? We focus on keystone species but ignore soil biodiversity. We can conserve so that we have that sense of nature in our imagination – as something that enriches us. We might gain inspiration from it and our contact with nature certainly has a positive psychological impact. Finally, we are told, we need to be realistic – to reject romanticism where utopian ideals might stop action.

This is a most unusual text. It's part philosophy, part poetry and a great deal of critical thinking about words and their meanings (real and imagined). It's the sort of text that should be read by all who want to see clarity in their thinking and who wish to explore areas that so many gloss over. Not an easy read but maybe an essential one.

Paul Ganderton



READ

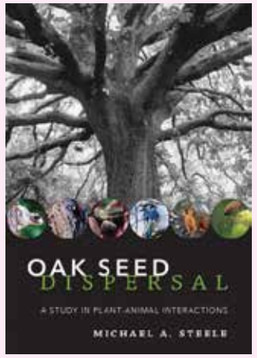
LIFE IN EXTREME ENVIRONMENTS

Eds. Guido di Prisco, Howell G.M. Edwards, Josef Elster & Ad H.L. Huiskes
Cambridge University Press 2021
£39.99

I was initially drawn towards this book because of my interest in the limits to life. Questions like "how rare can a population become?", or "how limited can resources become before a habitat becomes inviable?" were uppermost in my mind. In that regard, I rather misjudged the content of the book, which – probably rather obviously, on reflection – is actually about environments characterised by extreme levels of certain limiting conditions (like salinity, acidity, heat or cold). Despite that, the link between these types of questions, and the importance of (often unique) adaptations in determining the limits to life, is a salutary reminder that "all else being equal" gambits seldom apply in the limit. In that sense, *Life in Extreme Environments* can offer food for thought to both evolutionary biologists interested in adaptive potential, and ecologists interested in how populations might respond to extreme environmental changes. Extreme environments are characterised by environmental parameters permanently or periodically close to the known limits to life. These can include extreme heat (from deserts to hot springs) or cold (from polar regions to outer space), and areas that are highly acidic or alkaline. In their introduction, the editors set out a large number of interesting questions that stem from considering these types of environments, including what limits life, and how might that impact on our understanding of the origins and distribution of life in the past? Topical work on these issues is brought together under 4 main themes: the nature and mechanisms of adaptation to extreme environments; processes and interactions shaping biodiversity in extreme environments; polar environments and responses to change; and the boundaries of 'habitability'. The chapters within each section consider a huge range of life-forms, from viruses to vertebrates, and from micro-organisms to metazoans.

The value of the volume is to be found in bringing together such a wide range of perspectives on what constitutes an extreme and how organisms cope with those. For the specialist in extreme environments, this book will offer much at the cutting edge of the discipline; for the generalist ecologist, however, I suspect that this will be a book to dip into, rather than one to read from cover to cover.

Phil Stephens



READ

OAK SEED DISPERSAL

Michael A. Steele
John Hopkins University Press
2021
£55.50

The preface starts with a question that may occur to you on reading the title – 'why devote an entire book to the subject of oak dispersal?' The answer is that there are many oak species around the world, producing large and nutritious acorns that are mostly animal dispersed by nut-caching mammals and birds. Added to this is the ability of oaks to produce 'mast' years, a periodic bumper year of acorns to overwhelm the 'predators' in these years, which would seem counter-intuitive if germination depends upon being buried within a cache. Then there is the extra complexity caused by variable levels of toxic tannins in oak species growing in the same area. The upshot is that different types of oak in different parts of the world, from tropics to temperate, interact with their dispersers and seed eaters in different ways, so comparisons of different oak-disperser groups around the world can shed a lot of insight into how these systems work. Given that these interactions can have repercussions up through the trophic levels, they are crucial to understanding the functioning of whole forests.

The book starts with an introduction to oaks with a sound description of the life cycle and masting of oaks, and then looks at the interaction with dispersers. This includes animals familiar to us including jays and the introduced grey squirrels. Both cache acorns but the squirrel craftily nibbles off the pointy end of the acorn, excising the embryo and stopping their cached food from germinating over winter. The author gives a first-hand account of a number of experiments in the US using grey squirrels reared in captivity being exposed to acorns for the first time. They clearly show that the squirrels have an innate behaviour to chew off the embryo, although they were not always very good at it and needed to learn from observation of other squirrels or by trial and error.

Thereafter follows four chapters considering the plant-animal interaction from the point of view of different groups of dispersers including corvids around the world. Caching obviously works by the dispersers eating some acorns but some being left and the author takes us on an interesting journey into the grading between disperser and predator. The final chapters deal with what the future holds for these intricate interactions.

The book is written in the first person, with fascinating descriptions of experiments done within the author's group and the underpinning reasons, interspersed by results from other researchers to give a cohesive flow of ideas. The book is useful for undergraduates through to seasoned researchers in the field. It will also prove fascinating reading for anyone who is interested in how science works.

Peter Thomas

Under Prairie Skies

The Plants and Native Peoples of the Northern Plains

C. THOMAS SHAY

"*Under Prairie Skies* is a beautiful love story, pure and simple. C. Thomas Shay writes with deep affection, profound knowledge, and obvious fascination about the plants, places, and Native peoples of the North American prairies."

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ABOUT THE AUTHOR

C. Thomas Shay is a senior scholar in the Department of Anthropology at the University of Manitoba. He is the author of *The Itasca Bison Kill Site: An Ecological Analysis*.

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HORIZONS

THE ARBOUR

Anne Brontë
(1820-1849)

I'll rest me in this sheltered bower,
And look upon the clear blue sky
That smiles upon me through the trees,
Which stand so thick clustering by;

And view their green and glossy leaves,
All glistening in the sunshine fair;
And list the rustling of their boughs,
So softly whispering through the air.

And while my ear drinks in the sound,
My winged soul shall fly away;
Reviewing lone departed years
As one mild, beaming, autumn day;

And soaring on to future scenes,
Like hills and woods, and valleys green,
All basking in the summer's sun,
But distant still, and dimly seen.

Oh, list! 'tis summer's very breath
That gently shakes the rustling trees –
But look! the snow is on the ground –
How can I think of scenes like these?

'Tis but the frost that clears the air,
And gives the sky that lovely blue;
They're smiling in a winter's sun,
Those evergreens of sombre hue.

And winter's chill is on my heart –
How can I dream of future bliss?
How can my spirit soar away,
Confined by such a chain as this?

✺

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Butterflies and Caimen on Los Amigos River, Peru © Mark Cowan.

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