THE NICHE

Your magazine from the British Ecological Society

CAPTURING ECOLOGY

The winning images from our photographic competition

Jane Memmott
Meet our new President

Connecting with nature
Should we connect emotionally or cognitively?

Toolkit
How to build an interdisciplinary project

FISHING PRESSURE AND MARINE PROTECTED AREAS

ARTWORK BY JAMIE CANEPA

Marine Protected Areas (MPAs) that experience greater fishing pressure prior to MPA placement can have greater effects on species that are targeted by fishers. Pre-closure fishing pressure can be used to predict the magnitude of MPA effects to allow for more effective management.

Erin M. Jaco & Mark A. Steele, Pre-closure fishing pressure predicts effects of marine protected areas, *Journal of Applied Ecology*, doi.org/dkqk

Submit your amazing photos to: theniche@britishecologicalsociety.org

SHUTTERBUG

THE NICHE

MARCH 2020

Want to contribute to The Niche?
We welcome all ideas.
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BOOK REVIEWS
Books to be considered for review should be sent to the The Niche Editor at the address above.

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A green crested lizard in Danum Valley, Sabah, Malaysia. This photo was highly commended in the Individuals and Populations category of Capturing Ecology.

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BRITISH ECOLOGICAL SOCIETY

NEWS & VIEWS

© TOM BREEZE

FEATURES

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© ROBERTO GARCÍA ROA

YOUR SOCIETY

© ED HALL

COMMUNITY

WELCOME

It's fitting for spring that this issue is full of plenty of new articles, ideas and features for you. The BES also welcomes a new President, Professor Jane Memmott. On p30 you can read about Jane's plans for the Society as well as her experiences and research interests. Jane joins us in time for a new strategic plan, which will drive and shape our work for the next few years (p6).

Interdisciplinary work is at the forefront of a lot of ecologists' minds, which is unsurprising given that the big challenges we face as a planet aren't going to be solved by one discipline alone. Lydia Cole and Althea Davies provide some tips for beginning projects with social scientists (p18) in a new 'toolkit' article. Toolkit articles are a place for you to share your experiences in aspects of the craft that you may not get taught at university. If you have any experience that you would like to share in the form of ten top tips, then please get in touch.

It's always impressive to read about members' work and interests outside of ecology (p50), look at amazing photography (p22), and read transportive fiction (p62). If you're inspired by this issue, then I would love to hear from you! Thank you to our contributors in this issue and happy reading.

Kate

Kate Harrison, Editor
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NEWS & VIEWS

WORKING TOWARDS A WORLD IN WHICH NATURE AND PEOPLE THRIVE

What is the role of the British Ecological Society? What should our goals be? And how can we achieve more? We've been exploring these questions for the past year, taking input from many of you. The result is, we believe, a clear plan to guide our work over the next four years.

It's important that we reflect and set out our purpose anew every few years. It enables us to decide how we best invest the Society's resources – staff, money and members' time and expertise – in supporting our science, representing ecologists and ensuring our voice is heard. It allows us to measure our progress, adjusting as appropriate over time to fulfil our mission.

Ecology has never been more relevant, given the urgent climate and biodiversity crises we are facing. That gives us great motivation and is encapsulated in the new vision that opens our Strategic Plan for 2020–2023: 'Nature and people thrive in a world inspired by ecology'.

It is a vision that reflects our passion as ecologists for the natural world. It expresses the capacity of ecological science to help us understand life on earth, show us where it is under threat and provide solutions to the environmental challenges we face. And crucially, it recognises that we're dependent on nature for our own wellbeing and prosperity.

We fully intend to live up to our three, newly stated values: to be bold, inclusive and evidence based. These values spell out how we want to be seen, how we intend to go about our work and what we will use to focus our activities and guide our decision making.

At the heart of our new strategy are our members. We are a membership society, here to advance your science, your career and build a strong community of ecologists. It's hard to know sometimes if we are a small organisation or a large one. We have approaching 30 staff in our London office but over 6,000 members in 120 countries. Our activities span journals, events, research funding, policy work, education, careers support and public engagement. All these run successfully thanks to you, our members and the global community of ecologists.

Our strong hope and belief is that this new vision and these values resonate with you. They motivate the three goals set out in the strategy for our Society:

1. Advance and promote ecological science and its applications
2. Raise the profile of ecology to make a difference
3. Foster a strong and diverse ecological community

Ecological science will absolutely remain at the core of all the Society does, as made explicit in Goal 1. It includes plans that keep our world-class journals, grants and conferences right at the forefront of the research endeavour.

EDITORIAL

But we also want to raise the profile of ecology in the wider world. The last strategy saw a great increase in our activity in policy, public engagement and education. We now want to build on that to make a greater difference. Goal 2 is all about demonstrating the relevance of ecology among our many different audiences and increasing its influence in tackling the environmental challenges society faces.

Ecology is not going to make a difference, however, if ecologists aren't properly supported. Goal 3 affirms our ambitions for a Society that is a welcoming and inclusive home for all in ecology. It also outlines how we will facilitate those seeking a career in ecology.

So what will it look like in practice? Here are some examples of the plans we have:

- We are launching a new type of resource to make information on the management of biodiversity and the environment easier to discover. Applied Ecology Resources will combine a new journal, *Ecological Solutions and Evidence*, and a repository of grey literature.
- We want to develop better training and resources on open science, making sure there are appropriate rewards and acknowledgement for data contributors. We will also produce guidance to encourage data sharing, archiving and reuse.
- We aim to establish a regular programme of training for ecologists, and introduce new events that facilitate dialogue between researchers, practitioners and the policy community.
- We will increase the reach of our successful summer school for 16–18-year-olds by making more use of digital platforms, and we want to provide young ecologists at secondary school with the opportunity to build networks with like-minded peers.

We will work proactively to assemble the best evidence on topics of clear public interest to enable better policy making and showcase the range of people and disciplines that contribute to ecology.

NOW COMES THE REAL WORK. BUT WITH THIS CLARITY OF PURPOSE, WE BELIEVE WE CAN ACHIEVE A GREAT DEAL FOR OUR SCIENCE. PLEASE HELP BY GETTING INVOLVED AND HOLDING US ACCOUNTABLE TO OUR PLANS.

Hazel Norman
Chief Executive, British Ecological Society

WILL NATURAL HISTORY EDUCATION IN SCHOOLS WIDEN ACCESS TO ECOLOGY?

Karen Devine, Head of External Affairs

A UK awarding body that provides qualifications for people of all ages and abilities recently announced they are developing a GCSE qualification in natural history. It seeks to address a lack of engagement with the natural world and could contribute to a growing interest in ecological sciences. Many students do want to better understand the natural environment but it is important to note that this GCSE isn't a complete fix and brings its own problems and questions that are still to be answered.

If the intention of the course is appreciation, understanding and awareness of the natural world then it is an exciting development, the kind of course most of us would probably really enjoy. For it to truly lead students into further and higher education, it will have to meet the same scientific and mathematical demands required of GCSE biology and geography. Students making their GCSE choices with a future in ecology and the environment in mind should not be disadvantaged by a lack of comparative demand.

There are five awarding bodies competing for business in UK schools: OCR – the body developing this course, AQA, and Edexcel dominate, along with the Welsh board WJEC, and the Northern Irish board CCEA. AQA is by far the most popular of the awarding bodies and holds about 60% share of the GCSE market. OCR's market share dropped in the academic year 2017/18 to 8%. That doesn't mean OCR couldn't recruit an increasing number of schools, but it does mean that there are a lot of schools who don't currently engage with their courses. Students can only choose the course if their school is willing to offer it.

Science in school, either as the three separate sciences or a combined science course, is compulsory and almost all students aged 16 will sit GCSE assessments. Each year around 160,000 students take biology as a single GCSE qualification with most students, around 700,000, taking biology as part of a combined science course. Geography, a non-compulsory GCSE qualification, is taken by 250,000 students annually. Various other environmental science courses have existed at GCSE and A level to address the needs of students who wanted to be outside, focusing on whole organism biology. Uptake of these was never much greater than 2,000 in total.

Getting outside is integral to natural history. We know from our own research into recent curriculum changes on student access to fieldwork, that schools with a higher percentage of students eligible for free school meals are less likely to be able to offer field experiences and access to the natural environment. These schools are more likely to have limited school grounds to maintain regular outdoor learning access. Students from independent schools and those with the lowest percentages of free school meal provision have an almost 100% uptake of field experiences. If we want a diverse community of future ecologists, equality of access and opportunity at school is essential.

We, by which I mean the Education Committee, Climate Change SIG and the Teaching and Learning SIG, are working in this sphere, focusing on what scientific knowledge all students aged 16 should know about climate change and ecological principles. We welcome anyone who wants to get involved so do get in touch (karen@britishecologicalsociety.org). ✺

IF WE WANT A DIVERSE COMMUNITY OF FUTURE ECOLOGISTS, EQUALITY OF ACCESS AND OPPORTUNITY AT SCHOOL IS ESSENTIAL

© TOM BREEZE

Pollinator interaction between *B. lucorum* and *V. zonaris*.

INVEST IN POLLINATOR MONITORING FOR LONG-TERM GAIN

Despite urgent need, monitoring insect pollinators, especially wild bees and hoverflies, has often been considered too expensive to implement at a national scale. A research team, led by Dr Tom Breeze, from the University of Reading and the UK Centre for Ecology & Hydrology is studying how to improve pollinator monitoring in the UK in a cost-effective manner. This research examines hidden benefits of monitoring schemes.

By pooling data and expertise from a wide range of resources, the costs of schemes have been estimated to be between £5,600 for a small volunteer-led scheme collecting basic data and £2.8 million per year for professional monitoring of both pollinating insects and pollination to the UK's crops. The research showed that overall, for every £1 invested in pollinator monitoring schemes, at least £1.50 can be saved from costly, independent research projects.

Researcher, Tom Breeze, commented that "monitoring pollinator populations is vital to understanding the status and trends of these animals and identifying areas where we need to take dedicated action." Breeze also highlighted that governments should consider pollinator monitoring as an excellent investment from both a food security and scientific perspective.

MULTI-SPECIES GRASSLAND MIXTURES INCREASE YIELD STABILITY, EVEN UNDER DROUGHT CONDITIONS

"When I first started talking about investigating effects of drought in Irish grassland in 2009, some of the farmers that we spoke to thought I was crazy!" said Dr John Finn, Researcher at Teagasc, who presented his research into grassland yield stability at the BES Annual Meeting. But in the proceeding years there have been two serious summer droughts in Ireland, and climate models indicate that these will continue to become more frequent and more severe.

Conducting a two-year experiment in Ireland and Switzerland, Dr Finn found that increased plant diversity in grasslands was associated with increased yield stability, even under drought conditions. Protecting yield stability through methods like increasing the species diversity in grassland systems will become increasingly important as Europe is subjected to more intense summer droughts.

The experiments involved setting up multiple plots containing combinations of four agriculturally important grassland species to compare monocultures with species mixtures. Half of the plots were covered in rain shelters to create a severe drought event for nine weeks.

The researchers are now looking to test the effects of greater species diversity and run the experiments over several growing seasons.

Drought shelters

© JOHN FINN

LAVA FLOWS TELL 600-YEAR STORY OF BIODIVERSITY LOSS ON TROPICAL ISLAND

When humans arrive on islands, it's often been bad news for native animals. The dodo, perhaps the most famous human driven extinction to date, is a prime example of the irreversible damage humans can cause.

But the damage goes beyond individual species. On Réunion island, which forms part of the Mascarene archipelago, an active volcano has created a natural experiment allowing researchers to trace the impacts of human colonisation on the island's ecosystems.

"The series of lava flows delivers views of the vegetation development across several centuries, before and after the arrival of humans. They serve as a time-machine to look into the past." said Sébastien Albert, lead author of the study.

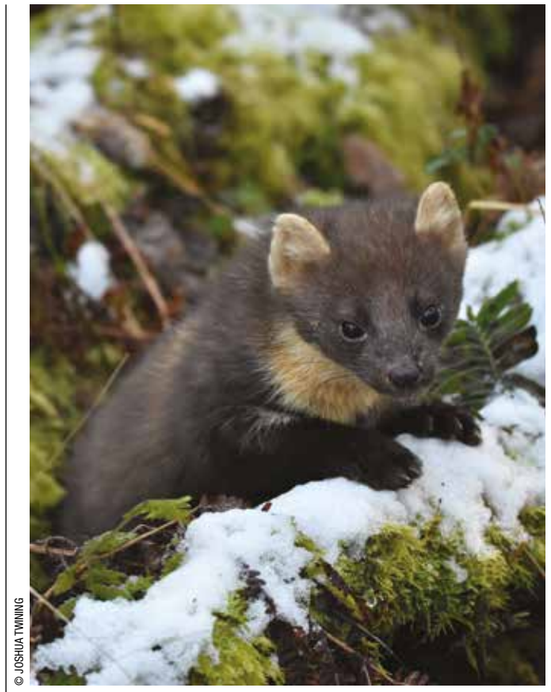
The researchers found that before permanent human settlements, the forests were dominated by large fleshy-fruited plant species, usually big trees. After human settlement in the 1600s, fruit eating animals (frugivores) like giant tortoises and flying-foxes went extinct on the island. By 1800 the large fleshy-fruited plants were nearly all gone as well.

Because of their role in seed dispersal, large frugivores are key for ecosystem recovery after a major disturbance like a lava flow. When frugivores are lost, tropical forests cannot fully recover. (*Journal of Ecology* doi.org/dnfb)

© HERVÉ DOURIS

NEW JOURNAL LAUNCHED: ECOLOGICAL SOLUTIONS AND EVIDENCE

Ecological Solutions and Evidence is an open access journal publishing articles with direct relevance for the management of biological resources and ecological systems. Led by Marc Cadotte (Editor-in-Chief), and Holly Jones (Lead Editor), the board of Associate Editors consists of both applied researchers working in academia and practitioners in a range of roles including consultants, NGOs and government agencies. *Ecological Solutions and Evidence* is the journal at the centre of Applied Ecology Resources, a new repository to preserve, share and discover knowledge on the management of environmental resources. (britishecologicalsociety.org/applied-ecology-resources)



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NORTHERN IRELAND'S RECOVERING PINE MARTEN POPULATION BENEFITS RED SQUIRRELS, BUT THE URBAN GREY SQUIRREL POSES A PROBLEM

Red squirrel populations in Northern Ireland are benefitting from a recovering pine marten population. Pine martens eat both red and grey squirrels, though the key difference is that red squirrels have evolved alongside pine martens over millennia, making them able to coexist. Grey squirrel populations likely avoid the pine martens, persisting in urban refugia.

Researchers at Queens University Belfast and National Museums Northern Ireland have found red squirrels are responding positively to the increased presence of pine martens across Northern Ireland. So, where pine martens occur, it increases the chances of red squirrels occurring, simultaneously reducing the likelihood of grey squirrels being present.

Historically, persecution of pine marten and loss of their preferred habitat led to severe declines across Ireland and Britain. In Northern Ireland, small, remnant populations were all that remained, but today the species is recovering. "The red squirrels' 'positive response' is likely due to grey squirrel disappearance rather than red squirrels and pine martens working together" says Joshua Twining, lead researcher from Queens University Belfast.

PARTICIPATION IN CITIZEN SCIENCE CAMERA TRAP PROJECT DRAMATICALLY INCREASED SCHOOL CHILDREN'S KNOWLEDGE OF UK MAMMALS

Children who participated in a citizen science project called MammalWeb, where they used camera traps to detect wildlife visiting their schools, were able to identify twice the number of UK mammals by the end of the project.

© SAMANTHA MASON

MammalWeb lent out camera traps to 42 schools in the North East of England for one month to record wildlife visiting school grounds. In that time 3,000 school children contributed over 2,000 photo sequences and submitted over 13,000 classifications.

At the start of the project, knowledge of UK mammals was generally poor with children only being able to name an average of three wild UK mammals. Some mammals you might expect to be named such as badgers and hedgehogs were only named by 20% of pupils.

After participating in the project, pupils could name on average six UK mammals. They were also more likely to name animals to species level rather than group, for instance 'grey squirrel' instead of 'squirrel'. They could also better distinguish between native and introduced species.

"Schools have the potential to be key participants in ecological citizen science projects, contributing valuable data in large quantities." said Samantha Mason who presented the research at the BES Annual Meeting in Belfast, "There seems to be a latent enthusiasm for local biodiversity within schools that we're not currently tapping into."

FUNDRAISING

BES–SFE2 JOINT ANNUAL MEETING EXHIBITION

We are now taking booking for exhibition space at Annual Meeting 2020. Packages including registration start at £700.

WILLS AND LEGACIES

The discounted online wills campaign designed to support our education and outreach work has now reached £217,000 in promised gifts. We still have a few discounted wills available and can now extend the offer to BES members in Scotland.

For more information on Annual Meeting and the wills offer contact Development Manager Paul Bower, paul@britishecologicalsociety.org

© MARTA YEBRA ALVAREZ

Researchers Anke Marie Hoefer and Adrian Garrido Sanchis test the FrogPhone

DIAL-A-FROG: RESEARCHERS DEVELOP THE 'FROGPHONE' TO REMOTELY CALL FROGS IN THE WILD

Frog research is often constrained by the costs and risks involved in remote, high intensity surveys, especially since frogs are most active at night. Researchers from University of New South Wales Canberra, University of Canberra and the Australian National University have developed the 'FrogPhone', a novel, open-source device which allows scientists to call up a survey site and monitor frogs in the wild.

The FrogPhone utilises mobile data coverage and capitalises on the wideband audio of mobile phones, which acts as a carrier for frog calls. Real time frog calls can be transmitted across this infrastructure directly to the user's phone, allowing users to identify the calls of different frog species. The phone itself has a large solar-powered battery capacity and contains digital sensors to automatically collect water and air temperature readings in real-time. This valuable data is then texted to the researcher.

Co-author Anke Maria Hoefer, of the Australian Capital Territory and Region Frogwatch Program, says "the device allows us to monitor the local frog population with more frequency and ease, which is significant as frog species are widely recognised as indicators of environmental health."

MOWING URBAN LAWNS LESS INCREASES BIODIVERSITY, SAVES MONEY AND REDUCES PESTS

Urban parks and road verges are often incredibly well maintained with close cut grass. While this may look neat and tidy, we're potentially missing out on a host of benefits. Using a meta-analysis to analyse data collected over the past 15 years, researchers at University of Quebec at Trois-Rivieres have found that reducing the intensity of lawn mowing in urban spaces leads to increased biodiversity, economic savings and reduced presence of pest species like the allergy-triggering common ragweed.

Regular lawn mowing favours grasses which grow from that base of the plant, other species that have their growing tips or flowering stems regularly removed by mowing can't compete. Allowing plant diversity in urban lawns to increase has the knock-on effect of increasing the diversity of other organisms such as pollinators and herbivores.

The lead author of the research, Dr Chris Watson says that citizens have the power to boost biodiversity in our urban green spaces but to do this "we need to shake the outdated social stigma that comes from having a lawn a few centimetres longer than your neighbour's."

Silky anteater, *Cyclopes didactylus*

© THAIS MORCATTY

LOCAL TRADITIONAL KNOWLEDGE CAN BE AS ACCURATE AS 10 YEARS OF SCIENTIFIC TRANSECT MONITORING OF ANIMAL ABUNDANCE IN THE AMAZON

Gathering population estimates of Amazonian species is incredibly complex. Researchers working in Peru and Brazil have turned to alternative methods of assessing wild populations, using local Indigenous knowledge as a low-cost, integrative tool.

An international consortium of researchers led by Oxford Brookes University pooled resources to compare conventional transect methods used to estimate species abundance with local knowledge. They started by assessing the level of cultural consensus amongst local Indigenous people, mostly men who hunt, for 97 species and compared their population estimates with those calculated from linear transects for the same animals at 16 different sites.

Thais Morcatty, a PhD student who presented the research at the BES annual meeting, said "in this study, our findings indicate that the estimates of species' abundances in the forest by local people, may be as accurate as the best scientific methods we currently have."

It is likely that a combination of these methods would be needed to assess the abundances of rare and elusive Amazonian species. This interdisciplinary approach can easily be applied to other communities, not just in unsampled areas of the Amazon but in other global biodiversity hotspots too. Read more on p20.

BUMBLEBEES EXPOSED TO CHERNOBYL-LEVELS OF RADIATION CONSUME MORE NECTAR

In the years since the 1986 nuclear disaster, the Chernobyl exclusion zone has become a biodiversity haven. Without humans the area is now home to dozens of charismatic species such as brown bears and wolves. However, the area still delivers low-dose radiation to organisms living there and the ecological consequences of this are unclear.

To help us understand, researchers at Stirling University exposed bumblebees to levels of radiation comparable to those in the Chernobyl exclusion zone. They found that it negatively affected the bumblebees' energy use, increasing their metabolic rate and nectar consumption.

Jessica Burrows, who presented the research at the BES Annual Meeting explains, "an increase in nectar consumption for an individual bee could have important ecological consequences, as bees may need to spend more time foraging to collect nectar for their individual needs. As a result, the growth of bumblebee colonies may be impaired if fewer resources are available for the developing brood; this might reduce the number of bees in the ecosystem."

Following this experiment, the researchers are now planning to conduct further research in the exclusion zone itself.

ANNOUNCING OUR STUDENT PRIZE WINNERS

We are delighted to present the winners of our Anne Keymer Student Talk Prize and Student Poster Prize for research presented at our Annual Meeting.

ANNE KEYMER PRIZE WINNER

JESSICA BURROWS

University of Stirling, Scotland

Chernobyl-level radiation exposure triggers elevated metabolic rate and nectar consumption in bumblebees *(Bombus terrestris)*

Radiologically contaminated sites such as the Chernobyl Exclusion Zone have created novel environmental stressors with the potential to influence the ecology of organisms and ecosystem function. Recent studies have recorded sub-lethal effects in invertebrates found at contaminated sites. We investigated a potential mechanism for these sub-lethal consequences by testing whether radiation exposure makes bumblebees less metabolically efficient. We demonstrated that chronic low doses increase metabolic rate and elevate food consumption. We argue this could have wider impacts on ecosystem function in radiologically contaminated sites, as reduced metabolic efficiency could lead to decreased colony sizes and therefore impair pollination ecosystem services.

ANNE KEYMER RUNNER UP

GERGANA DASKALOVA

University of Edinburgh, Scotland

Cumulative effects of global change drivers are stronger at latitudinal extremes

Marine and terrestrial ecological communities are under pressure from accelerating global change, yet we lack quantitative attribution of the interactive effects of different drivers on biodiversity over time. We tested the relationships among climate change, human use and changes in over 7,300 species populations and 44,500 communities. We found the strongest interactive effects on biodiversity in the marine tropics. Our findings suggest that there is no single trajectory for biodiversity across the planet as global change interactions differ across latitudes. By showing how human activities, both singly and in combination, are altering biodiversity, we can better inform policy and global assessments.

ANNE KEYMER HIGHLY COMMENDED

MICHAEL PASHKEVICH

University of Cambridge, England

Age is not "just a number": differences in ground, understorey, and canopy arthropod communities across an oil palm chronosequence

Oil palm plantations – grown to produce palm oil – are widespread across Southeast Asia. Established plantations can support a wide range of species, but many plantations will soon be replanted as they reach the end of their productive life cycle. Biodiversity responses to replanting are largely unknown. We assessed how replanting affected the total abundance and composition of arthropods, within eight years of a replanting event. We found no long-term changes in total abundance, but changes in composition occurred. Overall, the observed arthropod community was resilient to replanting, with implications for ecosystem services and yields.

ANNE KEYMER HIGHLY COMMENDED

LORNA DRAKE

Cardiff University, Wales

Otterly delicious: investigating the diet of the Eurasian otter *(Lutra lutra)* using high throughput sequencing and stable isotope analysis

ANNE KEYMER HIGHLY COMMENDED

ANDREW MOONEY

Trinity College Dublin, Ireland

Few large animals or many small? Managing zoo collections for visitor attendance and in situ conservation activity

POSTER PRIZE WINNER

KATHRYN HAND

Open University

What's the best way to measure all the leaves on an urban tree?

In my PhD I'm looking at various methods of improving urban tree data collection so we can better estimate the benefits these trees provide and, in turn, inform urban forest management. In my poster I compared the accuracy and efficiency of six methods used to estimate the leaf area of an urban tree. The methods used ranged from quick (smartphone app) to more time-consuming ones (destructive sub-sampling). Surprisingly, the smartphone app came out on top! However, these results were collected for a single tree only, so we'll be repeating with more trees this year to get a more robust answer.

POSTER PRIZE RUNNER UP

KEZ ARMSTRONG

Queen's University Belfast, Northern Ireland

Assessing the diet of a declining species: the common kestrel *(Falco tinnunculus)* in Northern Ireland

Traditional methods of studying raptor diet through pellet analysis can provide useful information but are often time consuming. Mammal bones and insect chitin are commonly found, however feathers and bones from birds are impossible to identify unless there is a distinct beak or feather present. Here we presented preliminary results of a novel complementary method of avian prey identification. The beaks and talons of six juvenile kestrels were swabbed during the 2019 breeding season. DNA was extracted from each swab, amplified, Sanger sequenced and blasted against the bold database to identify the prey to the species level.

POSTER PRIZE RUNNER UP

LUCY HARDING

Trinity College Dublin, Ireland

Endothermy in marine fish: does it expand their thermal niche or make them faster?

My work centres around the role of endothermy in marine fishes. Two hypotheses generally proposed to explain its significance are thermal niche expansion and elevated cruising speeds. Evidence to support either is scare and the ecological advantages conferred by endothermy in fishes remain debated. Through comparative analyses of published and collected data, I show that regionally endothermic fish do not encounter broader temperature ranges but that they do swim at elevated cruising speeds, when compared with their ectothermic counterparts. These results suggest the significance of endothermy lies in the competitive advantages it confers to swimming performance rather than facilitating occupation of broader thermal niches

POSTER PRIZE HIGHLY COMMENDED

AMY ARNOTT

Queen's University Belfast, Northern Ireland

Bugs and Brexit: the effect of agri-environment schemes on invertebrate biodiversity in upland grasslands

POSTER PRIZE HIGHLY COMMENDED

CLAUDIA GUIMARAES-STEINICKE

Leipzig University, Germany

Plant diversity affects plant surface temperature via canopy architecture in grassland communities.

POSTER PRIZE HIGHLY COMMENDED

NEHA MOHAN BABU

Syracuse University, USA

Herbivory intensity driven by multiple resources: model and data from the Serengeti

PONDERING PARTHENOCARPY IN THE POLLINEIGHBOURHOOD

Lewis J Bartlett, University of Georgia, @BeesAndBaking

Here at the food and ecology column, we had a fantastic BES 2019 meeting in Belfast. Full of food, wine, merriment – and great ecological science. I was certainly a busy bee - conference energy relies on busy bees! But so too does much of what we ate across the three days, with busy bees and their role in keeping us merry and fed featuring a fair few times throughout the event (much to my delight).

I think it is fair to say that pollination in agricultural systems was something of a flagship ecosystem service – demonstrable, quantifiable, immediately observable by the public in a way which captures the activist imagination. Almost all of us will have heard figures attributing billions in profit and crop output to pollinators. The motivation for growers to ensure that there is some degree of provision for their pollinators – through landscape conservation measures – is in many folks' eyes well established. For my part, my own career thrives on it. But today's column isn't a lecture in the eternal importance of pollinators for our food system, it's a speculation on how agriculture might evolve not to the benefit of pollinator provision, but to its detriment, and I present an open question on how we responsibly navigate this as ecologists.

During the Annual Meeting, we had two especially pertinent presentations on pollinator provision by growers. Lynn Dicks showcased a pan-European stocktaking of the perceptions of beekeepers and growers when it comes to which crops need bees, and which crops are good for bees (Breeze *et al.* 2019). Mostly growers are aware of when their crops need pollination, but there were notable over-estimations of pollinator demand – cases where growers think pollinators are needed where they are infact not. What is the responsibility of a conservation ecologist in that moment? Do we tell growers not to worry, that they actually don't need any pollineighbours? Is it different if you count yourself an agroecologist? What if you are both?

Katherine Burns of University College Dublin followed this up with a deep-dive into field trials comparing varietal demands of apple for pollination – where cider and dessert apples cared to very different degrees how much pollinator-pal-time they ideally needed. A thickening plot, as far as simple stories of pollination go. Not that ecologists are afraid of nuance and complication, but when we have practitioners to advise, simple messages are worth their weight in gold-standard open access.

The morning's research prompts took me back to work I was involved in a few years ago, where a colleague of mine set out to quantify the pollination deficit of courgette (in the ecological literature, a crop for which pollination is allegedly 'essential'). Turns out, there's little deficit; the field variety grown was parthenocarpic – producing fruit without fertilisation and with absent or reduced seeds. Montage one frantic PhD-project-plan rewrite later and we had a meta-analytical review from the plant breeding literature of just how many crops can be induced to show parthenocarpy despite ecologists claiming they required pollination when grown. There are many (Knapp *et al.* 2017). Suddenly, our flagship ecosystem service looks a little mired in the mud.

Not all crops can escape a need for pollinators, but it appears many can – looking across varieties or across technologies, we may be overstating the need for pollination, and growers may be further overestimating it beyond that – all perhaps to conservation's benefit across the agricultural landscape. How long might that last? Will we see a sea-change in understanding where growers are able to forgo needing pollination? Forgo prioritising it? What will drive them to that? I work in the tumultuous realm of US beekeeping, where honeybees are easily acquired to meet the gluttony of American monocrops; and where honeybees, and their keepers and scientists, are often demonised. But without access to supplemental managed bees, would growers simply move away from pollination entirely? Would they learn they don't need it if providing, or provisioning for, pollinators becomes harder? If wild bees cannot meet demands in the current landscape, will we move toward meeting the demand by changing the landscape, or move toward removing the demand by changing the crop? What then? Can ensuring pollination remains plausible by keeping bees mean that growers keep some value in the pollinators already there? Something for me to think on, and hopefully for you all to enjoy a tea-time ponder on as well. TTFN.

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DRAW YOUR STUDY ORGANISM

ASK THE EXPERT

WHAT IS AN ORCID ID AND WHY DO I HAVE TO HAVE ONE WHEN SUBMITTING TO A BES JOURNAL?

Answered by Simon Hoggart
Journal of Animal Ecology

The BES journals require authors to include an ORCID iD when submitting a manuscript. ORCID provides a persistent digital identifier – an ORCID iD – that you own and control.

Why have an ORCID ID?
An ORCID ID is a key part of your digital presence (your discoverability online). It distinguishes you from every other researcher and is used to bring together your scientific records including publications, datasets, software, and other digital objects.

By having your work connected, you will increase citations, enable connections with possible collaborators including those from other fields, and contribute to good open science practices.

To make the most of this increased discoverability we recommend that you enable auto-updates from trusted partners including Crossref and DataCite so that your ORCID iD is automatically updated with your latest papers and datasets.

For instructions see
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TOOLS OF THE INTERDISCIPLINARY TRADE

HOW TO MAKE YOUR INTERDISCIPLINARY PROJECT A SUCCESS

Lydia Cole and Althea Davies share their experience on how to improve the success of interdisciplinary research across the natural and social sciences.

Ecologists who find themselves working on the human dimensions of ecological change and conservation face a dilemma. On the one hand, understanding human–nature relations is now recognised as essential for effective ecosystem governance and conflict mitigation. On the other hand, interdisciplinary working is hard: it takes longer and is more expensive; the best course of action is seldom clear at the outset and may be highly debated throughout; and it may not be a good career move for ECRs because of perceived obstacles, ranging from obtaining funding to publication impacts.

It is unsurprising then that progress to 'mainstream' social science within ecology and conservation has been slow. Many researchers learn 'on the job' or from relatively few experienced colleagues, rather than finding established support and training networks, which raises the risk of uncomfortable criticism where natural scientists 'borrow' from social sciences. This was our experience and motivated us to run a workshop at the 2019 BES Annual Meeting to share challenges and solutions for working across the natural and social sciences as an ecologist. Here we present what we learnt.

TEN MAJOR CHALLENGES AND WAYS TO MANAGE THEM

Note that some challenges are distinct to stages of a project, while others apply throughout.

1. Finding a funder

- Check documentation on their approach to interdisciplinarity, contact to seek clarification, e.g. on risk management, on identifying appropriate reviewers. Consider getting experience as a reviewer of interdisciplinary proposals yourself

2. Building the team

- Engage early and equally, and involve social scientists to enhance understanding not simply to communicate findings
- Consider selecting people whose work you know, rather than inviting leaders in each discipline
- Include an interdisciplinary expert in the team-building process. Include people who are open to being challenged and open to new ways of doing things

3. Establishing leadership

- Ideally the project lead will be firm but enabling: creating space and mutual respect for all, leaving egos aside

4. Not knowing what goals or outputs are realistic and achievable at the outset

- Identify a potential funder who accepts this form of uncertainty/risk as an inherent part of the project
- Identify key risks and 'best practice' mitigation strategies

5. Estimating time requirements

- Extra time is needed to establish good working relations and procedure, and for project management; this requires patience and understanding from managers and funders, who may see it as 'unproductive' time
- Expect the balance of contributions from different disciplines to vary at different stages of the project
- Be as generous as possible with time allocated for researchers (rather than PIs): they are often most squeezed
- Set clear milestones and regularly revisit these to minimise slippage, particularly for producing outputs

6. Finding shared understanding of language

- There are several ways of knowing (epistemological pluralism) and it's essential to accommodate them as the project develops

7. Maintaining communication

- Regular, face to face meetings are invaluable
- Be reflexive, it will help understand how and why new or contradictory insights emerge
- Establish routine fieldwork communication methods to connect those in the field with institution-based collaborators, particularly if fieldwork is prolonged

8. Maintaining disciplinary rigour

- Each discipline should interpret findings before sharing and integrating
- Combining disciplinary lines of evidence too early can result in bias and 'cherry-picking', particularly if there are power imbalances between disciplines or researchers
- Regularly revisit original goals to avoid disciplinary or project drift

9. Combining natural and social sciences

- Difficulties often arise when seeking to compare and combine quantitative and qualitative data
- Seek examples in the growing literature, particularly journals which encourage or require interdisciplinary work
- Expect differences, jointly discuss whether these are due to disciplinary bias/filters or whether they are meaningful, e.g. reflect how different disciplines or stakeholders perceive problems, which may cause tension between disciplines and/or in the real world

10. Competing publishing expectations and norms

- Develop a 'road map' of intended publications, recognising that not all disciplines will play an equal role in all outputs
- Ensure clear communication of decisions made by corresponding author/project lead at every stage
- Ensure time for input from 'supporting' disciplines to inform interpretations

A longer version of this article with resources can be view on the People and Nature blog. The slides shown at the workshop are available in posts on the Conservation Ecology SIG (besconservationsig.wordpress.com) and Tropical Wetland Consortium (tropicalwetlands.wp.st-andrews.ac.uk) websites.

Acknowledgements
We would like to thank Dr Kath Allen for her help in the development and running of the workshop, and all workshop participants and invited contributors for their valuable input.

Sam Perrin asks...

WHAT'S CHANGED SINCE YOU'VE BEEN AN ECOLOGIST?

PROFESSOR HELEN ROY
Centre for Ecology & Hydrology

"What we can do with statistics now is absolutely incredible. I really admire the ways in which statistical modellers are managing to use these very enormous, sometimes wildly unstructured data sets that we have, from everyone from long-term datasets to the citizen science community. When I was doing my Masters and PhD, we would have no opportunity to conduct that sort of analysis. I think it's so exciting to see how those datasets can be used to address all kinds of scientific questions. Also how they meet the needs of providing indicators for things like conservation and policy decision making. It's just inspiring, the computer power (and the people) and the statistical innovations at work now."

DR ABIGAIL MCQUATTERS-GOLLOP
University of Plymouth

"In the last 10 years there's become a respect for people who work at the science–policy interface. I've been told before that I'm not a scientist, and that working with policy makers to make sure that science is used in decision making isn't the same as being a scientist. So obviously it's been really undervalued. That has changed, and there's loads of evidence to prove it. There are now funding programs to get science into policy, relationships between scientists and policy makers have improved, there's more and more members of the scientific community wanting to know how to engage with policy. And that interest just wasn't that strong, even seven or eight years ago.

I remember giving a talk about how to get your science into policy, and someone asked 'why would I care if my science gets into policy'. That kind of conversation happens less now, because people realise that we are having a climate amd biodiversity emergency. Managers need to make good decisions about the environment, and we have knowledge that can help them make those decisions. Cooperation between scientists and policy makers is becoming more common, and I think it's a real success story."

Sam Perrin is a freshwater ecologist, currently completing his PhD at the Norwegian university of Science and Technology. He also runs the website Ecology for the Masses, where you can find full interviews with both Helen and Abigail.

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WHY RESEARCHERS SHOULD BE USING LOCAL TRADITIONAL KNOWLEDGE TO ESTIMATE BIODIVERSITY

Sicily Fiennes
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Nearly one in three species on Earth can be found in the Amazon, its forests and rivers harbour the richest habitats in the world. But for researchers, studying species that live there is a monumental task. It is an incredibly challenging area, given its remoteness and the high costs of fieldwork expeditions. **Sicily Fiennes**, BES Press Intern, discusses new research methods using Indigenous knowledge and their value for estimating the abundances of threatened species in the Amazon.

It is vital now, more than ever to understand the abundance of Amazonian species, as overhunting, deforestation and deliberate burning are huge threats to biodiversity. The harvest rate of wildlife is unprecedently high in tropical regions and overexploitation of the Amazon's fauna has been particularly severe in recent years. Worryingly, there has been an expansion in subsistence hunting in the Amazon, focused on most of the medium-sized large mammals, reptiles and birds.

Meat consumption in the Amazon is driven by species availability and local preferences for meat, which are influenced by religious and cultural taboos. Demand from urban bushmeat markets could be driving the increasing exploitation of species.

UTILISING INDIGENOUS KNOWLEDGE IN SPECIES RICHNESS STUDY

To gather estimates of populations for a wide variety of Amazonian species, including those threatened by hunting, Thais Morcatty, a Brazilian ecologist and BES member, studying at Oxford Brookes University, turned to alternative methods.

Thais was faced with a common problem. Typically, line transect surveys are used to estimate species abundances and are based on whether you directly encounter an animal. This then allows you to extrapolate these estimates over a whole area to attain population numbers. However, research has already shown that these standard methods are insufficient and likely under-detect terrestrial mammals. Subsequently, Thais tapped into the expert knowledge of local indigenous hunters to enhance scientific data.

Thais aimed to collect local estimates of species richness through interviews and compare them against ten years of transect data from 16 sites in the Peruvian and Brazilian Amazon. These sites were part of a cross-organisation consortium involving British, Spanish and Brazilian research groups. Ninety-seven species were included in the analysis, included the heavily hunted howler and woolly monkeys, tapirs, paca and peccaries.

Indigenous hunters were recruited to identify a 'cultural consensus' for species abundance estimates. Asking communities their opinion and utilising local knowledge is crucial as it reflects the biological and cultural diversity of the Amazon biome. This allows the fostering of stewardship by Indigenous people and recognises their voices as the true guardians of tropical forests.

"Cultural consensus theory assumes that cultural beliefs are learned and shared across people and that there is common understanding amongst people from the same cultural background regarding a topic", said Morcatty.

WHY INDIGENOUS KNOWLEDGE IS INVALUABLE FOR ECOLOGY

Thais and other researchers found a good consensus amongst local people on species abundance for many of the species. Hunters agreed more on abundance estimates for medium to large species, which were easy to spot and hunted frequently.

Thais commented that "local people are very accurate when they estimate by themselves".

For example, high agreement was documented for howler monkeys and tapirs - diurnal, non-elusive and frequently hunted for subsistence. On the contrary, the neotropical otter, an elusive, aquatic species which is not rarely hunted, had a low consensus for its abundance.

Interestingly, although the researchers found that local estimates and scientific transect calculations were in close agreement with each other for many species, there were some exceptions. Some species had considerably good consensus amongst locals but were rarely detected by the transects.

The yellow-footed tortoise is adept at camouflage, Thais said, "its carapace colours match perfectly with the litter on the forest ground, making it really difficult to detect during transect sampling." Nocturnal species such as pacas, tapirs and armadillos are rarely spotted in diurnal surveys. What these species have in common, is that they are popular amongst hunters and are reported by local people during interviews.

Hunting pressure can be so severe on certain species, that they disappear from transects, such as currasows and spider monkeys. Local people may be the last people to see them and hold valuable information on critically endangered and rare species.

As a result, local knowledge may be the only way to keep tabs on certain species, so must be incorporated in management strategies otherwise we risk not detecting severely threatened species. Science is not enough. Indigenous people simply know more than researchers, as the Amazon is their home.

These findings demonstrate that local knowledge is precise in estimating species abundance in tropical forests. Thais explains, "these findings indicate that, overall, the results we found in around 10 years of transect monitoring are very similar to those obtained through traditional ecological knowledge for the same period".

© THAIS MORCATTY

THE FUTURE OF MONITORING IN THE AMAZON

Based on Thais' findings, Indigenous citizen science can be an accurate and low-cost tool for monitoring populations in tropical forests and approximating their conservation status.

In the future, monitoring must transcend the combined transect-cultural consensus approach to assess the abundances of rare and elusive Amazonian species. These developments will be particularly useful in unsampled areas of the Amazon, where we do not yet know the species composition and have not engaged with people who live there.

As demonstrated by Thais, partnerships among scientists and local people are the best way to achieve wildlife conservation. Local knowledge could accelerate the establishment of protected areas and creation of critical management strategies. This is especially pertinent in the Amazon, where both species and Indigenous cultures are threatened by anthropogenic activities such as forest clearing, dams, mining and oil extraction. A holistic redirection of ecology to local knowledge may better help protect one of Earth's biodiverse forests, such as the Amazon.

Conservation as a discipline should be advocating for the continued incorporation of traditional ecological knowledge into research. Future researchers can follow in Thais' footsteps and look above and beyond the science to ensure that first and foremost, the local culture of Indigenous and riverine peoples in the Amazon is preserved.

Stay tuned to the BES journals for updates on this work!

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CAPTURING ECOLOGY

Every year we welcome our members to enter our popular photographic competition Capturing Ecology. The winning images range from up close perspectives that display the intricacy of ecology, to images that demonstrate the relationships that exist within ecosystems.

This year we received over 450 submissions covering aspects of ecology from around the globe. We were delighted to see our wining shots receive national and international coverage.

Our winners are showcased at a free exhibition at Ulster Museum from 11 February to 23 March, coinciding with the Northern Ireland Science Festival. Printed here are a selection of the fantastic images and there are more to view on our website.

Congratulations to all our winners and many thanks, as always, to our wonderful panel of judges!

RED NIGHT

ROBERTO GARCÍA ROA
University of Valencia, Spain

OVERALL WINNER

The Malagasy tree boa (*Sanzinia madagascariensis*) is a non-venomous snake species endemic to Madagascar. Big individuals became difficult to find in some areas surrounding human settlements. Fires produced by humans and poaching are only some of the threats these snakes face.

I am currently conducting a personal project called "Mosaic" to document, through images, a wide spectrum of patterns, colours and displays that animals use to interact, which is one of my main research interests. Madagascar is a diverse country with striking species of vertebrates and invertebrates showing very interesting examples of this. Unfortunately, many areas of Madagascar are suffering huge anthropic pressures and big snakes are becoming increasingly difficult to see. During my visit to Madagascar, I had the pleasure of finding this outstanding snake and taking pictures of it.

Malagasy tree boas use tree branches as comfort zones. As with many snakes, they can remain immobile waiting for prey or resting during the day. To offer a dramatic scenario trying to reflect the conditions that these snakes are suffering in that area of Madagascar because of poaching and fires, I used an external red light as a source of light and a severe blurring to capture the environment.

A wide-angle lens and a long exposure allowed me to play with different elements in the same photograph. First, I captured the snake by using an external flash. Then, I gave light to the environment with a red light that, with a soft movement, produced a distortion of the background generating that magic situation.

CAPTURING ECOLOGY CATEGORIES

Up Close and Personal
Images displaying the intricacy of nature using close up or macro photography. Creative and abstract imagery is welcomed and may include images denoting patterns, symmetry, form, and the study of micro-organisms.

Dynamic Ecosystems
A demonstration of the relationships within an ecosystem or community, with a clear emphasis on interactions between different species.

Individuals and Populations
A unique look at a species in its environment, either alone or as a population. There may be other species in the picture, but the emphasis should always be on one.

People and Nature
We increasingly recognise people as part of the global ecosystem, as opposed to separate from it. Photographs in this category provide an interesting and original take on the relationships between people and nature, and submissions to this category may be featured on the cover of our journal People and Nature.

Ecology in Action
A demonstration of the inspiring work relating to the practice of ecology, with a single striking image showcasing Ecology in Action.

The Art of Ecology
This is a chance for members to show us their artistic flare, with a creative and original take on photography denoting ecology.

SLEEPING BEAUTY

KATHERINE MULLIN

Cardiff University, UK

INDIVIDUALS AND POPULATIONS: HIGHLY COMMENDED

Whilst conducting amphibian surveys in the highland rainforests of Madagascar (my PhD research), I often stumble across chameleons. Encountering them is even more likely during nocturnal surveys when the chameleons sleep on vegetation at approximately 5 foot - my perfect eye and camera height.

SLEEPING STILL

FELIX FORNOFF

University of Freiburg, Germany

INDIVIDUALS AND POPULATIONS: CATEGORY WINNER

Leafcutter bee (*Megachile sp.*) offspring develops in nests made from ovate leaf cuttings thoroughly arranged in multiple buffering layers by their mother bees. The pigmentation of the pupas' eyes indicates the approaching end of metamorphoses and the arrival of the spring of their lives.

ICELAND'S LADY

HANNAH WESTHENRY

University of South Wales, UK

DYNAMIC ECOSYSTEMS: HIGHLY COMMENDED

Alchemilla alpina hangs on to fragments of dark volcanic rock. For centuries the substrate has been beaten down by the powerful flow of glacial waters, eroding away the bed rock to create the underlying steps of Gulfoss waterfall. Only a selected number of species can survive in Iceland's harsh conditions, alpine lady's-mantle being one of the most recognisable of Iceland's herbaceous species. Its dark green palmate leaves go hand in hand with the once explosive Icelandic rock.

CAPTURING TUNDRA VEGETATION CHANGE

GERGANA DASKALOVA
University of Edinburgh, UK

ECOLOGY IN ACTION: STUDENT WINNER

The tundra is warming faster than any other region in the world, but we can only survey little parts of these rapidly changing landscapes on foot. Using drones, we can capture a bigger picture of how climate change is altering northern ecosystems. On Qikiqtaruk-Herschel Island, that means carrying around many big bags full of equipment, making for a picnic-like spread amidst the cottongrass tussocks. This photo was taken on an expedition supported by the National Geographic Society.

WHY DID THE SLOTH CROSS THE ROAD?

ANDREW WHITWORTH
Osa Conservation and University of Glasgow, UK

PEOPLE AND NATURE: CATEGORY WINNER

I was driving out from the Osa Peninsula located on the southern Pacific of Costa Rica on a dark stormy day. This female three-toed sloth (*Bradypus variegatus*) had luckily just about made it across the road, and the drivers of the Toyota on this occasion had spotted her in good time.

TEENY TINY WORLD

SANNE GOVAERT
Ghent University, Belgium

THE ART OF ECOLOGY: STUDENT WINNER

This tiny mushroom, a *Mycena spp.*, was growing inside a rotten tree trunk. Due to the microclimatic conditions inside the trunk, condensation had formed on the *Mycena*. *Mycenas* feed on dead wood and litter, so I could move the mushroom attached to the bark and easily photograph it.

BATTLE IN THE UNDERGROWTH

BEN GOODHEART

Montana State University, USA and Zambian Carnivore Programme, Zambia

DYNAMIC ECOSYSTEMS: HIGHLY COMMENDED

An Angolan green snake (*Philothamnus angolensis*) predating upon a foam nest frog (*Chiromantis xerampelina*) In the Kafue National Park, Zambia.

FOR THE LOVE OF FLAMINGOS

PETER HUDSON

Penn State University, USA

THE ART OF ECOLOGY: CATEGORY WINNER

Flamingos are all legs and necks but at the same time graceful and fascinating and I admit I have a deep passion for them, so I was thrilled when, flying high over Lake Magadi, Kenya, I watched this flock form themselves into a heart shape.

FLUORESCENCE

ROBERTO GARCÍA ROA

University of Valencia, Spain

UP CLOSE AND PERSONAL: CATEGORY WINNER

Fluorescence is a biological phenomenon that ranges across kingdoms, from bacteria to animals. In animals, scorpions are likely the most iconic group. The function of fluorescence is still unclear, but it is a good reason to search for these animals in the wild, such as in this small scorpion found in Madagascar.

MEETING JANE MEMMOTT

Interview by Kate Harrison
Photography by Claudia Janke

I caught Professor Memmott on one of her 'peak lull' days in August – a rare quiet day in her schedule following three weeks of leave and before the start of term. It was sunny and we were in an urban biodiversity hotspot, the University Botanic Gardens in Bristol. Jane, who is director of the Gardens, gave us whirlwind tour taking in the outdoor displays, greenhouses, and art installations before we settled down to talk about work and life, and what she'd like to achieve during her two-year term as BES President.

Taking nectar from Himalayan Balsam *(Impatiens glandulifera)*

So how was it being elected President of the BES?

Oh it was great honour. I joined the BES when I was a first year PhD student and have been a member ever since. The first grant I received as a lecturer was a BES grant, and that jump-started the whole thing. It got me the data for my first pollination paper and everything else followed from there. I wanted to be an academic long before I joined the BES, but the BES helped me get there and I'll be a member for ever.

I've seen a lot of people start off with those small grants, as I did, and that's one great thing about ecology - you can do a lot with a few thousand pounds – balls of string and plastic bags can get you a long way as a field ecologist!

As BES president you'll have two years in office - what would you like to do with your presidency?

The BES runs spectacularly well, and with just two years you're not going to change huge amounts, you can bring a flavour though. It's a bit like these botanic gardens, I'm director here but I don't need to meddle in the day-to-day operations at all, as it has a fantastic team who run it very well. But I can bring some extra things with me and there are some things on my to-do list as president.

Ecology is about studying the environment but among our undergraduates and PhD students there's a bias toward the animal side of things. I'm an entomologist so I work a lot on the animal side too but I'm keen to get more people enthusiastic about plants. Our students arrive not liking plants. I was the same and I still have a horror of photosynthesis nearly 40 years later. We need to up the importance and interest in plants in our teaching – show students the charismatic and interesting side of plants to draw them in.

Practitioners are very important. I've worked a lot with conservation practitioners – people who aren't academics and who don't live in ivory towers, in fact they don't live in universities at all. They're the people who buy and manage nature reserves and work anywhere from local councils to conservation charities, to natural history societies. We must take more time to build relationships with them – a team made up of academics and practitioners can achieve far more together than either can alone.

The third thing I'd like the BES to work towards is capturing the interest of teenagers. There are lots of activities for families and primary school kids at local wildlife trusts, to get them outside and having fun. But there's a lot less for teenagers. And it's hard being a teenager when you're interested in insects for example, it's not cool. I went through an aquatic stage when I was a teenager and used to wake up at 5.30am to go pond dipping so no one would see me. If we get teenagers interested in ecology and guide those who already are, we can help a really engaged new generation to develop.

And finally, I'm really interested in getting ecologists more involved in interdisciplinary work. Many, probably most, of the really big problems in the world need an interdisciplinary approach to solve them and ecologists are key players in finding these solutions. This requires a different skill set to every day ecological work and I'm keen to help equip ecologists with these skills.

I'D LIKE THE BES TO WORK TOWARDS CAPTURING THE INTEREST OF TEENAGERS

Identifying and closing the gap between practitioners and academics is a huge challenge, and you've done a lot of work on that already. What kind of challenges have you come across?

I've worked a lot on farms and thought farmers might be hard to work with. Farmers are often reported in the media as damaging the environment, but the vast majority really like wildlife on their farms and most are really interested and highly knowledgeable about it too. For one project we visited 80 farms looking for 20 field sites and only one farmer didn't want to work with us. It's the same with practitioners, we might be working in the same areas, but we don't occupy the same airspace most of the time and so it can be hard to meet to talk about common interests – but there are many interests we have in common.

As scientists we need people skills to work with practitioners, you have to be able to succinctly explain what you're doing and why it's important and be really enthusiastic because enthusiasm is infectious. The students and postdocs who were working with these farmers were ambassadors from the world of science to the world of food production and both sides got to know each other really well and learnt a lot from each other.

A big project I ran with a team of colleagues, the Urban Pollinators project, was based in Bristol, Reading, Leeds and Edinburgh and it ran for four years. When I was writing the grant, we got the practitioners on the board right at the beginning of the application process as project partners and we included the questions they were interested in as well as ours in the proposal.

Practitioners have the local knowledge that we just don't have as academics. In the Urban Pollinators project we needed 15 sites in four cities to plant meadows and they knew every park, nature reserve, road verge, and the people to talk to about site permissions too. I had coffee with the county ecologist in Bristol for four or five years before the project got going and that is where some of the ideas came from. It takes a long time to build working relationships with people outside your field and we'd meet every month or so and just chat and work out what makes each other tick and think whether there were any opportunities for collaboration.

Academics are so busy these days, our student numbers have doubled, and having the time to build those relationships can be seen as a luxury. If the BES could facilitate these meetings somehow, make it easier, that would be great.

Using a refractometer to measure the concentration of sugars in nectar

YOU HAVE TO BE ABLE TO SUCCINCTLY EXPLAIN WHAT YOU'RE DOING AND WHY IT'S IMPORTANT

The Urban Pollinator Project has ended now and the main paper came out last January. It received a lot of positive coverage – you found that urban environments have huge potential as biodiversity hotspots.

There are more bee species in urban habitats than in surrounding farmland and the positive take is that urban habitats are good for pollinators. However, the less positive take is that the farmland, on average, wasn't great for pollinators. That project ran concurrently with another where we measured the amount of nectar in the countryside, looking in particular at historic declines, and we found that we've lost a third of our nectar since the 1950s with the industrialisation of agriculture.

I've now got a PhD student measuring nectar in the countryside and another one measuring nectar in towns. Towns are hotspots for nectar, if you looked at the quantity of nectar in this botanic garden compared to a bit of farmland, there are huge quantities here compared to the farmland. We've looked at the gaps in nectar provision in the countryside and we're interested in how towns and cities can potentially bolster those gaps and what we can do to make towns and cities even better for pollinators.

One of the nice things about towns and cities is that its where most people live, and it's great to be able to study biodiversity literally in the backyard. It's hard to personally save a whale or a tiger but if you have a garden, a balcony or even just a doorstep, you can attract bees and butterflies to it by providing flowers. The bumblebee is the sound of summer to me, sitting in the garden with a glass of wine and the sound of buzzing is a lovely way to end a day. That's good for people as well as pollinators.

Catching bumblebees

THERE ARE MORE BEE SPECIES IN URBAN HABITATS THAN IN SURROUNDING FARMLAND AND THE POSITIVE TAKE IS THAT URBAN HABITATS ARE GOOD FOR POLLINATORS

How do we make sure that the potential of urban areas for pollinators is realised?

We can do the science and publish it in good journals, but unless we get those results to the right people in the right format, the results won't make a difference. Katherine Baldock, the lead postdoc on the Urban Pollinators project, got a NERC Knowledge Exchange Fellowship after the project and has done a tremendous job helping with policy statements, sitting on committees and taking that research to the people that need to read it. Without doing that sort of work, the results will take much longer to make a difference.

Once the policy side is completed, we can go back to the science because there's so much we still don't know. We know about general levels of bumblebee abundance and species richness in towns and cities, but we don't know basic things like the number of colonies and it's the colonies that are the reproductive unit.

We worked with a physicist recently who did some sophisticated modelling for us which has allowed us to make predictions about how to make a city robust to species loss. We were able to predict the habitats that provide the best protection against species loss – habitats like gardens come out as important as expected, but allotments had a huge leverage proportional to their area.

Now that we have these predictions, we need to do the actual field trials and test what we find. If it turns out that allotments are as good as we think, then we've found something that's good for both people and pollinators. And if it works well for people too, then any conservation work is probably more likely to happen.

It might be that we can turn towns and cities, which are about 10% of the land area of the UK, a similar area as nature reserves, into an even more pollinator-friendly habitat. They're not the same as high-quality nature reserves but they're a very useful support area. Moreover, people are similar to pollinators in some ways, they like flowers, they like gardens and they like allotments, so it's a win-win situation.

In the tropical greenhouse of the Bristol University Botanic Gardens

You've done a lot of collaborative work then, with practitioners and you mentioned physicists. What about social scientists?

I've just started to work with social scientists. I work on network interactions, plant–pollinator interactions and food webs, and there's a parallel field in social networks: how communities of people work, whether socially or in the workplace. I'm trying to join those fields together and I had a PhD student working on it for a while, looking at how knowledge moves across conservation organisations. There's never going to be lots more money put into conservation, so we wanted to improve the way these organisations operate as a system. It's an approach that comes from the world of business.

There was a really nice study done by a colleague in a children's kidney ward, mapping the links between the children, the parents, the consultants, the nurses, all the different medical people, the play group leaders and so on. They found that the most important people for knowledge transfer were the playgroup leaders. The playgroup leaders knew the children, the parents and the consultants (who probably thought they were the most important people in the network) and were key people in the overall system for knowledge flow. This approach allows you to see how the system works as a whole, which means you can then see how to get it to work more effectively.

So, linking conservation organisation networks, right through to plant-pollinator networks on a nature reserve is where I'm trying to go at the moment. It's hard to get funding for interdisciplinary research though, and it takes a while to get the right angle and the right committee.

In terms of the big solutions to the big problems that are out there, they require interdisciplinary approaches. A single discipline isn't going to save the planet. Take sea defences. Rather than building sea walls which cost millions per kilometre, an alternative is to let the sea in and allow a salt marsh form which then absorbs the shock from waves and floods. They can work brilliantly, they're far cheaper, and they give you a new nature reserve too. But if you want to punch a hole in a sea wall you need engineers and hydrologists, you need social scientists to get local people on board and then you need the conservation managers to manage the nature reserve. We need these teams to do the big projects and that's the work I'm really interested in at the moment.

That's where you want to be working, on those big solution-focussed projects?

That's what I'd like to do but it's irritating because everyone says we need to do interdisciplinary work but it remains very hard to get it funded. You need to have people reviewing it that can see the bigger picture, the bigger solutions that are going to come out of it. The funding rates on interdisciplinary research are lower than for single disciplines and that needs fixing.

BIG SOLUTIONS TO THE BIG PROBLEMS REQUIRE INTERDISCIPLINARY APPROACHES

Is there much in the way of being an academic that you would change?

Student numbers have doubled in the last five or six years and we haven't doubled the number of academics or halved the amount of teaching. There's only so much smart teaching you can do and it's important to keep that personal touch, so students don't feel like they're passing through on a conveyor belt.

And there's lots of new things coming through that add huge amounts of administration. Take Athena Swan which is brilliant, we've just got our Silver in Biology at Bristol, but the workload for these awards is huge. And it's getting much harder to do the work that makes the world go round.

How is your work life balance?

I'm still working on it! I take three weeks every year as a complete break in the summer and breaks at other times of year too. Not taking holidays is the worst thing you can do, it's completely counterproductive. I've had my best ideas when I'm on holiday, walking along the beach not thinking about science, that's when the big ideas come out. I don't work on Friday nights and Saturdays, though sometimes I do some work on a Sunday.

That's not much time off in the week!

Well, I don't ever work after 9pm, only rarely after 8 and I always leave work at 5.00. I'm the only early-riser in my family so I can do three hours of work on a Sunday morning before anyone else gets up, so it doesn't interfere with family life. And I only do the fun work at home too. It's a question of finding what works for you.

Has that been one of you bigger challenges in your career, finding that work life balance?

Yes, it is a huge challenge. One of the downsides of being an academic is you never quite finish everything. You might finish one job, you get that grant submitted, but then there's a dozen other things that have built up while you were working on that and it's difficult catch up with yourself. Everyone needs to learn to say no to things – and sometimes to the things you really want to do too.

This is where mentoring is important.

Yes, early in my career I got stressed over all sorts of things that didn't matter in the end. Pairing up established academics with people coming in and passing on those tips on how to survive is really important.

I never had an official mentor per se, but I've always had people I can talk to. One thing that worries me now is there's less time for socialising and finding those people you can talk to. We used to use the staff room a lot more 5-10 years ago and that was really good for moral support and a lot of research ideas would come out of those conversations too.

I still think being an academic can be one of the best jobs in the world though.

What's your message to the next generation of ecologists?

Ecologists have a fantastic toolkit for helping to solve the world's problems. But we can't do it on our own, it does need to be interdisciplinary. Get involved in interdisciplinary work if at all possible. It's intellectually challenging and fun and it's where the win-win situations will be.

Be part of the solution and be prepared to work outside your comfort zone because there's exciting science to do there. You've got to be willing to ask the daft questions which is hard when you're an expert in your field, but get in there and give it a go.

You can read the world as glass-half-empty or glass-half-full. I'm a glass-half-full person, we need to be positive, and if you are, I suspect you're more likely to move things forward.

I have to say I've yet to meet a glass-half-empty ecologist.

We have to be glass-half-full otherwise we'd all be miserable! And we've just spent the day wondering around these wonderful botanic gardens - we have a lot to be thankful for. ✺

BIOGRAPHY IN BRIEF

Childhood love and a bedroom full of frogs, newts and slow worms

▪

As a teenager, secretly pond dipped in the early morning

▪

Degree in zoology at Leeds

▪

Summer internship at Natural History Museum entomology department

▪

Travelling and tour guiding in Peru and Costa Rica

▪

Commuting between Costa Rica and Leeds for a PhD on the community ecology of phlebotomine sand flies

▪

Postdoc in tropical dry forests at Imperial College London and NHM

▪

Postdocs on tropical food webs and biological control at Silwood Park

▪

Biocontrol work in New Zealand, Australia and Kenya

▪

Junior lecturer, Bristol University

▪

Since starting a family, combines international projects with those nearer to home

▪

Professor of Ecology

WHAT ARE THE FORTHCOMING LEGISLATIVE ISSUES OF INTEREST TO ECOLOGISTS AND CONSERVATIONISTS IN 2020?

ILLUSTRATIONS: CREATIVE MANIA / NOUN PROJECT

This is our tenth assessment of the forthcoming legislation that we consider is likely to have consequences for ecologists or the environment. We review issues ranging from a global scale, those in the European Union, those in the United Kingdom and constituent countries.

Our aim is to encourage greater interest and awareness of policy changes both so that readers may become involved and so they can be aware of opportunities and challenges. There is a parallel annual process identifying technological, societal and biological changes that are likely to have impacts on conservation; this is published in *Trends in Ecology and Evolution*.

Although the UK election provided some clarity over Brexit, there is an enormous amount to be sorted out, which is still likely to dominate much of the discussion in the UK.

The previous legislative scans (Sutherland 2011–19) are available to download for free on the British Ecological Society website. The issues described in those scans are not repeated here, even if still relevant.

GLOBAL

2020: The super year for nature

The year 2020 has been termed the 'super year' for nature due to the anticipated adoption of major international policy decisions, including a new agreement to protect biodiversity in the high seas, commercial mining regulations for exploitation in the international seabed area, and a new global biodiversity framework. In order to create a momentum for the adoption (and implementation) of ambitious global biodiversity targets at the UN Biodiversity Conference, not only meetings under the Convention on Biological Diversity are key, but also the outcome of other meetings. These include the upcoming Conference of the Parties to the Convention on Migratory Species, the World Biodiversity Forum in Davos, the Global Symposium on Soil Biodiversity, the UN Ocean Conference, the UN General Assembly's Biodiversity Leaders' Summit, and the IUCN World Conservation Congress.

At the IUCN World Conservation Congress a global standard for nature-based solutions will be launched. The concept came under the spotlight with the 2019 Nature-Based Solutions for Climate Manifesto and the declaration of the UN Decade on Ecosystem Restoration 2021-2030, the strategy of which will be finalised in 2020. The need for a better alignment of the climate, biodiversity and land agendas with a sharpened focus on land restoration and nature-based solutions was also a key message from the 2019 Conference of the Parties to the UN Convention to Combat Desertification, which also established an intergovernmental working group to address drought.

For the oceans, accepted IUCN motions for the upcoming IUCN World Conservation Congress ask the international community to pursue a global agreement to combat marine plastic pollution; to protect the deep-ocean ecosystems and biodiversity through a moratorium on seabed mining unless or until specific environmental safeguards have been agreed upon; and urge state members of IUCN to take initiatives to ensure the effective protection of the oceans through a change in the current legislation on ocean pollution from ships. New sulphur regulations under the International Maritime Organisation just came into force in 2020, and at this year's conference of the organisation cutting greenhouse gas emissions from shipping will be high on the agenda.

Finally, in 2020, parties to the Paris Agreement on climate change will communicate their plans for climate action in time for the Glasgow Climate Change Conference in November. Expectations for this Conference to raise ambition in addressing the climate crisis are high, partly due to the lack of agreement on a number of key issues at the 2019 UN Climate Change Conference, but also with regard to progress on nature-based solutions.

Protecting the environment in conflict situations and in outer space

In July 2019, the International Law Commission adopted a set of draft principles aimed at protecting the environment before, during and after armed conflicts. The adoption of the principles is expected to take place in 2021 following consideration of comments and observations from governments, international organisations and others, received by the end of 2020.

Furthermore, the United Nations' Committee on Peaceful Uses of Outer Space adopted guidelines for the long-term sustainability of outer space activities, including policy and regulatory frameworks for space activities.

EUROPE

Following the European Elections in May 2019 the EU institutions are seeking to set out a new forward-looking agenda for the EU, agree on a new budget (2021–2027 Multiannual Financial Framework) by the end of 2020, whilst at the same time trying to navigate the political and financial implications of the UK leaving the block.

European Green Deal

Ursula Von der Leyen, President of the European Commission, has set out an ambitious environmental agenda. Her European Green Deal defines the key political objectives of the new Commission for the next five years. Executive Vice-President Frans Timmermans has been tasked with leading the Commission's work on the European Green Deal and is the Climate Action Commissioner, he has also been put in charge of both the environment and agriculture portfolios. It remains to see whether this can bring some coherence to the EU's policymaking in these areas.

Brexit

The UK left the EU at the end of January 2020 and the transition period has begun: unless extended this will conclude at the end of 2020, with or without a new deal. The EU has appointed Michel Barnier, who was formally the EU's chief negotiator for the UK's exit under Article 50, to oversee the next phase. He is now in charge of the 'Task Force for

Relations with the United Kingdom'. Environmental standards are expected to be an important strand of the negotiations, closely related to other key trade issues, such as tariffs and market access, but this is not inevitable and risks remain for both the UK and EU environment.

Common Agriculture Policy

The European Parliament failed to agree a position on the reform of the Common Agriculture Policy before the European elections and work has resumed on the three files. In early 2019 the Environment committee voted though an environmentally ambitious opinion on the 'CAP Strategic Plans' file, in contrast the Agriculture Committee agreed on a position which sought to weaken the environmental elements. The two committees are engaged in fresh negotiations to try to reach compromise position before a final vote in Plenary in June 2020.

Farm to Fork Strategy

The 'Farm to Fork' Strategy, to be published in the spring, aims to prepare a roadmap towards a more environmentally friendly food system. It reflects a dramatic shift in framing of agriculture and food policy in response to several reports on the impact of the food and agriculture system on climate and biodiversity which highlighted that the EU is not on track.

EU Forest Strategy

Building on the 2030 biodiversity strategy, the Commission plans to prepare by the end of 2020 a new EU forest strategy covering the whole forest cycle and promoting the many services that forests provide.

European Climate Law

In March 2020, the EU plans to propose a European Climate Law, which is envisaged to enshrine the 2050 climate-neutrality target into law.

EU Biodiversity Strategy and the UN Convention on Biological Diversity

In March 2020, the EU will set out its new Biodiversity Strategy and simultaneously it will work on agreeing an EU position towards an ambitious new global framework to protect biodiversity at the UN Conference of the Parties to the Convention on Biological Diversity in Kunming, China. Discussions are underway on the development of an 8th Environmental Action Programme to be proposed in 2020.

UNITED KINGDOM

Chemicals

Uncertainty hangs over the future of the UK's chemical regulations, pending the delivery of the long-awaited Chemicals Strategy, which was significantly delayed due to Brexit preparations and uncertainty. A call for evidence is expected this spring, with a formal consultation expected towards the end of the year. Little is currently known about the Government's intentions, but stakeholders have suggested it should extend beyond the current EU Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regulations to cover pesticides and biocides, and possibly polymers and medicines too.

Energy and climate

In November this year, Glasgow will hold what is likely to be a defining UN Climate Change Conference, as world leaders thrash out plans for bringing the Paris Agreement into full effect. As the host country, there will be increasing pressure on the UK to get its house in order and start closing the gap between its net-zero ambitions and current emissions.

Following Brexit, the UK will also need to re-establish its relationship with the EU Emissions Trading System (EU ETS). Following a consultation last year, a linked UK and EU ETS remains the preferred option for a carbon trading market post-Brexit. However, in the event of no EU deal, it would introduce a carbon price of £16 per tonne for sectors that require allowances, with the exception of the aviation industry.

Fisheries Bill

The Fisheries Bill 2017-19 provision about policy objectives in relation to fisheries, fishing and aquaculture, including access to British fisheries, failed to complete its passage through Parliament and fell at prorogation. The Fisheries Bill 2019-20 was announced in the Queen's Speech on 19 December 2019, and no date has yet been set for the second reading.

There is considerable concern in the environment movement that negotiations to secure necessary trading partnerships for the UK following exit from the EU on 31 January, will trump the significant Government ambition for environmental improvements.

ENGLAND

Environment Bill

The Environment Bill 2019, published on 15 October 2019, sits alongside the Government's longer-term objectives for "this to be the first generation to leave the environment in a better state that that which we inherited". Many of the provisions in the Bill are in line with *A Green Future: Our 25-year plan to improve the environment*. The first part of the Bill provides measures to address environmental governance gaps following withdrawal from the EU on 31 January 2020. We trailed various aspects of this landmark Bill in last year's summary. It is likely that the following will be contained in the Bill:

- A new legal mechanism called an 'environmental review' will enable the Office for Environmental Protection (OEP) to take enforcement action against public authorities
- The OEP will also be able to take action against the government if it fails to meet its legally binding climate change targets
- There is a requirement for legally binding targets on air, water quality, biodiversity and waste efficiency
- The list of environmental principles is trimmed to five
- Biodiversity net gain will apply to all developments in England that require Environmental Impact Assessment (EIA) and must be maintained for 30 years: exempt are national Infrastructure projects, and irreplaceable habitats
- Conservation covenants will be introduced
- Local nature recovery strategies will be a duty on Local Authorities to support government's ambition for a Nature Recovery Network
- The NERC Act 2006 is strengthened so that all public bodies must now have regard to the conservation and enhancement of biodiversity
- The conservation of water resources will include the requirement for water resource management plans to be statutory, and by powers to allow the Environment Agency to vary or revoke abstraction licences without the need to compensate
- There will be provision for making regulations that introduce charges for single-use plastics
- Powers will be introduced to make producers responsible for 100% of packaging waste

Agriculture Bill

The Agriculture Bill 2019-20 was announced in the Queen's Speech on 19 December 2019, and introduced to Parliament on 16 January 2020. The principle of public money for public goods drives the provisions of the new Bill. It retains plans for a new Environmental Land Management scheme which emphasizes the importance of protecting soils, as a new public good. Provisions in the Bill are expected to contribute to the government's commitment to reach 'net zero' by 2050.

SCOTLAND

In Scotland, 2020 will be characterised by debates and action centred on two issues: the UN COP 26 in Glasgow (November) on tackling climate change (with significant earlier inputs to the Convention on Biological Diversity [CBD] COP 15 in Kunming), and the proposed second Scottish Independence Referendum ('#indyref2') in part triggered by EU Exit, on which we offer no comment.

2019-2020 Programme for Government

Protecting Scotland's Future: The Scottish Government's Programme for Government 2019-2020 is very much the greenest 'Programme for Government' yet. It strongly reflects the Spending Review themes of climate emergency, sustainable inclusive economic growth, wellbeing, and child poverty. There is a strong emphasis on Scotland's place in Europe and dealing with the consequences of EU exit, which is likely to influence the planned legislative programme with four environmental Bills:

- Circular Economy: measures to encourage the re-use of products and reduce waste; further action on single use products
- Continuity: to maintain alignment with EU law in devolved areas after EU Exit including a 'keeping pace' power and will replace, where necessary, powers in connection with existing EU law lost in consequence of the repeal of the European Communities Act 1972. Will also make provision to maintain the role of environmental principles and effective and proportionate environmental governance after EU exit
- Good Food Nation: continues - responsibilities on Scottish Ministers and selected public bodies to set out and enact statements of policy on food
- Rural Support: regulation-making powers for Scottish Government to amend or replace the EU Common Agricultural Policy elements of retained

EU law and provide new powers for the collection of agricultural data required to simplify and improve CAP legislation for its operation beyond 2020 and EU exit

Having adopted the UK Climate Change Committee's recommended targets in the Climate Change (Emission Reduction Targets) (Scotland) Act in autumn 2019, the Scottish Government will update its Climate Change Plan in the spring. This is expected to continue the closer alignment of climate change and nature, especially for the 'land use' and 'nature-based solutions' sectors. The nature-based solutions are likely to be a strong theme at CoP 26 in Glasgow including interest in local 'offsetting' of the conference's carbon footprint in Scotland in addition to any formal arrangements.

Towards a 'Green Bank'

The Scottish National Investment Bank will become operational in April 2020, with its primary mission to facilitate the transition to a net zero economy. An Infrastructure Investment Plan is expected, informed by advice from the Infrastructure Commission for Scotland, which took evidence on the importance of investing in nature for a net zero, resilient and nature-rich economy. The Scottish Government is also compiling a £3bn Green Investment Portfolio for projects supporting the response to the Climate Emergency.

Planning Framework and Regional Land use strategies

Consultation on the fourth National Planning Framework (NPF4) is expected in the autumn. This is likely to be very different from previous plans, with a longer time-horizon, fuller regional coverage, and improved alignment with wider programmes and strategies, including the transition to net zero. By incorporating Scottish Planning Policy, the Framework will acquire more 'teeth' as part of the statutory development plan.

The Scottish Land Commission is leading the development of Regional Land Use Strategies as part of the response to the 'Climate Emergency'.

Consultation on vision, outcomes and knowledge accounts for the Environment Strategy are expected in the spring, with the Strategy published later in the year, with a monitoring framework probably published in 2021.

Biodiversity Challenge Fund and related work

In autumn 2019 the Scottish Government announced that a 'Biodiversity Challenge Fund' would be doubled to £4m running over two years, concluding in 2020 to help meet international biodiversity commitments and address the drivers of biodiversity loss, tackle the climate emergency and including marine as a priority area for action.

A CBD 'Subnational Workshop' on cities and regions will be held early in 2020 to devise an 'Edinburgh Declaration' for consideration at the COP 15. The Scottish Government and Scottish Natural Heritage are leading a 'Biodiversity Programme Board' to channel energy and resources into concerted action to meet the Aichi targets, and to devise the impetus and action to meet the 2030 ambition.

Grouse and deer

Two Scottish Government-instigated reviews will be discussed in detail during 2020: the Grouse Moor Management Review (published on 19 December 2019) led by Professor Alan Werritty, and the Deer Working Group Review, led by the late Simon Pepper (published 5 February 2020). Both reviews may have a significant impact on the Scottish Government's policy and legislative proposals for rural Scotland.

Finally…

After 28 years of existence, Scottish Natural Heritage shall be renamed 'NatureScot' (Scotland's Nature Agency) on 1 May 2020. NatureScot will continue to prioritise restoring and enriching our biodiversity, with an ambitious programme of activity including:

- Creating vital greenspace in urban areas
- Tackling invasive non-native species
- Restoring habitats – notably peatlands and coasts
- Promoting 'environmentally friendly' farming and sustainable species management; and
- Increasing public knowledge and access to the natural world, prominently through National Nature Reserves

WALES

Protecting and enhancing Wales' natural resources and maintaining current standards in environmental protection post-Brexit is a Welsh Government priority. The 2019 consultation on *Environmental Principles and Governance in Wales Post European Union Exit* highlighted different gaps and starting positions across the UK, and referenced Wales' unique legislation, especially the Environment (Wales) Act 2016, guided by the Well-Being of Future Generations (Wales) Act 2015. It also recognised the importance of the four UK administrations working more collaboratively post-Brexit and agreed to have a common set of environmental principles.

The Welsh Government made its own Climate Emergency Declaration in April 2019, emphasizing the public-sector ambition of being carbon neutral by 2030. The Welsh Government 20-21 budget to some extent reflects the funding needed to tackle this, embedding the requirements of the Well-being of Future Generations Act and starting to demonstrate how the budget process reflects spending priorities to support people's well-being, encourages nature-based solutions, and avoids problems for future generations.

Environment (Wales) Act reports

The second *State of Natural Resources Report* will be published in late 2020. The recent interim report released by Natural Resources Wales (NRW) explains current approaches and encourages increased stakeholder collaboration. NRW will also publish seven Area Statements by Spring 2020. These "living documents" describe place-based approaches to managing Wales' natural resources, following the ecosystem approach. They will also inform, and be informed by, the local Wellbeing Assessments and Wellbeing Plans produced by the Public Services Boards.

Low Carbon Plan

The Environment Act requires greenhouse gases emissions in Wales to be reduced by at least 80% by 2050. Wales expects to reduce overall emissions from buildings and fixed infrastructure by at least 30% during 2020 against a 2010 baseline. Wales' national trajectory for this, separate from the wider UK, is described in the 2019 *Prosperity for All: A Low Carbon Wales,* which sets out Wales' approach to transition to a low carbon nation, to cut emissions and increase efficiency in a way that maximisers wider benefits for Wales, ensuring a fairer and healthier society.

Air Quality

The National Assembly for Wales' Climate Change, Environment and Rural Affairs Committee's *Inquiry into Air Quality* in Wales had a response deadline of 7 February.

The Welsh Government's consultation on the *Clean Air Plan for Wales: Healthy Air – Healthy Wales* closed on 10 March. The plan sets out policy direction and proposed actions to reduce air pollution to improve public health and the natural environment, including enhancing air quality monitoring and assessment capabilities. It also commits the Welsh Government to publish a White Paper this Assembly term on a *Clean Air Act for Wales*.

Circular economy

The Welsh Government's consultation on their *Circular Economy Strategy for Wales* closes 3 April. It proposes that Wales moves towards zero waste by 2050, encourages reuse, repair and remanufacture of products and materials, and maximises the economic and social opportunities of a more circular economy. Wales is already third in global league tables for household recycling.

Welsh National Marine Plan

The first Welsh Marine Plan was published in November 2019. It sets out the policy for the next 20 years for the sustainable use of Welsh seas.

NORTHERN IRELAND

In January 2020 the Northern Ireland Assembly agreed a deal which has restored devolved powers to the Northern Ireland Executive after a 1090 days hiatus. The Assembly collapsed as a result of a botched renewable heat incentive scheme in January 2017. The draft Deal, entitled 'New Decade New Approach' was approved by the Parties on Friday 10 January and approved by the Northern Ireland Assembly on its first sitting on Saturday the 11 January.

The Restoration of the power-sharing Executive in Northern Ireland

The New Decade New Approach deal includes a number of significant environmental commitments such as the creation of an independent Environmental Protection Agency and commitments towards creating legislation on climate change. No timetable has been set out for either of these commitments.

As outlined in the new deal Climate change will become a priority area for the new Programme for Government which will last until 2022.

The deal states that *'The Executive* ***will*** *tackle climate change head on with a strategy to address the immediate and longer term impacts of climate change* and that *The Executive* ***will*** *introduce legislation and targets for reducing carbon emissions in line with the Paris Climate Change Accord.* There is an ambition to create a new Energy Strategy will set ambitious targets and actions for a fair and just transition to a zero-carbon society. This is followed up by a statement which includes "The Executive **should** bring forward a Climate Change Act to give environmental targets a strong legal underpinning". The deal also commits to an Economic Strategy which will support clean and inclusive growth and create jobs as part of a Green New Deal. The creation of an Independent Environmental Protection Agency is sure to be a controversial element for the new Department of Agriculture Environment and Rural Affairs Minister. Northern Ireland remains the only part of the United Kingdom and Ireland not to have one established, and it shows through Northern Ireland's poor environmental governance record.

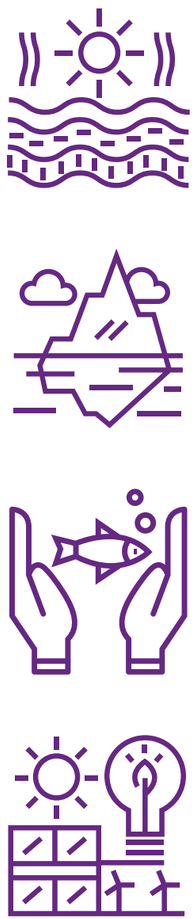
Other environmental commitments include a plan to eliminate plastic pollution and the closing down of the Renewable Heat Incentive scheme (that caused the collapse in government) and replaced with a scheme that effectively cuts carbon.

The Environment Strategy

The Department for Agriculture Environment and Rural Affairs are currently developing a long-term plan for the Environment. The Environment Strategy will seek to set ambitious targets for Northern Irelands Environment that can deliver real improvements to the quality of the environment with an additional focus of improving the health and wellbeing of people in Northern Ireland, create opportunities to develop the economy and for Northern Ireland to fully play its part in protecting the global environment for decades to come. The form of the Environment Strategy will be for the Minster to decide, but the public engagement exercise has been popular with over 1500 responses from the public to date.

Post Brexit Priorities

The Northern Ireland Executive will have to move to ensure key pieces of legislation are included within their future programme. Because agriculture and environment are devolved competencies, it is likely that legislation will come forward on Agriculture and Fisheries to replace both the European Union Common Agriculture Policy and Common Fisheries Policy. Westminster has already made moves to include Northern Ireland in any future legislation through various clauses, however it will be for the Minister to decide on whether to bring forward primary legislation through the Northern Ireland Assembly or remain included in the Westminster Agriculture and Fisheries Bill. Similarly, the Environment Bill has made provisions to extend the Office of Environmental Protection to Northern Ireland, another decision the new local Minster will have to take. The Office of Environmental Protection will be set up to provide high-level oversight of environmental issues across the United Kingdom, similarly to how the European Union Environment Commission provided scrutiny and recourse for Member States. ✺



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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.

YOUR SOCIETY

EVENTS

PALAEOSIG SCIENCE COMMUNICATION AND WRITING WORKSHOP

♦ 13-14 MAY 2020

♀ UNIVERSITY OF STIRLING, SCOTLAND

Join the Palaeoecology SIG for a 2-day workshop on science communication, with specialist facilitation and training for palaeoecologists on writing for a broad ecological audience. Writing for non-specialist audiences is an increasingly important skill for academic and non-academic careers, but there are relatively few opportunities to learn to write for wider audiences. This workshop aims to provide training and practice in writing effectively about palaeoecological research for non-specialist audiences, and produce accessible summaries of key papers representing influential and/or innovative research in palaeoecology, identified by the global palaeo-community. The workshop will focus on practical skills development to produce short, effective summaries of a selection of these papers which will be disseminated on the PalaeoSIG blog after the event. We welcome attendees from other SIGs to help improve mutual communication. Check the BES events page for registration details: https://www.britishecologicalsociety.org/event/palaeosig-science-communication-writing-workshop-2/

PLANT-SOIL-ECOSYSTEMS ANNUAL MEETING

♦ 13-15 OF MAY 2020

♀ AIX-MARSEILLE UNIVERSITY, MARSEILLE, FRANCE

The theme of this annual meeting is Aboveground-Belowground interactions. Meeting including conference, workshop and field trip. See the notice board for full details. You can now sign up via bit.ly/30I00zA

BES AQUATIC ECOLOGY GROUP & LINNEAN SOCIETY JOINT MEETING

♦ 29 MAY 2020

♀ LINNEAN SOCIETY, NEW BURLINGTON HOUSE, LONDON

https://www.britishecologicalsociety.org/event/species-ecological-processes/

Come along to this one-day joint event from BESAG, The Linnean Society and The Freshwater Biological Association, exploring links between ecology and taxonomy in the face of global change! Confirmed speakers include Florian Altermatt (University of Zurich and Eawag), Mary Power (University of California), Jose Montoya (CNRS: French National Centre for Scientific Research), Julia Reiss (Roehampton University), Markus Weitere (Helmholtz Centre of Environmental Research), and Anje-Margriet Neutel (British Antarctic Survey). If you would like to present a 5-minute lightning talk, please send a short abstract (max. 200 words) to Dr. Julia Reiss (julia.reiss@roehampton.ac.uk) by 10th April 2020.

EVENTS

MICROBIAL ECOLOGY SIG

We will be holding our annual Microbial Ecology SIG event at Manchester Metropolitan University (MMU) and the University of Salford (Manchester) in June this year.

♦ 2 JUNE (AM)

♀ PUBLISHING WORKSHOP HOSTED BY THE BES

♦ 2 (PM)-3 JUNE 2020

◗ MICROBIAL ECOLOGY SYMPOSIUM – FROM LAB TO FIELD AND BACK AGAIN

♦ 4-5 JUNE 2020

◗ WORKSHOP ON BIOINFORMATICS OF AMPLICON SEQUENCE DATA

Keep an eye out on Twitter (@BES_Microbial) for registration updates and abstract submission details!

A DATA SYNTHESIS HACKATHON FOR UNDERSTANDING RECRUITMENT AND RETENTION IN CITIZEN SCIENCE

♦ 10 JUNE 2020

♀ UNIVERSITY OF GLOUCESTERSHIRE, CHELTENHAM

There are many anecdotes about recruitment and retention in citizen science, and a few empirical studies, but this hackathon is a chance to bring together data sets on recruitment and retention from existing studies – creating the largest ever synthesis of volunteer participation in citizen science. We would love input from people who have numbers of people engaged in at least two stages within a project. (This could be the number of people reached through the media, visiting a website, registering, taking part once, taking part more than once, taking part in structured recording, leading other volunteers, and so on.) In the hackathon we will harmonise the terminology used for these different points in a project and aggregate our data to identify similarities and differences across projects. The results will be presented at the symposium the following day. We have a limited number of supported places, so please apply with details of the data you want to bring.

Full details of both events are on the Citizen Science Group webpages.

MAKING CITIZEN SCIENCE BETTER

♦ 11 JUNE 2020

♀ UNIVERSITY OF GLOUCESTERSHIRE, CHELTENHAM

◗ SYMPOSIUM AND WORKSHOP

How can we make our citizen science better? Many ecological citizen science projects are designed and run by ecologists, but what can we learn from other disciplines? This symposium, aimed for anyone interested in ecological and environmental citizen science (whether you've run, are running, or are thinking of setting up a citizen science project), will explore how we can improve recruitment and retention in our citizen science. We have speakers covering a range of disciplines - marketing, psychology, social science, values, behavioural change – so come and learn something new! We will also have workshop sessions to learn from each other. At the symposium we will also presented evidence from a hackathon the preceding day.

© ED HALL

LEEDS MUSEUM INSECT EXHIBITION

♦ 16 JULY-6 SEPTEMBER 2020

♀ BRODRICK HALL, LEEDS CITY MUSEUM

Experience insects from a new perspective in an exhibition of Leeds Museum's entomology collection. With huge images and unique animations, discover the myriad of colours and forms that inhabit the world beneath our feet. The exhibition will feature work from Ed Hall, a previous Capturing Ecology winner.

Free

BESAG ECR WORKSHOP AND ANNUAL MEETING 2020

♦ 10-11 SEPTEMBER 2020

♀ BRITISH ECOLOGICAL SOCIETY, 42 WHARF RD, HOXTON, LONDON

Save the date for our ECR workshop and Annual Meeting! Confirmed speakers to date are Melody Clark (British Antarctic Survey), Judy England (Environment Agency), Manuela Truebano (University of Plymouth), and Chris Clements (University of Bristol). Further details will be announced via the BES website and Niche notice board as well as the BESAG mailing list, Twitter, and Facebook. We hope to see you there for great science and networking! #BESAG2020 #BESaquatic

WHAT IS THE ROLE OF SCIENTISTS IN ACTIVISM?

Rachael Antwis, University of Salford and Microbial Ecology SIG
Barbara Smith, University of Coventry and Agricultural Ecology SIG
Olaf Schmidt, University College Dublin
Daphne Kerhoas, Bristol Zoological Society

A short report from the Agricultural Ecology and Microbial Ecology Special Interest Group social held at the BES Annual Meeting, Belfast, December 2019

2019 was a busy year of environmental activism. Spurred on by the actions of Greta Thunberg and many others, thousands of people gathered to voice their concerns over climate change and biodiversity loss and occupied hundreds of public spaces across the world. Our understanding of the current situation is based on the work of scientists (among others), but what is the role of scientists in activism? At the 2019 Annual Meeting, the Agricultural Ecology and Microbial Ecology SIGs held a social event to discuss just this.

Should academics and other scientists be engaged in activism, using their knowledge and voices to cast the net wider and apply pressure on policy makers to act, or should they refrain from politically motivated activities? Thirty-one SIG members took part in the debate, and attitudes to the topic were discussed in small groups. Views varied among attendees, and below we present a summary of some of these.

Activism is defined as the practice of vigorous action and campaigning for a given cause in order to achieve political goals. In order to answer the question of engagement, we could ask ourselves; 'what is a scientist?', and 'what is their essential role?' A scientist is someone who is studying or has expert knowledge of one or more of the natural, physical or social sciences. Scientists aim to discover facts and, increasingly, a major role is to communicate these facts to others. This includes communication with communities outside of science, including the general public and policy makers. Consequently, science and politics are not mutually exclusive, and as such, there is a strong argument for scientists to be involved in activism, particularly when science is being ignored at the peril of social, economic and environmental stability. Given what we know about the imminent implications of climate change, many people agreed that activism was critical for safeguarding wellbeing. Furthermore, it gave some people a sense of involvement, rather than being removed from the real issue, enabling them to feel connected with society whilst joining the political conversation as a scientist. Some people felt we need to use our voices as scientists to give a truthful, unbiased account of the state of the world, and that we shouldn't be afraid to be passionate - we can't afford to not be anymore. More than ever, it is time for action and deeds, not just words.

But where is the line? The tactics of Extinction Rebellion, for example, have relied heavily on mass-arrest, which may lead to reputational and employment issues, thus unintentionally undermining the science on which activism stands. Furthermore, some of the actions over the summer of 2019 caused considerable disruption to the general public, potentially alienating the very society we need on board to fight the climate crisis. For some at our SIG event, scientific credibility and environmental activism were not compatible activities. Members felt that activism compromised their ability to remain impartial and therefore to be trusted by both their colleagues and stakeholders.

Regardless of your viewpoint on environmental activism, the time for behaviour change is now, and that time is rapidly dwindling. Many of the SIG members are making significant changes in their professional and personal lives to reduce their environmental impact. It was agreed that the key to success, however, will rely on system change underpinned by political willpower, however that is driven.

This piece represents a very brief sketch of the discussion, we hope that SIG members will come together and write a joint piece to develop this debate.

PLANT-SOIL-ECOSYSTEMS GROUP AT THE ANNUAL MEETING

BES ANNUAL MEETING
BELFAST
DECEMBER 2019

Last year's annual meeting now seems a long time ago and we have some exciting new events to look forward to this year. However, it's great to reflect on another fantastic BES conference. The thought-provoking plenaries were fitting to many of our interests, whether thinking about different ecological scales or how best to communicate our research. It was fantastic to see soil ecology showcased in the final plenary lecture by Professor Richard Bardgett and journey through the last 30 years of soil ecological research demonstrates how far the field has developed. This is particularly fitting as plant and soil research was very well represented at BES and it was inspiring to see so many talks on soil ecology and plant soil interactions in sessions organised every day of the conference. Some of our highlights included Dr François-Xavier Joly's research involving an arthropods poo factory to study the roles of detritivores in litter fragmentation, Dr Joana Bergmann's explanation of the importance of root hairs for the belowground economy and Dr Jane Lucas' journey into how antibiotics in agriculture can disrupt the soil microbiome. We all left the meeting feeling tired, but inspired at the wealth of exciting research being conducted in our fields. Thanks for everyone who worked hard making the annual meeting the inclusive, positive and welcoming conference it always is.

The Plants-Soils-Ecosystems and Peatlands SIGs both want to thank everyone for coming along to our joint social event during the annual meeting. It was an enormous success with around 100 ecologists making their way into the oldest surviving building in Belfast for an evening including live music and great company. It was great to meet so many enthusiastic ecologists across all career stages and chat all things plants and peat-y! We will, of course, be organising another social event at this year's conference – so make sure to keep in touch and come along!

FOREST ECOLOGY GROUP

The Forest Ecology SIG is looking for some enthusiastic new committee members to help run events and communicate great science to our membership, with Deputy Secretary, Treasurer and a Blog Officer roles all up for grabs. The Deputy Secretary will focus on helping the current committee develop and run exciting workshops, conferences and other events for the SIG community, and will preferably be based in the UK. The Treasurer role will help with managing the SIGs event budgets and all things financial! This isn't a big job, so we'd love for you to help develop ideas of what you think people might want from our SIG or collaborative events with other SIGs. This role would also be preferably based in the UK. Finally, we want to engage more with our membership. Our communication channels are the main point of contact between the Committee and our SIG community, making the Blog Officer role perfectly suited to anyone with a passion for communicating exciting science, opportunities and group activities to the wider community. We want bigger, better and more exciting content, so the Blog Officer role will oversee our blog and help to generate new and interesting material to put up on our website.

Interested? We'd love to hear from you! Please get in touch with Tom at thomas.ovenden@stir.ac.uk or via Twitter, @BESForest.

AQUATIC ECOLOGY GROUP

The BESAG is an active network of aquatic ecologists whose interests overlap with several other SIGs and we are keen to develop cross-disciplinary activities. BESAG is growing – we now have more than 3500 followers on Twitter! For the latest news, future meetings, and job advertisements you can follow us on Twitter (@BES_AquaEco, #thursdayjobday, #BESaquatic), Facebook (BES – Aquatic Ecology Group), and you can join our mailing list by emailing v.r.edmonds-brown@herts.ac.uk. You can also find us on the BES website in 'Membership & Community' > 'Special Interest Group'.

PLANT ENVIRONMENTAL PHYSIOLOGY GROUP

Annual PSE meeting: Aboveground and Belowground Interactions Conference. 13–15 May 2020. Marseille, France.

This symposium will focus on the interactions between plant communities and soil organisms (microorganisms or arthropods) as well as their role in the functioning of ecosystems. We will have two days of conference with sessions under four main themes: litter decomposition, plant-soil-feedbacks, Mycorrhiza and roots. Confirmed keynote speakers are Stephan Hättenschwiler (CEFE, Montpellier, France), Ciska Veen (NIOO, Wageningen, Netherland) and Tom Parker (University of Stirling, UK). Each session will finish with a workshop-like discussion to explore current ideas and areas for further research in each topic. Oral and poster presentations are invited. An excursion to the experimental site O_3HP (https://o3hp.obs-hp.fr/index.php/en/) is organised for the 15th. You will be able to walk around and find out about a long-term experimental site reducing precipitation in the summer months with a dynamic roof above a mature Downy oak forest. You can now sign up via https://bit.ly/30lO0zA See you in Marseille!

JOIN US!

Sign up for our email list by sending an email to listserv@jiscmail.ac.uk with the subject: BLANK and message: SUBSCRIBE PLANT-SOIL-ECO First name Last name. Don't forget to follow us on Twitter for the latest news and updates @BESPlantSoilEco or find us on Facebook by searching: BESPlantsSoilsEcosystems.

TEACHING AND LEARNING GROUP

We are running three workshops this year. A call for abstracts will be out soon!

- Plant Blindness, 9 June 2020, University of Leeds
- Connecting children and teenagers with local nature, 22-23 June 2020, Royal Holloway
- Enhancing Fieldwork Learning Showcase 10th Anniversary! 8-9 September 2020, Open University, Milton Keynes

CHARTERED INSTITUTE OF ECOLOGY AND ENVIRONMENTAL MANAGEMENT

BURSARY AWARD WINNERS

We are delighted to have awarded our CIEEM Bursary Awards to two excellent candidates. We had 24 applicants for the bursaries and only wish we had more money available to share. **Leah Farquharson** and **Amy Basford** have been awarded the coveted £2000 bursaries and we hope that the funding will be a very positive boost to establishing their careers.

Leah graduated from the University of Edinburgh in 2014 with a BSc in Conservation and Ecological Management (Hons). Since that time, she applied herself through volunteer and working experience in both UK and tropical ecology. Leah has primarily worked in the engagement and education side of conservation in the last few years but is now trying to make the move to a practical, land-based employment role.

To achieve this, Leah is doing a self-funded MSc in Environmental Protection (Conservation) at the University of Stirling whilst continuing to build on her volunteering experience. She intends to use the bursary to fund additional training courses including the Tropical Plant Identification course at Kew Gardens and environmental consultancy-related training.

Amy is a recent graduate from the University of Swansea, having achieved a first-class honours degree in Zoology. She is now undertaking an MSc in Environmental Biology: Conservation and Resource Management at Swansea. In addition to her studies she has been a volunteer for the Birmingham and Black Country Wildlife Trust and is also a member of the Birmingham and Black Country Bat Group.

Like Leah, Amy is planning to use her bursary to undertake further training to complement her postgraduate studies. These courses are likely to cover survey and identification of a range of protected species and habitats. Bats are, of course, a particular passion and Amy intends to buy her own bat detector as well as learning how to handle bats with a view to becoming a voluntary bat carer.

We wish Leah and Amy well with their plans.

ACTION 2030 GROUP

We have now set up a task and finish group to coordinate our organisational approach to practical action in relation to the Climate Emergency and Biodiversity Crisis. The Action 2030 Group, chaired by Past-President John Box, is tasked with identifying how CIEEM can reduce its own environmental impact (including achieving a net zero carbon impact by (or before) 2030) as well as how we can support our 6000 members to press for sustainable solutions through their work and businesses.

We are still keen to collaborate with partners and would be delighted to hear from BES members with ideas and suggestions that we could help take forward.

AIR QUALITY IMPACT ASSESSMENT ON DESIGNATED SITES

Following our very successful Spring Conference on managing and mitigating air quality impacts on biodiversity, CIEEM has now published an advisory document on the ecological aspects of assessing and mitigating air quality impacts on designated sites.

This is a very important area of professional practice that has been heavily influenced (pre-Brexit at least) by recent European Courts of Justice rulings on how such impacts should be assessed as part of infrastructure development projects. We hope that the advice will help practitioners better understand the factors that need to be considered. The document can be downloaded from our website at www.cieem.net.

Sally Hayns CEcol MCIEEM, Chief Executive Officer
01962 868626 | enquiries@cieem.net
cieem.net

GROWING THE NATION'S NETWORK OF LONG-TERM ECOLOGICAL EXPERIMENTS

The turn of a new year and a new decade is a good time for taking stock. The ECT is embarking upon its twelfth year of operations and our national register of currently active long-term ecological field experiments (LTEs) now stands at 30 across 27 different sites. Over the past 18 months, we have added five "new" LTEs to the register. Given the unique national resource these LTEs represent as *research platforms* for the whole community to come and use, further detail on these recent additions seems in order, along with reflection on the likely sources of the next LTE registrations.

The five "new" LTEs are: Peatland-ES-UK, Ainsdale Dune Slacks, BIFoR-FACE (Birmingham Institute of Forest Research's Free-Air Carbon Enrichment facility), the North Wyke Rowden Plots and the North Wyke Farm Platform. The youngest of these is the BIFoR-FACE experiment at Norbury in Staffordshire, started in 2017 with funding projected to 2026, whilst the award for longevity amongst these five LTEs goes to the Ainsdale Dune Slacks grazing experiment on the West Lancashire coast – established in 1974, the Sally Edmondson Plots as they are also known represent the longest-running dune slack wetland grazing experiment in the UK.

ECT's national sites network covers a wide range of habitats and experimental approaches, and these five LTEs manifest that diversity. Peatland-ES-UK is a heather cutting and burning experiment on three upland blanket bog sites in North Yorkshire and Lancashire, whose impacts will include a better understanding of carbon cycling in relation to climate change; Ainsdale Dune Slacks is a sheep and rabbit grazing experiment on dunes of national conservation importance, whose impacts lie in improving conservation management practice; BIFoR-FACE is an awe-inspiring carbon dioxide enrichment experiment in mature oak woodland in Staffordshire, the impacts of which will be a step-change in our understanding of how temperate forests (and their pests and diseases) react to the inevitable future increases in atmospheric CO_2; the North Wyke Rowden Plots in Devon are looking at the effects of varying livestock grazing regimes on grassland inputs and yields, and whose impacts will be realised in building grasslands' resilience to future environmental change; and finally, the North Wyke Farm Platform is a further agroecological study investigating the complete soil-to-plant transfer of nutrients under different livestock

grazing systems and planting, with the aim of improving the environmental sustainability of lowland grassland livestock farming. You can read more about all these LTEs on our website: https://www.ecologicalcontinuitytrust.org/sites.

ECT is a UK-wide charity, but with LTEs (so far) only registered in England, Scotland and Wales. At the BES2019 conference in Belfast, we initiated conversations with ecologists based in Northern Ireland aimed at plugging the obvious gap in our geographic coverage. We are optimistic that the next LTEs to be registered in 2020 will come from Northern Ireland – watch this space!

With new LTE registrations very much in mind, please get in touch with us if you are associated with an LTE that meets the criteria published on our website. There are several benefits to joining ECT's national network.

SUPPORT THE ECOLOGICAL CONTINUITY TRUST!

If you would like to see ECT's network and influence grow further, please consider supporting us via our online donations platform: https://www.ecologicalcontinuitytrust.org/donate. Thank you.

Ben Sykes Executive Director, ECT
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ecologicalcontinuitytrust.org

MEMBER STORIES

MAGGIE HILL

Over 50 years with the BES!

#Saltmarsh #Wales #Landscape

I joined the BES because the Annual Meeting was in Liverpool where I was a postgraduate. I started by doing botany at Oxford, then a PhD on saltmarshes, so I love mud and estuaries. I worked on ecological impact assessments, dealing with anything that could be built on the coast. Then I led the marine team at Countryside Council for Wales (now Natural Resources Wales), becoming one of its directors.

What inspires me most about ecology is… understanding how habitats today reflect past events and using information about sites to influence decisions on their future. The first book to inspire me was *The Unofficial Countryside* by Richard Mabey – helping me find wildness in unexpected places.

The most significant experience of my career is… working with people from other disciplines who see things through different eyes. It was a revelation to go with them to places I thought I knew well! Now I volunteer – for RSPB, CIEEM, BES as a mentor, and organise walks and site visits – giving me a different perspective on our profession.

I would tell my younger self… when you go somewhere for a meeting or conference try to find time to visit sites nearby. Work and family pressures make it hard, but I realise I missed some fascinating places which is annoying.

My favourite organism is… thrift *Armeria maritima* because it is found in my favourite habitats – saltmarshes, cliffs and sand dunes. But it's hard to beat flocks of dunlin on the tideline against wide open skies of an estuary.

CAMILLA BERTOLINI

@CamiBe90

#BenthicEcologist
#MultipleStressors #CoastalZones

I have always been an ecologist in a way, for example for my bachelor I decided to take the 'coastal ecology' addition to marine biology at Plymouth university. There I was inspired by all my professors on all sort of ecology aspects, from behaviour to population and community ecology. I then started a PhD in Belfast, under Nessa O'Connor and she was involved in the Aquatic Ecology SIG and introduced me to the BES. I have been a member since, with no regrets. I love being part of this community

The most significant experience in my career… that difficult 'reviewer 2' on my first PhD paper…

My favourite organism is… I somehow became 'mussel girl ', and I am a real believer that #musselarecool (check the hashtag if you are on social media, there is a whole mussel fan world out there). Why? They move around to form self-organised patterns on the seabed, resulting in complex 3D reefs which host a high biodiversity. Not only that, but they seem to be able as larvae to select suitable/safe habitats to become adults in. They are also considered a sustainable food source and contribute to nutrient cycling. They do a lot for something so small!

Outside of ecology… I am a blogger at holisticfish.weebly.com and try to be a sustainability influencer, being an active citizen and also, I can be found rowing in the lagoon or running in some trails... an active life!

ROLAND RANDALL

Over 50 years with the BES!

#CoastalPlantEcology #Conservation
#FarmlandEcology

I came from a rural/farming background. Undergraduate degree in geography at Cambridge, Masters in biogeography at McGill with thesis on coastal vegetation of Barbados, and a PhD in coastal plant ecology at Cambridge. I taught at the University of Ulster and then went back to Cambridge until retirement. I joined the BES to keep abreast of subject and attend meetings.

What inspires me most about ecology is… the beauty of nature and its significance in human wellbeing. Research in maintaining species diversity and understanding reasons for species distribution both as a result of human interference/cessation and of natural changes. Seeing the role of historical one-off events in the micro-distribution of plant species

I would tell my younger self… to experience as many habitats as possible. Do what interests you and not what others think is in your best interests. Work with other like-minded scientists and learn from their experience whenever you can. Listen to what advice others give you but do not be afraid to do whatever you think is right.

My favourite organism is… dwarf pansy (*Viola kitaibeliana*) because it is so small and beautiful, has an intriguing distribution and specific ecological requirements and such a dynamic population pattern – the ideal teaching species!

Outside of ecology… I enjoy working with my family on the small farm where we live, visiting National Trust properties with my wife and looking after an historic orchard at my College.

SERAINA CAPPELLI

@SerainaCappelli

#PlantPathogens
#GrasslandDiversity
#SpeciesInteractions

I studied environmental sciences, because of the diversity of topics covered in the study program. I got hooked on ecology and ended up doing a PhD about the ecological role of pathogens in grasslands. My supervisor and peers (luckily) encouraged me to join the BES and attend the annual meetings.

What inspires me most about ecology is… nature often tells better stories than a writer can come up with. There are so many intriguing interactions between species.

The most significant experience of my career has been… I'm writing this one day after my successful defense. This was definitely a significant day, but what made it so great were the people who accompanied and supported me on the way there. Without an amazing supervisor (Eric Allan) and amazing peers this would not have been possible.

I would tell my younger self… don't be afraid of R, statistics or senior scientists. They are all actually really cool.

My favourite organism… changes almost daily. Currently it is the shaggy ink cap (*Coprinus comatus*), because it is a fungus preying on nematodes. How cool is that?

Outside of ecology… I am an olive farmer and a hobby politician for the Swiss Young Green Party.

CONNECTING PEOPLE WITH NATURE

Do we want to connect emotionally or cognitively?

Marcus Grace
Professor of Science Education, University of Southampton

A few years ago, I wouldn't have even asked this question. Surely the answer is obvious: we should be connecting with the natural world both emotionally and cognitively – with both our hearts and our minds.

In recent times, thanks to popular authors such as Richard Louv and his concept of 'nature deficit disorder', there has been a growing belief in the importance of immersing ourselves in nature. This is often derived from the argument that a disconnect with nature can be detrimental to our health and wellbeing, and this in turn compromises our ability to face up to the challenges of global sustainability. There is now firm evidence that getting out into nature can have a positive effect on our physical and mental wellbeing, and there have never been so many recommended ways to do this - jogging, cycling, yoga, mindfulness, tai chi, forest-bathing, outdoor therapy, to name just a few. I wouldn't criticise any of these – indeed, I have found some of them very helpful myself - but they are all very much 'emotional' approaches, encouraging participants to experience nature without necessarily 'learning' about it.

As a science educator, I have often borrowed teaching ideas from well-regarded environmental educators such as Steve van Matre and Joseph Cornell who encourage their students to love and respect the natural world while at the same time developing an understanding of how ecosystems work. Over the years, papers in science journals have often called for a more socially-oriented approach to science, given that scientific research can never really be entirely value-free and is commissioned and implemented by humans, all with their own vested interests. We have become familiar with these arguments, whether or not we agree with them.

However, the scientific community is perhaps less aware of the flip side of the coin. There has been a recent spate of papers in academic and professional journals – principally in the field of environmental psychology and social science, which have reinstated the emotive-cognitive dichotomy, and promoted the exclusive importance of emotional aspects over cognitive aspects when considering how people can and should connect with nature.

Science academics may be frustrated by such publications, but what turns the frustration into alarm and dismay is the recent proliferation of blogs, tweets and conference presentations, which disregard the evidence, and promulgate a clear backlash against the importance of science and scientific knowledge. A number of high-profile and influential representatives from large environmental bodies, have lately made clear distinctions between emotional and knowledge-based connection with nature, going as far as recommending that scientific knowledge and factual information should not be a part of this connectedness. These are the organisations we turn to for answers in these disturbing times of climate change and increasing loss of biodiversity, so people listen to them. It is certainly not appropriate here, nor is it my intention, to launch an attack on individuals or their organisations, but it is useful to explore reasons why their exclusively emotional connection stance seems to be becoming increasingly prevalent.

There are now a number of well-established and widely used scales for measuring engagement and connectedness with nature. A quick online search will reveal scales such as the 'Connectedness to Nature Scale', the 'Engagement with Beauty Scale', and recently Natural England have adopted the 'Nature Connection Index'. These scales tend to be based on feelings and emotional responses to nature, but interestingly, if you drill down into their origins, we find that they often draw on Stephen Kellert's nine dimensions of the biophilia (i.e. the ways that we engage with nature). One of his nine dimensions is the 'ecologistic-scientific', which encompasses the scientific study of nature and increasing knowledge, so it seems peculiar that the scales don't reflect this.

The designers of the 'Nature Connection Index' make it clear that they have not included cognitive aspects of nature connection because emotional elements are more important in relationships between nature connection and wellbeing. And this highlights a key point: nature connection is primarily about people's health and wellbeing, so why would they want to include anything about cognition? I would argue that the heart and the mind are inseparable, at the very least because humans get emotional satisfaction from learning things! When we experience the delight of seeing a flock of geese returning to their winter-feeding grounds, wouldn't that thrill be further enhanced by knowing what kind of geese they are and something about their ecology, so we can better imagine the various highlights and challenges they encountered on their arduous journey? While we're hugging a tree (as I frequently do), wouldn't we get even more emotional satisfaction, and feel even more connected to nature, if we knew what kind of tree it was, how old it might be, and its place and significance within the woodland ecosystem? Some might derive pleasure from knowing that squirrels nest in its canopy, others from knowing that tardigrades live among the epiphytic mosses on its trunk.

So why and how do we find ourselves in this situation of separating knowledge and emotion?

Well, I suggest two main reasons for this.

The first is a deep-seated philosophical reason. As educated human beings, we tend to fall into two camps relating to how we view, understand and analyse the world around us – positivists and interpretivists. Whereas scientists take a positivist, quantitative approach to analysing human behaviour and society using reason and logic, interpretivists use non-scientific, qualitative methods on the basis that we can only properly understand the world through our subjective experiences.

These positivist–interpretivist differences between people are difficult to resolve, but a first step in the process must be at least to recognise each other's perspectives.

The second reason is, I believe, less intractable, and centres round the way we learn about science and nature - and I feel I and my colleagues in the science education profession are partly to blame for this. We have not communicated strongly enough the message that due to research evidence from around the world, the recommended way we teach science has moved on dramatically over the last twenty years. It is certainly true that the 'old' ways of teaching facts about nature can be off-putting, and sadly, we can find plenty of examples of people recounting their negative experiences of failing to connect with nature as a result of traditional fact-based methods. Of course, we now know that learning is an active process, and by using appropriate pedagogical approaches, knowledge-based aspects can be as engaging and motivating as the emotional aspects.

Immediate and straightforward examples of teaching techniques in this toolbox of blended approaches might be: i) ensure we know something about our audience's background so we can pitch the discussion appropriately; ii) place factual knowledge into a context which is relevant and meaningful to the learners' everyday lives; iii) rather than simply telling people facts about nature, arouse their curiosity by asking questions such as: *Do you know what this is? How did these things come to be here? Why does this holly tree have berries and this one doesn't?*; iv) draw on evidence-based information, anecdotal evidence and fiction – but make it clear which is which!; v) encourage participants to adopt a detective-like approach and explore nature using all their senses. The list goes on.

It's time to blend the together the emotional and cognitive aspects of nature to provide a more fully rounded and satisfying experience, so we can connect with nature in a more enjoyable and informed way. It's no coincidence that hugely popular TV programmes such as Bake Off present a blend of fun, emotion and learning – people want to learn at least something about the ingredients and techniques involved in making the cake. And given the power of Sir David Attenborough's documentaries to move public opinion, it is clear that knowledge plays a role alongside emotion in establishing nature connection and engagement. ✺

JULIA MIGNÉ

Outreach Coordinator for
Conservation Optimism
University of Oxford

Describe a typical day in your role.

My days are usually quite different from one another so it is hard to describe what a typical day might look like. I constantly have a pile of post-it notes on my desk that I use as a to-do list so the first thing I do when I arrive in the morning is usually to assess what tasks are the most urgent. Then I make sure to check all the social media channels I am in charge of and to do all the necessary retweets/shares. Conservation Optimism is a community so making sure to have those updated is extremely important.

If I am organising an event such as the Conservation Optimism Summit, for example, I will then alternate between lots of different tasks during the day. Updating the website, designing posters, coordinating catering, making sure presenters have all the information they need, buying people's plane tickets and making sure they have what they need to apply for visas are all tasks that I might be juggling with.

What do you love most about your job?

Each day is different! I love the fact that my job allows me to develop a range of skills. Recently I had to be trained on how to live stream sessions for the summit and it was great to get the opportunity to learn more about a different piece of equipment and software. I also love the fact that it allows me to meet many incredible conservationists from all over the globe!

Why is your job important? Will its importance change in the future?

This job allows conservationists across the planet to share their success stories and to get a dose of optimism whenever they need it. Science communications and outreach is all about bridging the gap between different audiences and with all the challenges we currently face in terms of biodiversity and climate breakdown it is extremely important to be able to convey those messages in a nuanced way. I am pretty confident that science communication jobs will become more and more important in the future.

How would you describe your work-life balance? Does your role offer any benefits when it comes to this balance? Does it present any challenges and, if so, how do you overcome these?

Work-life balance when organising conferences can be tricky. There is a huge amount of work that needs to be done in the background during the weeks before an event and it can be difficult to manage to properly switch off during those times. However, I find that forcing myself to log off emails for at least one day a week help regain a certain balance. Delegating certain tasks to other people when I can is also a great way to reduce the burden it might have on my workload. Doing some kind of exercises as well during those peaks time can make a big difference in my mood and energy levels, even if it's just a few minutes of yoga a day!

What skills and qualifications are needed to do your job? Do you have advice on how to obtain these?

Having a degree in both ecology and journalism helps a lot with my job. It allows me to have the science background needed to understand some of the big conservation issues but also the communication and writing skills needed to then bring those issues to different audiences. Those skills can be developed through degrees or specific training but they can also be grown through personal projects like blogging, filmmaking or creating a podcast.

What career pathway have you followed to get to where you are now?

I started with a BSc in zoology and then moved on to an Erasmus Mundus MSc in applied ecology, which allowed me to study in four different countries over two years. During that time, I was working on a thesis on the abundance and distribution of sea turtles in South Brazil and while I was enjoying researching that specific topic, I started realising that I would rather be talking about other people's research than being the one doing the research. With some encouragement from one of my professors, I decided to apply for an MA in International Journalism and got into Cardiff University.

While doing my degree there I focused on covering environmental issues and did my master thesis on a conversation-related topic. During that year, I also had the opportunity to do a work placement at BBC Wildlife Magazine and started pitching my conservation stories to various media outlets.

After my degree, I teamed up with a few of my fellow graduates and we decided to start our own project while applying for jobs. After months of hard work, we launched INKLINE, an international media platform that features positive news, interviews with go-getters championing sociocultural causes, stories of people living their purposes and chasing passions amid adversities.

This side project has since been a great way to display my communication skills and has definitely helped me get my first job as the Science & Conservation Communications Officer at Chester Zoo and then my current job as the Outreach Coordinator for Conservation Optimism.

What is your one top tip for someone that would like to achieve a similar career?

Build up a portfolio to display your skills! Be it a podcast, a website or a well-curated social media account, it is a great way to prove that you know how to identify an audience and that you are capable of engaging with that audience. ✺

ARE OUR CONFERENCE INITIATIVES WORKING?

We've written before about LGBT+ initiatives at the BES Annual Meeting. But are they reaching the right people? Are they raising awareness outside the LGBT+ community? We chat to some delegates: Vishwadeep is an LGBT+ PhD student in India, who attended the BES AM for the first time last year. Dani is an Early Career Researcher in the UK, a BES regular who's not yet managed to attend the mixer. Helen is a Professor in the UK, also a BES regular but not a member of the LGBT+ community.

Thank you all for agreeing to give your perspectives! I'll start simple: did you enjoy the annual meeting?

Dani: I always really enjoy the BES Annual Meetings!

Helen: Yes, a wonderful celebration of global ecology.

Vishwadeep: I personally did not at all feel I was attending for the first time. People were so friendly!

Exactly what we like to hear! Any highlights?

H: I was delighted by the focus on people and nature.

V: It was amazing to meet people from LGBT+ community working with all their passion and without any fear of their identities.

That brings us nicely onto my next question. We want the annual meeting to be a safe space for LGBT+ members. We run initiatives and events promoting LGBT+ inclusivity and awareness. Did you notice any?

H: I noticed in the programme that there were events during the week, and I am delighted to see the emphasis on inclusivity.

D: Yes - the LGBTQ+ mixer and the pronouns section of the badges. Also, the past couple of years there have been gender neutral bathrooms available.

V: Gender neutral washrooms was indeed great stuff. The one that grabbed my attention was the LGBT+ mixer where we could hangout together and meet people.

I understand, Vishwadeep, that it was your first time at the LGBT+ mixer.

V: It was my first time and certainly not the last.

Dani, is there anything we can do to persuade you to next year's mixer?

D: I'm usually just tied up with other events - this year was a better format though, with it not clashing with the other SIG socials!

Helen, were you aware of the mixer?

H: I am aware of the mixer but didn't know anyone attending – I'm sure it was fun!

The mixer wasn't our only colourful event… did any of you happen to catch our resident raucous drag queen Polly Nation at the Science Slam?

D: I've had that privilege two years in a row; nothing quite says BES science slam like a hilarious drag act themed around bee mating habits. What an absolute hero.

H: I saw her this year and last year. Great talent and incredibly entertaining (and informative).

Did any events and initiatives benefit you, either directly or by raising your awareness of LGBT+ conferencing issues?

V: I'm from India, where gay sex has been decriminalised just the last two years, so the LGBT+ mixer and the concept of inclusivity is very appealing to me.

D: Yes, and I really like the fact the organisation is really open to members' inputs on LGBTQ+ support and visibility.

How does your experience of LGBT+ inclusivity at the BES compare with other conferences you've been to? Can we be doing more?

V: Truly speaking, this is the first time I have ever been to a conference which promotes inclusivity of the LGBT+ community and this is certainly inspiring.

D: I think BES is pretty good, especially in comparison to some other big societies. One thing that I haven't noticed is discussion around LGBTQ+ issues in fieldwork.

H: I have attended the Women in Ecology breakfasts and found these incredibly uplifting. Perhaps we could have a combined event at the next BES?

Great ideas, thanks! Finally, did you get a rainbow pin badge? If not, I'll have to get you one each as thanks!

H: I did, but I'd love another because I think I lost it on the ferry!

V: I got two of them!! They're fabulous.

D: I did! Does it mean you have been to too many BES events when you have one in every colour? ✺

BRITISH ECOLOGICAL SOCIETY

LGBT+ readers, please seek out the "British Ecological Society LGBT+ group" on Facebook.

If you have any ideas or initiatives please post there, or get in contact with me (iainmstott@gmail.com). We would particularly appreciate further testimonials for the website: email me and cc Kate Harrison (kate@britishecologicalsociety.org). We're in the process of formalising the network structure, so look out for further introductions from network leaders.

britishecologicalsociety.org/membership-community/diversity

THE CLIMATE EMERGENCY AND BIODIVERSITY CRISIS

WE HAVE UNTIL 2030 TO AVOID THE WORST OF THE CLIMATE EMERGENCY

Global average temperatures are currently 1°C hotter than preindustrial levels. We have only ten years to keep below 1.5°C maximum heating. Even a further 0.5°C of heating will significantly worsen risks of drought, floods, extreme heat and poverty for millions of people (Mike Morecroft, *The Niche*, December 2018). The IPCC (2019) report says urgent and unprecedented changes are needed to reach this target, which could prevent the complete loss of corals and ease pressure on the Arctic. This requires halving global greenhouse gases emissions by 2030 and ending emissions by 2050.

In response to the statutory Committee on Climate Change (CCC) report (May 2019), the Climate Change Act 2008 was amended in June 2019, legally committing the UK government to reduce all greenhouse gas emissions to 'net-zero' by 2050. This requires about 1-2% of our GDP investment every year; yet not acting would be far more costly. The CCC considers ramping up policy significantly would facilitate meeting the carbon reduction targets and curbing carbon-expensive activities.

The CO_2 accumulating in the atmosphere since the start of the Industrial Revolution comes from burning fossil fuels that can only be banned through huge changes across the world. The improving economics and increasing capacity of renewable power demonstrate the way forward. CO_2 removal through forest planting and habitat restoration will also be needed. New jobs are in these new industries, with technological research driving down unit costs. The future of the planet lies with them.

ACCELERATING BIODIVERSITY LOSSES

Globally there is an unprecedented decline in biodiversity with over one million species at extinction risk (and the rate is increasing) without transformative changes. The five direct drivers with the largest impacts are: changes in land and sea use; direct exploitation of organisms; climate change; pollution; and invasive species. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life. The Environment Bill 2020 mandates biodiversity net gain in England meaning that development is not at the expense of vital biodiversity. But this will be nowhere near enough to reverse the devastating species and habitat losses in Britain and overseas (e.g. State of Nature Report 2019).

CLIMATE EMERGENCY AND BIODIVERSITY CRISIS ARE LINKED

We need sound advice about adaptation to and consequences of the rapidly changing climate for both people and nature; a role BES members can and do play. John Lawton's *Making Space for Nature* mantra of 'More, Bigger, Better, Joined Up' has to be implemented on a large scale. Nature-based solutions must play a key role in mitigating against and adapting to climate change. Resilient ecological habitat networks crossing landscapes connected through green and blue corridors are essential, also providing daily contact with natural environments for our physical and mental health and well-being. England is the focus, but the principles apply to different contexts and geographies. But we must all participate and promote these goals or they won't happen.

OUR CHALLENGE TO THE BES

CIEEM has set up an Action 2030 group on the climate emergency and biodiversity crisis (Sally Hayns, *The Niche*, December 2019). It needs your support. The BES is fully in support of science to underpin such actions, but we need to go further. This is our challenge to the BES:

- Declare a climate emergency and biodiversity crisis and develop an action plan reflecting the Society's operations and activities to support awareness and action amongst its members. The Landscape Institute, CIEEM and CIWEM made such declarations in 2019. These are not advocacy by prestigious institutions but a recognition of reality.
- Set a 2030 target of net-zero carbon emissions from fossil fuels in BES activities and operations. This will be very challenging in many ways. A start would be deciding to source energy supplies from green, non-nuclear sources.
- Ensure that the BES pension scheme divest from companies with fossil fuel interests. Worldwide, many institutions, cities and organisations have divested in what has become a real challenge to companies involved with fossil fuels.
- Set up a staff and member focus group to challenge the Society and its members on useful ways forward. We look forward to working with such a group which could work with CIEEM and other bodies to determine joint and effective actions.

John Box
john.box@knowlebox.co.uk

Penny Anderson
Penny.Anderson@pennyanderson.com

OUR RESPONSE

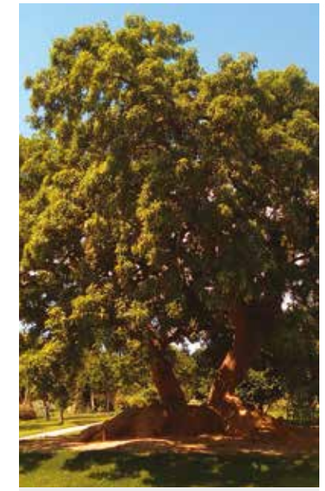
The world is facing climate and ecological crises, and all of us – governments, businesses and individuals – need to make urgent and significant changes for nature and people to thrive.

The British Ecological Society will continue to publish, fund and publicise the latest research, support our members in advancing their science and make the best evidence and expertise available to policymakers. But it is right that we are challenged to look at the carbon footprint and sustainability of our own activities.

We have already made some progress; our new offices achieved a gold standard of environmental sustainability, we have an environmental screen on our investment portfolio and we have revised our travel policy.

However, we recognise we need to do more. As part of delivering our new strategy for 2020-23, we have an objective to further reduce the environmental impact of activities across the Society and we will update members regularly on the progress we make.

Hazel Norman
Chief Executive



WORLD'S LARGEST HERB?

In the last issue was a great article about bananas and disease (*Bananas!* By Sara Middleton, December 2019). But in it was the commonly held factoid that the banana plant is the biggest herb in the world.

As an Anglo-argentine, I have always understood that the ombú tree (*Phytolacca dioica*) from the Pampas was in fact the largest herb on the planet. It certainly grows to huge proportions and has secondary thickening (as does the banana) but not true wood.

Dr John Jackson
Rtd CEO Royal Forestry Society

SEND LETTERS TO:

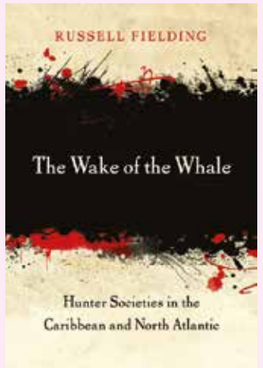
The Niche Editor, British Ecological Society
Charles Darwin House, 12 Roger Street
London, WC1N 2JU

Or email: theniche@britishecologicalsociety.org

Include a reference to the article (issue, title) you are responding to.

Letters may be edited or used in a different format in the magazine.

READ | WATCH | LISTEN | VISIT



READ

THE WAKE OF THE WHALE

Russell Fielding
Harvard University Press (2018)
£22.95

There are many emotive environmental subjects today, but the plight of whales must be close to the top of the list. The reasons for concerns are many and varied as are future prospects for whale populations. Overall, the prognosis is not good and the term 'wake' is alarmingly appropriate, especially given the decision by Japan to resume commercial whaling after a break of more than 30 years. However, as is the case with most environmental issues, the story is complex and here Fielding focuses on two relatively small whaling communities in the Faroe Islands of the North Atlantic and St. Vincent and the Grenadines in the southern Caribbean where so-called artisanal whaling occurs in contrast to the commercial whaling of nations such as Norway, Iceland and Japan. In addition, his observations are based on personal investigations of environmental and cultural practices in both locations where the inhabitants have also strived to develop conservation strategies directed at both whale survival and societal survival. Indeed, it could be argued that this mutual relationship is the essence of artisanal whaling; without the whales in sufficient numbers the island societies and their traditions would be in jeopardy given that whale and dolphin are a major food source. The relationship has become increasingly fragile in the last three decades for various reasons. First pollutants, most notably mercury produced by industrialised societies, have increased and entered the marine food chain eventually being deposited in the meat of the hunted whales and dolphins. This has had repercussions for several aspects of human health and has led to various recommendations by island health authorities, one of which was to stop consumption of meat from pilot whales in 2008. As Fielding comments, 'the Faroese health authorities officially advocated ending the Faroe Islands' thousand-year history of whaling'. Mercury levels in whales and the human population are also high in St Vincent and the Grenadines. In both North Atlantic and Caribbean locations alternative, often more expensive and often imported, foods are replacing traditional whale meat. An additional issue, facilitated by social media, is the sharing and publicization of photographs of whale and dolphin kills whose sights and sounds are especially distressing. This has increased pressure, especially from beyond the islands, for the restriction/banning of whale/dolphin harvesting.

This text is both technical and emotive. It provides an insight into rarely-observed artisanal whaling and highlights the jeopardy of whaling communities living 'on the edge' as well as the plight of hunted sea creatures. It also evokes the concept of environmental determinism which has never been defunct in reality but just in need of reinterpretation. This is not only a book about whales/dolphins, glorious as they are, and their plight but about environmental ethics.

Antoinette Mannion

GET INVOLVED

We would like to expand the scope of culture reviewed in The Niche. If you have read an interesting book, from any genre, that touches on ecological research or concepts, then write us a review!

Publishers can send review copies to: The Niche Editor, British Ecological Society, Charles Darwin House, 12 Roger Street, London, WC1N 2JU

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.

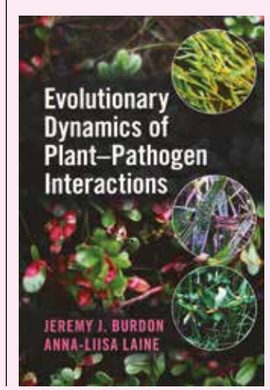
For further details email Kate: kate@britishecologicalsociety.org

READ

EVOLUTIONARY DYNAMICS OF PLANT–PATHOGEN INTERACTIONS

Jeremy J. Burdon, Anna-Liisa Laine
Cambridge (2019)
£ 39.99

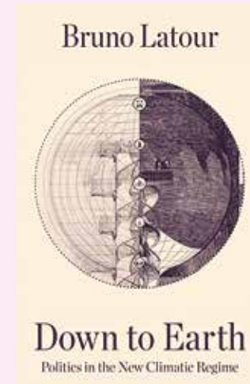
Plant-pathogen interactions provide some classic examples of evolutionary arms races, especially in cases of gene-for-gene co-evolution. However, a recurring theme of this book is that interactions in the real world are very rarely so simple. The complexity of interactions involved is stressed throughout, such as spatial patchiness and temporal fluctuations, mixed infections of different pathogens, and virulence or resistance depending on environment as well as genetics. This complexity is important, for example, when attempting to forecast the impacts of climate change, or the effectiveness of plant conservation strategies, in the presence of pathogens. The result is a very thorough account of complicating factors in the field, the often-contradictory results of studies so far, and open questions for further research.



Plant pathology has major practical applications in agriculture and forestry, but this book argues that these systems are somewhat exceptional compared to most wild populations. Headline-grabbing outbreaks of tree-killing diseases can occur when pathogens are introduced to new regions or when virulent new strains evolve, but many more pathogens remain endemic at low levels. Agricultural systems often promote extreme boom-and-bust cycles, with large areas of a single, uniform crop. Therefore, ecological studies of factors limiting pathogen incidence in wild plant communities can provide valuable lessons for more durable crop protection. Wild plant pathogens are also important in their own right, limiting plant ranges and shaping community structures, and case studies throughout the book include plenty of wild hosts. Another key theme is the new advances being made possible by molecular approaches, but only when combined with field-based studies.

The authors' stated aim is to bring together different disciplines: applied plant pathology in both agriculture and forestry; molecular and genetic aspects; ecology and evolution. This resulting book is essential reading for any plant pathologists wanting to think in more depth about ecological and evolutionary aspects. For ecologists without a genetics background looking for an introduction to plant-pathogen systems, some earlier chapters may prove heavy-going, but Chapter 8 on plant community dynamics would be a good starting point. Certainly greater cross-talk between these fields has the potential to produce some exciting advances.

Nichola Hawkins



READ

DOWN TO EARTH: POLITICS IN THE NEW CLIMATIC REGIME

Bruno Latour
Polity Press (2018)
£12.99

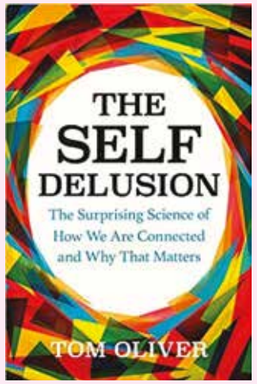
In a world where the possibilities of growth seemed endless it was easy to embrace globalisation – the prosperity of other nations didn't come at anyone else's expense. Climate change, however, reveals that the possibility of everyone having it all was a fantasy. This, Latour argues, is one of the causes of the strange situation we find ourselves in. The continuing drive for globalisation now sits uncomfortably alongside a desire to turn away from global connectivity towards the protection of national or ethnic borders.

Refreshingly, *Down to Earth* seeks to understand the reasons for mass denial of climate change, rather than blame people for their ignorance. One conclusion Latour puts forward to is that 'the elites' are not as oblivious to the reality of climate change as they lead us to believe. They have understood that we cannot all go on as before, but instead of changing their ways they have freed themselves of the burden of solidarity and instead spread messages of nationalism. By denying the reality of the Earth fighting back, they have created a movement which puts itself outside of worldly constraints. This lack of realism is understandably very appealing.

While the book doesn't provide solutions, it is a thought-provoking exploration of different outlooks and ways of thinking. I appreciated the chance to question what our global problems are really about, given that our attempts to address them directly and in isolation continue to fail. In particular, Latour draws important connections between some of the greatest challenges we face, including climate change, inequality and tension between different groups of society.

Overall, the philosophical language of *Down to Earth* may seem alien to scientific readers, and the many analogies make the text more elegant yet harder to follow. While I could not identify with all the arguments put forward, I valued the questions Latour raised.

Rebecca Nesbitt



READ

THE SELF DELUSION

Tom Oliver
Weidenfeld & Nicolson (2020)
£20

In The Self Delusion, Tom Oliver argues that we should see ourselves not as sovereign individuals but as part of a deep, interconnected universal network. He uses diverse branches of science to show that we are entirely dependent on both other people and the world around us, and that our bodies are not distinct from the environment. The molecules in our bodies are in constant flux, and our component cells being continuously recycled. Our bodies also don't function independently: we rely on the bacteria of our microbiome.

We are likewise reliant another people. Few of us would stand much chance of survival if a plane crash left us stranded alone. The bare minimum we would need is a good knife, and how many people are needed to make that knife? No one person knows how to mine and make the different materials in it, as well as create and operate the machines used to mould it. We are also emotionally dependent on the people around us, and Oliver laments that the world we are creating is harming those connections, leading to loneliness and mental health challenges.

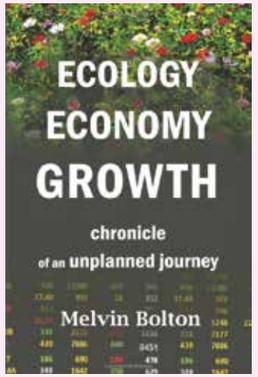
Another part of our self-delusion is that we have an unchanging, independent identity, something which psychology and neuroscience reveal to be untrue. Not only does the way I react to situations change over the course of my life, it also changes on very short timescale, for example based on how hungry I am.

Failing to recognise our connection to the world around us can lead to failures to protect it. If we understand that greater environmental protection and care for other humans, near and far, is in our self-interest we are more likely to act in ways which benefit people and nature. Most ecologists are already acutely aware of our dependence on the natural environment as well as on other people, although facts in this book may come as more of a surprise to others. What ecologists may be less aware of is the psychology of how our conscious understanding of connectivity can be absorbed into our sense of identity, and how this varies between cultures. While Western culture emphasises the individual, Eastern culture focuses on the whole and on interdependencies. This can manifest itself in subtle ways, for example through language. Eastern cultures use more verbs and Western cultures use more nouns, reflecting worldview of discrete identities. American newspapers are more likely to blame perpetrators, whereas Chinese newspapers focus more on situations.

Some of the proposed solutions may also be unfamiliar to many ecologists. Rather than tackling individual problems, Oliver advocates addressing their root cause by moving away from an individualist outlook towards a more collective perspective. He suggests ways we can reverse the trend towards perceptions of the self as autonomous and independent, which increasingly verges on narcissism. For example, meditation can cause long-term reduction in self-focus, and there is evidence that neural pathways related to compassion, empathy and sense of self can become restructured in the brains of experienced meditators. Computer games have also been created to increase empathy.

Ultimately, Oliver hopes we will adopt a new paradigm where people fundamentally acknowledge and take responsibility for their impact on others and the natural world. In order to change the world, we first need to change ourselves.

Rebecca Nesbit



READ

ECOLOGY, ECONOMY, GROWTH: CHRONICLE OF AN UNPLANNED JOURNEY

Melvin Bolton
Ribbonwood Publications (2019)
£10.99

It's not often that just skimming a book returns you to the beginning of your work! In the early 1970s, the first modern wave of serious environmental concern spread around the world in tones very similar to climate strikes today. A wealth of texts like WM Thomas' *Man's Role in Changing the Face of the Earth* and Ehrlich's influential work *Population, Resources, Environment* set the scene for a time just slightly post-Carson and alongside the Stockholm Conference. Each covered different aspects of the environment but they were united by a sense of the inter-disciplinary nature of global ecological/environmental study. It was like looking at a box full of jigsaw pieces and seeing the final image being created. Since that time, our knowledge has increased significantly in depth but also in insularity. The focus needed for great work seems to preclude wider studies of context and significance. What Bolton has done here is to attempt to bring together the many strands of natural and human interactions to show how we got to this point and how we might proceed from it.

The book's 22 chapters come together in three sections, giving the reader more of a narrative overview than detailed analysis. We start with a rapid dive, first into deep time with the formation of life but then, in a blink, to pre-modern human populations and the development of both the human species and their requirements in terms of energy and food. There's a look at the role of developing human societies and the way this impacts upon the environment, culminating with a discussion on Neolithic development. The second section covers more detail but for a shorter time span. It's a section of contrasts! The main focus here is the developing relationship and tensions between natural and economic worlds; between the obvious biophysical limits placed upon a Neolithic society and the less obvious but still crucial economic ones faced in the 20th century. The end point, World War II, is apposite. We are drawn into the picture of the development of modern consumerist models of economics, setting this against social development and people's responses to nature. Our final section, *into the growth trap,* sums up the focus and feeling of trying to reconcile a burgeoning population with the clear impacts upon an increasingly pressured environment. The opening chapter looking at developments in ideas and international agencies, focusses on Keynes rather than Rostow given the title but the same trajectory is clear. Subsequent chapters focus on the rise of environmentalism and the background of pesticides, pollution, biodiversity and climate change. Bolton then turns to population projections and how we might meet current and future needs whilst accepting the obvious limits of ecosystems. A concluding chapter brings together the strands and suggests how we might go in the future.

This was always going to be a massive undertaking in just one book and there are going to be areas not covered or insufficiently covered. The focus may best be seen in the subtitle – an unplanned journey. The author has focussed on a narrative – the story of how we got here and like any good story there's going to be a focus on specific key areas. There are no images or data (although there is a significant reference section to follow ideas through) so the reader can just flow through the work. As an overview, this would be great for educators getting a sense of the size of the topic or those wanting to see how the pieces fit together.

Paul Ganderton

READ

GRASSLAND PLANTS OF THE BRITISH AND IRISH LOWLANDS: ECOLOGY, THREATS AND MANAGEMENT

Peter Stroh, Kevin Walker, Stuart Smith, Richard Jefferson, Clare Pinches and Tim Blackstock
BSBI (2019)
£31.50

This book sets out to 'assemble in one place all the relevant grey and peer-reviewed literature for 109 of our most threatened lowland grassland species so that they might be better conserved in the future'. Introductory chapters briefly review the history of British and Irish grasslands and grassland plants, describe the eight lowland priority grassland types and the threats they currently face, and analyse the traits of threatened species. Not surprisingly, given that the greatest single threat to semi-natural grassland is too little management, or indeed none at all, the stand-out trait of threatened species is short stature.

But the core of the book, taking up the great majority of its nearly 400 pages, is 109 individual species accounts, comprising identification, biogeography, habitats, ecology, threats and management requirements. One sometimes wishes the authors could be a bit more definite about the latter, but I'm sure they do too; in the usual absence of real experimental evidence of what works and what doesn't, they're clearly doing the best they can.

The species covered are a mixed bunch, from plants that I still think of as common (hard to go for a walk on the Peak District limestone without treading on *Saxifraga granulata*) to others that are very, very rare; if *Crepis praemorsa* were any rarer it would be extinct. The authors are also in the usual two minds about the few grassland aliens that have made themselves thoroughly at home in Britain. Despite explicitly restricting themselves to natives and archaeophytes, there are nevertheless accounts of *Muscari neglectum* and *Fritillaria meleagris*, both relatively recent garden escapes.

The accounts are uniformly excellent, compressing an enormous amount of information into a small space, and everyone and anyone concerned with grassland management and conservation should have this book on their shelves. Mind you, it would be a shame if that were its only readership; I'm certain it would be enjoyed by anyone with an interest in British and Irish natural history, if only for the photographs, which illustrate two universal truths: nice plants grow in nice places, and say what you like about the value of trees, grasslands do at least let you see the view.

Ken Thompson

HORIZONS

THE JOURNEY

Fionn Ó Marcaigh
Trinity College Dublin

The swallow flew, and its flock flew with it. Down to the midges dancing above the water, up over the shapely reeds to dogfight with the moths, down and up and up and back. Food. After food: rest. Soon: the roost, a dark tree in a dark fen, a belly full of insects, chattering calls. After rest: flight. Later: flying and flying, over the Irish Sea, over Europe, over Egypt and the Nile, over palaces and shanties and tombs. Over and not of them, on a journey.

Now: Stopped. Caught. The roost still ahead. The swallow is in the air, but not flying. Hanging. How? Held by something unseen, light but strong. Can't make itself free. The dark has been coming, but now a light not of the sun, from the gaze of some great unknowable creature. A creature handling the swallow's wings and feet, looking down from blue eyes and the light shining on its head, so bright. What is it?

…

The man worked carefully to unpick the swallow's form from the mist net, as its dark eyes looked up at him. The rest of the ringing team were doing the same, all down the line of net, by the light of their head torches. After they had raised this net in front of the roost-tree, stretched taut between its poles, they had spent the evening standing still as statues and watching the twisting flock of swallows. The sun had set, and the evening had covered them all over in gold, then darkness. A red LED glowed on the side of the man's head torch, a white blade of light shone from the front. Illuminating the swallow's wing, where the last loop of net fell away, and it was only his hand that held it, delicately, like it was the most precious thing in the land. And who could say it wasn't?

How many generations of swallows have been taken from nets since bird ringing studies began a century ago? Too many for a bird to grasp. They stretch back, links in an evolutionary chain, one of the unbreakable chains of life and death and survival that these scientific efforts have thrown light upon. We all journey along these chains, whether or not we see them. In the fen, the man put a metal ring on the bird's leg, measured its wings, its little skull. He murmured to it like a puppy, as if his words could reassure or command it. *Swallow, swallow, little swallow.* Turning to the team's scribe, what he said aloud was all data: Barn Swallow, *Hirundo rustica,* Age Code, morphometrics. Written in the thick logbook, to join a dataset of decades, made up of lives.

When he was finished, the man placed the swallow on his other hand, uncurled his fingers, and made it free. The swallow regained its flight, its birthright, became once again a bird. It called out as it burst from his hands and back to its journey, to wander and fly and live and die. Not a symbol or a datapoint, but a thing breathing and flying, made a messenger by the ring on its leg. Whether it would be caught once more in this fen or another, or found in the pellet of an owl or lying dead on sands or cobbles, the ring would carry the message. From it, man or woman could recognise this swallow, understand the Swallow, trace this swallow's journey, understand the Journey. The man watched it go. The swallow flew. ✺

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