CIEEM in practice
Issue 113 | September 2021
Bulletin of the Chartered Institute of Ecology and Environmental Management

The Next 30 Years: Views from Our Patrons and Vice Presidents

Carbon Offsetting to Achieve Net Zero by 2030

Great Crested Newt Licensing

UK Overseas Territories: Outstanding Treasures

30th Anniversary Edition: The Next 30 Years

SUPPORTING NATURE'S RECOVERY

Our forthcoming conferences showcase the latest ideas and techniques in preventing biodiversity loss and restoring ecological resilience. Join us to find out how your projects can benefit from doing things differently.

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Two half days, online

In this time of opportunity to address the challenges of re-imagining and re-integrating strategic planning with the key agendas of the natural environment, sustainability, transport and wellbeing, this conference will explore how ecologists, environmental managers, planners, and policy makers can work together to develop and influence innovative approaches.

Management, Mitigation & Monitoring CIEEM Autumn Conference

16th & 17th November 2021

Bristol

There is increased public and political awareness of the climate emergency and biodiversity crisis, creating demand for more sustainable management of ecological resources. Through sharing good practice and innovation, delegates can join us in championing smarter, more effective ways of working.

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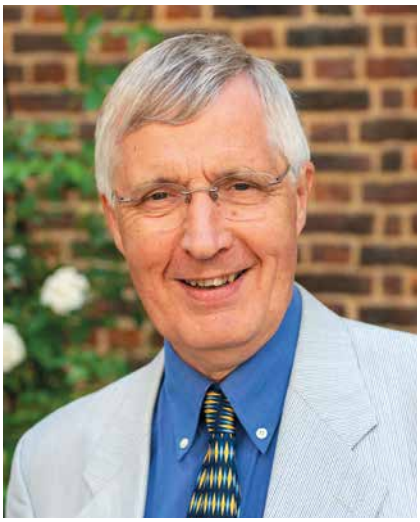
CIEEM

Editorial



Welcome

This landmark edition of *In Practice* provides an important opportunity to consider the question: *"What will the next 30 years mean for professional ecologists and environmental managers?"* As I come to the end of my 3 years as CIEEM President, here is my answer. Our professions have an unprecedented opportunity to grow to meet the increasing demand on our knowledge, skills and competence. In the immediate future we face the challenges of successfully implementing Biodiversity Net Gain and the Environment Bill as well as changes to the Natural Environment and Rural Communities (NERC) Act and the introduction of new agri-environment schemes such as Environmental Land Management. Whilst these developments have biodiversity at their core, there is a gradual and significant shift towards a more ecological approach to managing our environment, of which biodiversity is a part – with other ecological factors such as ecological function, nature-based solutions and ecosystem services coming to the fore. Ecologists and environmental managers have the opportunity to be driving this more holistic and ecological approach. Whilst maintaining our strengths, CIEEM needs to provide a home for a wider range of professionals, and new ecologists in particular.

The breadth of our skills and competence needs to grow as we rise to the challenges of how to make measurements which are new to us, to both inform new ecologically based solutions and to measure the degree of our success. New technologies integrated into our fieldwork will support this growth, from remote sensing and drones assessing efficiency in carbon capture through eDNA analyses of invertebrate communities to the use of big data to harness the rapidly growing database of ecological information. Amongst all this is the need to liaise closely with research ecologists to make sure they know the questions we need answering, but also to understand the directions they are pointing out to us in which we should be going.

Importantly, our confidence will grow. Envied for the passion we have for our work and the environment, we are losing the habit of apologising for our recommendations and solutions and instead becoming more assertive. Not only are we being shown to be correct in terms of predictions made, there is a greater recognition that all is not well, a willingness to listen and an expectation that we will provide the solutions. This gives us a foundation on which to build and develop confidence in what we have learned and know and confidence to recommend and implement the solutions.

We are in a very strong position to be able to respond to the opportunity presented to us, to realise our ambitions and the urgency of putting our professions centre stage. The future is to a significant extent in our own gift. As President of CIEEM, I can give testimony not just to a highly professional, dedicated and hard-working secretariat so ably led by Sally Hayns but to the network of committees, working groups and interest groups all led by our Governing Board, all of whom would be the envy of any professional body. The Governing Board comprises volunteers with a healthy range of backgrounds, skills and geographies, providing a great foundation for our Institute to respond to the challenges of growth. And what better than to have Richard Handley as our next President, who, working for the Environment Agency, is very well placed to ensure that CIEEM is a welcoming Institute and to ensure that our excellence in biodiversity extends to more fully include other aspects of ecology and environmental management. I wish Richard and CIEEM all the very best as we grow into the next 30 years.

Max Wade CEcol CEnv FCIEEM
CIEEM President

THEIR FUTURE NEEDS YOU

You are good at what you do, right? Competent, capable and building some valuable experience?

Can you spare some time to share some of your knowledge with the next generation of professionals? You could provide some guidance to those starting out, or perhaps give some advice to more experienced people switching roles or stepping into the world of freelancing. Maybe even help someone tackle a sticky situation that you have navigated successfully before.

CIEEM's Member Mentoring platform is an easy way for other members who want to be like you get some advice from, **well...you.**

And you do not have to have a few years behind you. Maybe you are in the early stages of your career but are already a whizz with the latest bit of fancy kit?

To become a mentor register at
cieem.onpld.com

Give a little and the chances are you will gain a lot.

CIEEM

In this issue

Pearl is the 30th anniversary gift. So we give you these freshwater pearl mussels (*Margaritifera margaritifera*) feeding in a highland river. © Sue Scott/NatureScot

In Practice

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CIEEM News

New CIEEM Patron – Judy Ling Wong

We are delighted to announce that Judy Ling Wong is now a CIEEM Patron. In her role Judy will act as an ambassador for CIEEM and the profession, especially with regard to making the sector more diverse.

Judy said: *"I am delighted to be appointed a CIEEM Patron. The death of George Floyd has sent a wave of emotion through the world, giving impetus to addressing issues of diversity, equality and inclusion at a time when building local and global interconnectedness is fundamental to solutions to the protection of nature and people, especially in relation to the climate emergency. White people make up only 11% of the world population. I look forward to playing a role in supporting the aspiration of CIEEM to make its particular contribution to this important journey."*

Bat Mitigation Guidelines – last chance for feedback

In June we published a 'beta version' of new draft Bat Mitigation Guidelines (https://cieem.net/bat-mitigation-guidance/), which significantly update the 2004 Guidelines published by English Nature (now Natural England).

The document is open for feedback, comments and suggestions for change until 17 September 2021 and we hope to publish a final version before the end of 2021.

Erratum: CIEEM Post Nominals

In the last edition of *In Practice*, one author included the post nominals 'QCIEEM'. This was in error and slipped through multiple proofreading eyes unfortunately. To be clear, post nominals only exist for Associate (ACIEEM), Full (MCIEEM) and Fellow (FCIEEM) members. Student and Qualifying members cannot use any variation of CIEEM post nominals. Our apologies for any confusion this may have caused.

Raising Standards – draft competency standards

As part of our Raising Standards initiative, a number of volunteer practitioners have been developing taxa-specific competency standards for survey and mitigation. Draft standards are being published on the CIEEM website (https://cieem.net/raising-standards/) and the working group welcomes feedback on individual standards using the feedback form provided.

Staff changes

Since the last edition of *In Practice* we have sadly said goodbye to Katie Allen and Helen Moore.

We have also been delighted to welcome two new members of staff: Louis Ormston (Professional Development Coordinator) and Sophie Lowe (Digital Marketing and Communications Coordinator).

In July and August we were supported by two internships funded by the University of Southampton. Clare Langrish helped with drafting a briefing paper on policy divergence, and Samuel Hillier helped with professional development.

New BNG Report and Audit Templates

In July this year CIEEM published a framework for writing reports for projects aiming to achieve Biodiversity Net Gain (BNG) (https://cieem.net/resource/biodiversity-net-gain-report-and-audit-templates/).

The templates set out a suggested structure and content for reports specifically produced in relation to BNG assessments, including a Feasibility Report, a Design Stage Report and an Audit report. These templates, which are part of our ongoing work to support BNG implementation, have been designed for development projects but can be adapted for other land use change projects and appraisals.

CIEEM has moved

We have now taken up residence at new offices in Ampfield, Hampshire. See the full address on page 5. Our phone numbers remain unchanged.

CIEEM Conferences

Date	Title	Location
5 and 7 October 2021	Scotland Conference 2021 – Greening our Grey: Improving the Biodiversity in Urban Landscapes	Online
16-17 November 2021	Autumn Conference 2021 – Management, Mitigation and Monitoring	Bristol

Find out more: https://cieem.net/events

In Practice Themes and Deadlines

Edition	Theme	Article submission deadline
December 2021	Urban and Cultural Ecology	n/a
March 2022	Working on Site	19 November 2021
June 2022	Nature-Based Solutions	18 February 2022
September 2022	Bryophytes and Lichens	TBC

If you would like to contribute to one of these issues, please contact the Editor at nikprowse@cieem.net. Contributions are welcomed from both members and non-members. Further information and guidance for authors can also be found at: https://cieem.net/in-practice/

Did You See?

Environment Bill

The Environment Bill returned to Parliament in May with several Government amendments. New clauses give powers of the Secretary of State to amend the Habitats Regulations. Other amendments include: expanding Biodiversity Net Gain to cover Nationally Significant Infrastructure Projects, a new legally binding target on species abundance for 2030, and one to add the hedgehog to protected species listed under the Wildlife and Countryside Act 1981.

https://cieem.net/government-introduces-amendment-to-habitats-regulations/

Treasury commits to nature-positive future in response to Dasgupta Review

The UK Government has issued its response to the Dasgupta Review on The Economics of Biodiversity, committing to a *"nature-positive future"* in which the decline of biodiversity loss is reversed by 2030, and economic and financial decision-making supports the delivery of this goal. Government will also *"ensure all new UK bilateral aid is spent in a way that does no harm to nature."*

https://cieem.net/treasury-commits-to-nature-positive-future-in-response-to-dasgupta-review/

Defra launch Tree and Peatland Action Plans for England

The Environment Secretary, George Eustice, has launched strategies for restoring peatland habitat and for the planting and restoration of trees and woodlands to address the climate emergency and biodiversity crisis.

https://cieem.net/defra-launch-tree-and-peatland-action-plans-for-england/

Guidance on species reintroductions in England published

Defra and Natural England have published guidance for anyone considering species reintroductions or other conservation translocations in England. This comes alongside the launch of a species reintroductions task force to help drive recovery of declining species.

https://cieem.net/guidance-on-species-reintroductions-in-england-published/

Welsh First Minister announces new Climate Change Ministry in Cabinet re-Shuffle

Wales' First Minister, Mark Drakeford, has announced the formation of a new climate change ministry, headed by Julie James as Minister for Climate Change. The brief of the climate change role will bring together the environment, energy, housing, planning and transport portfolios. Lesley Griffiths has remained as Minister or Rural Affairs.

https://gov.wales/new-top-team-to-lead-wales-into-a-brighter-future

https://llyw.cymru/tim-newydd-i-arwain-cymru-i-ddyfodol-mwy-disglair

New Scottish Cabinet announced

Scottish First Minister, Nicola Sturgeon, has announced her new Cabinet following the recent election. Two new posts have been created to deliver for nature and climate: the Cabinet Secretary for Net Zero, Energy and Climate, with the role given to Michael Matheson, and Cabinet Secretary for Rural Affairs and Islands, which Former Minister for Rural Affairs and the Natural Environment Mairi Gougeon will take up.

https://cieem.net/new-scottish-cabinet-announced/

Stormont moves first ever Climate Change Bill to next stage

Stormont MLAs have agreed to move Northern Ireland's first ever climate bill to the next stage. They voted 58 to 29 in favour after more than 6 hours of debate, meaning the proposed legislation will proceed to detailed scrutiny at the assembly.

www.bbc.co.uk/news/uk-northern-ireland-57051232

New Chair of the National Biodiversity Forum announced by Minister Noonan

Minister for Heritage, Malcom Noonan, has announced Professor Tasman Crowe is the new chair of the National Biodiversity Forum. The Minister thanked Professor Yvonne Buckley for her work as previous Chair.

www.malcolmnoonan.com/post/new-chair-of-the-national-biodiversity-forum-announced-by-minister-noonan

Practitioners' guide to Resilient Ecological Networks

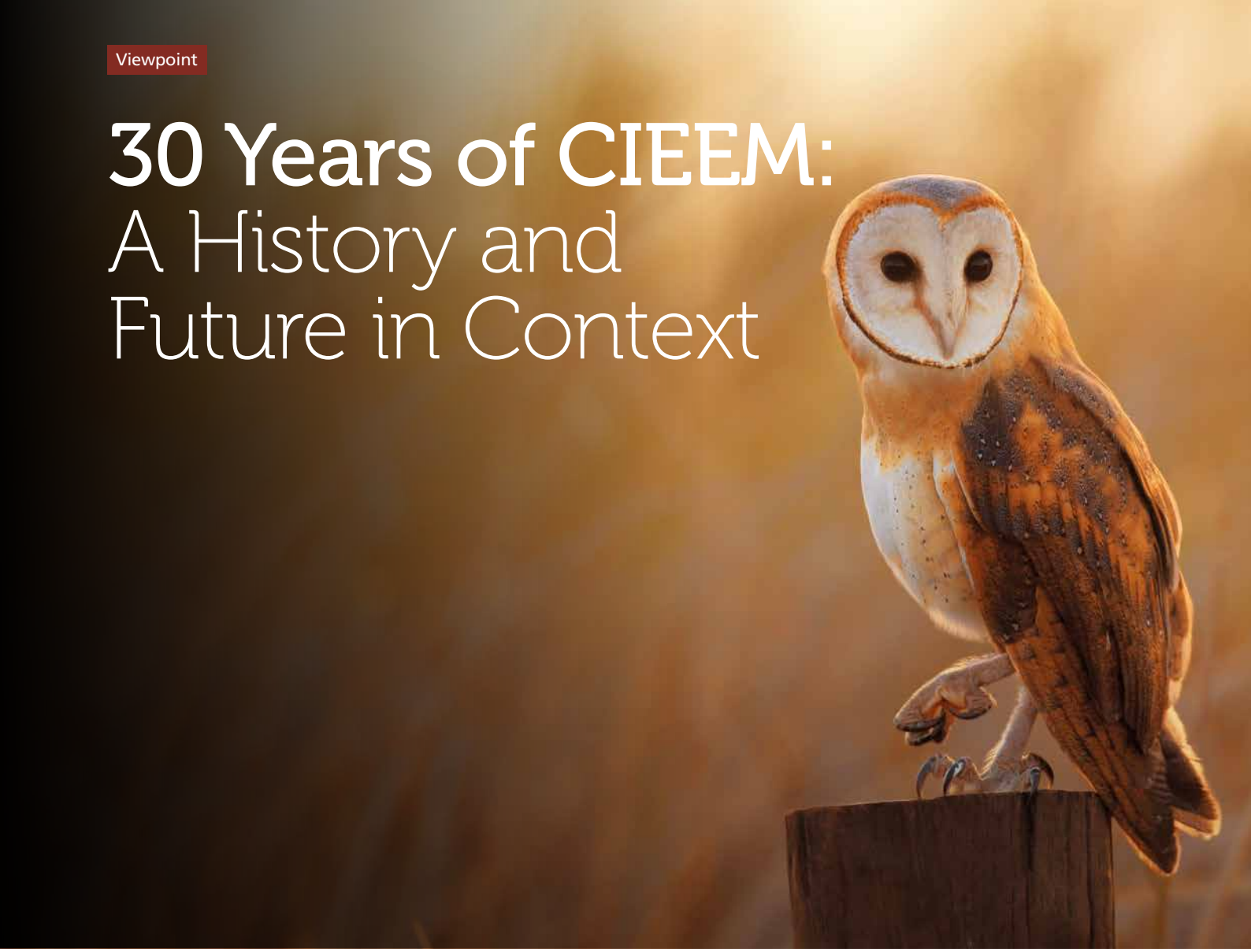
Natural Resources Wales has published a guide providing practitioners with a support framework for designing Resilient Ecological Networks based upon the principles of the sustainable management of natural (SMNR).

https://naturalresources.wales/guidance-and-advice/environmental-topics/landmanagement/

practitioners-resilient-ecological-networks/

Viewpoint

30 Years of CIEEM: A History and Future in Context



Jason Reeves
CEnv MCIEEM
Head of Policy and Communications, CIEEM

Introduction

It was a different world when the Institute was incorporated on 19 August 1991, and subsequently held its inaugural meeting at the Royal Geographical Society in London on 26 September 1991. It's hard to believe that when IEEM (later to become CIEEM) was founded we didn't have smartphones, the internet had been available to the public for just 1 month and there were about two and a half billion fewer people on the planet.

Table 1 gives some historical context to the lifespan of the Institute. The world has changed immeasurably in many ways that we would not have even guessed at 30 years ago. Who could have predicted not just the influence of social media, but that it would even exist? We have seen a greater awareness of the value and benefits of nature but sadly also its ongoing decline, and the continual rise of CO_2 concentrations in the atmosphere.

"CIEEM has been at the forefront of creating the modern biodiversity profession in the UK and Ireland, championing professionalism and standards."

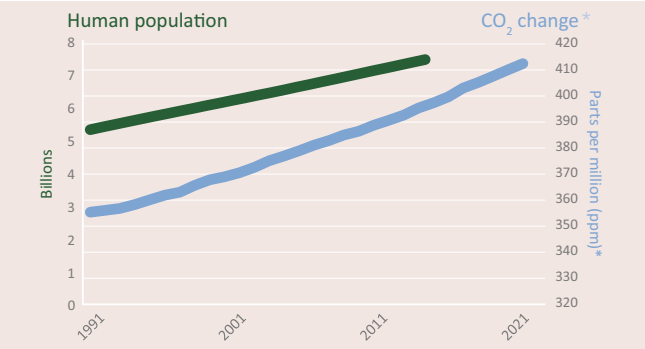
If you are interested in the history of the Institute, I highly recommend delving into the *In Practice* archives, in particular editions 1 (October 1991), 33 (October 2001) and 76 (June 2012). These are the inaugural, 10th anniversary and 21st anniversary editions, respectively, and are all publicly available in the CIEEM Resource Hub[1].

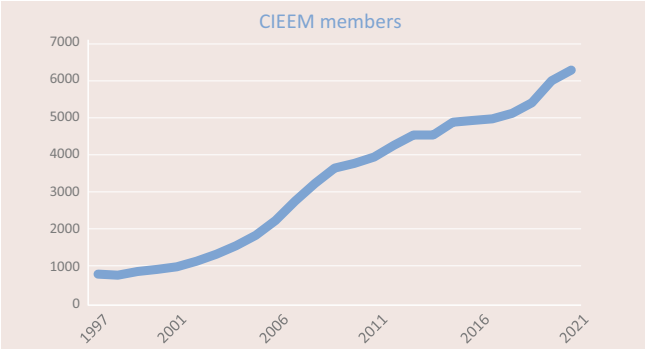
What have we achieved?

The Institute has come a long way in 30 years. We have been at the forefront of creating the modern biodiversity profession in the UK and Ireland, becoming a champion for professionalism and standards. We have published landmark guidance on key topics such as Ecological Impact Assessment and Preliminary Ecological Appraisal, and more recently we have been a partner in developing the

Table 1. Timeline of Events

ENVIRONMENT		CIEEM	OTHER
Global Environment Facility (GEF) established Protocol on Environmental Protection to the Antarctic Treaty signed	1991	IEEM established First IEEM *Bulletin* (later *In Practice*)	Internet made public
Rio Earth Summit Habitats Directive adopted by EC 'Ecological footprint' phrase first used Wicklow Mountains and The Burren National Parks 1991	1992		
Golden toad declared extinct	1993		Maastricht Treaty creates EU
Environment Agency, Scottish Environment Protection Agency and National Park authorities established	1994		Channel Tunnel opens Amazon.com founded
	1995		
Kyoto Protocol signed Constanza *et al.* estimates value of biosphere Ballycory National Park 1998	1996	Jim Thompson appointed Executive Director	Dolly the sheep cloned
	1997		
	1998	First Geographic Section: Scotland	Good Friday Agreement Regional assemblies established Google founded
UN Millennium Development Goals created Pyrenean ibex declared extinct Cairngorms, Loch Lomond and Trossachs National Parks 2000	1999		Global population: 6 billion
Defra created Millennium Ecosystem Assessment project initiated	2000		UK foot-and-mouth disease 3G publicly available
Society for the Environment established Last sighting of Yangtze river dolphin (Baiji)	2001		Return of direct rule in Northern Ireland
	2002	Joins European Federation of Associations of Environmental Professionals (EFAEP)	
New Forest National Park 2005	2003		
	2004	Licensed by SocEnv to award CEnv status	Facebook founded
Kyoto Protocol comes into force	2005	First meeting in Ireland	YouTube founded
Stern Review on the Economics of Climate Change published *An Inconvenient Truth* released	2006	First EclA Guidelines published Inaugural Medal awarded to Sir David Attenborough	Twitter founded
The Economics of Ecosystems and Biodiversity (TEEB) project commissioned Madeiran large white butterfly declared extinct	2007	Inaugural Best Practice Award First 'lobbying', on Environmental Liability Directive transposition	Devolution restored in Northern Ireland Apple iPhone launched
Climate Change Act (UK)	2008		
EU Birds Directive adopted *Making Space for Nature* published Aichi biodiversity targets South Downs National Park 2010	2009	Sally Hayns appointed CEO First 5-year strategic plan First conference outside the UK (Dublin)	Deepwater Horizon oil rig disaster Apple iPad launched Equalities Act (UK)
	2010		Global population: 7 billion 4G publicly available
UK National Ecosystem Assessment report Constanza *et al.* revalue annual global ecosystem services West African black rhinoceros declared extinct	2011		
	2012		Zoom founded CRISPR gene editing discovered
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) established Pinta giant tortoise declared extinct	2013	Chartership: renamed CIEEM CIEEM able to award CEcol status	#BlackLivesMatter movement started
Sustainable Development Goals created Great Pacific Garbage Patch mapped Bramble Cay melomys (rodent) declared extinct	2014	CIEEM Chartered Institute of Ecology and Environmental Management	Same-sex marriage legal in England, Scotland and Wales Scottish independence referendum
Paris Climate Accord agreed	2015		VW emissions scandal Same-sex marriage legal in Ireland
	2016		Brexit Referendum 5G publicly available
	2017		#MeToo gains momentum
Greta Thunberg's 'Our house is on fire' speech Po'ouli (black-faced honeycreeper) declared extinct	2018	CIEEM meets Environment Advisor in Downing Street	
SNH rebranded as Nature Scot	2019	Declares climate emergency and biodiversity crisis	
The Economics of Biodiversity: The Dasgupta Review published Start of the UN Decade of Ecosystem Restoration	2020	CIEEM made a charity	UK leaves the EU HS2 construction begins COVID-19 pandemic Same-sex marriage legal in NI
	2021	30th anniversary	





*Data from Ed Dlugokencky and Pieter Tans, NOAA/GML, https://gml.noaa.gov/ccgg/trends/gl_data.html. Pre-Industrial level = 280 ppm.

principles and guidance for biodiversity net gain. We have developed both carrot and stick to raise standards; introducing the CIEEM Awards to recognise best practice and celebrate outstanding achievements in the sector but also addressing concerns about the quality of individual members' work via the professional conduct procedures.

We have continued to support members and others through continuing professional development, delivering some memorable conferences, training workshops and, more latterly, webinars. One landmark moment was the launching of our Competency Framework in 2013 which established a career progression structure for the profession. Our 15 Member Networks and Special Interest Groups, run by members for members, have evolved to become an essential element of our member engagement and knowledge-sharing activities.

Over the past 10 years, in particular, we have developed and increased our influence and reach as the voice of the profession. We now regularly meet with ministers and their advisors across the UK and Ireland, liaise directly with government departments and give evidence to parliamentary committees. We have forged strong partnerships with like-minded organisations to give even greater emphasis to our work.

Like many other organisations we declared a climate and biodiversity emergency in 2019. Unlike several others, we have done something about it. We have a proactive and ambitious Action 2030[2] working group and have been putting our carbon net zero plan into action as a core element of our new strategic plan[3]. We now have our own carbon management plan, and are developing resources for members to use to both reduce their own impacts (e.g. sustainable materials use) and help guide the restoration of nature through nature-based solutions.

Our achievements over the past 30 years and the progress we have made has involved the effort, time and commitment of so very many people, most of whom volunteer their time. We are grateful to every one of them – from Presidents, Patrons, members of Council/Governing Boards and the Standing Committees, Fellows, Geographic Sections, Special Interest Groups and task/working groups, to *In Practice* authors, the *In Practice* Editorial Board, and so many, many others. Thank you again.

"We have a critical role to play in achieving a more sustainable future for current and future generations. We cannot shirk this responsibility. We have much work to do."

What next?

So what will we achieve in the next 30 years? Where do we want to be in 2051? The future is, of course, uncertain, but with our current lens we can see some priority areas for action.

We must continue to evolve our leadership role as a profession instrumental in addressing the interlinked climate emergency and biodiversity crisis. We aim to fully embed environmental considerations into social and economic decision-making. The green recovery from the COVID-19 pandemic, linked to the UN's Biodiversity COP15 and Climate COP26 meetings later this year, are pivotal points for a radical change in emphasis in society and governments.

We want and need to be at the forefront of creating a more equal, diverse and inclusive profession. We need to proactively encourage and work with others, as well as taking our own action, to remove barriers and injustice within ecology and environmental management however it appears. There are so many positives about the work our members do but we need to make sure that we become more open and inclusive to people from all backgrounds and circumstances. Linked to this, we need to tackle the systemic undervaluing of the work that ecologists and environmental managers do and the concomitant exploitation, by some employers, of those in the early stages of their career.

Technological advancements are also likely to have impacts on both the profession and the environment. The rise of AI, DNA technologies, remote sensing, quantum computing and 3D printing will all influence the practice of ecology and environmental management. CIEEM has a responsibility to explore these technological advancements and provide opportunities for members to acquire knowledge, confidence and competence in new approaches.

Looking much further ahead, and more broadly, the next 30 years are almost certain to see a human step onto the surface of Mars. Is it too much to expect that at the same time to have halted the loss of biodiversity and started to restore habitats and ecosystems?

No one can precisely predict the future, but we must work to ensure that the natural environment – the foundations upon which our societies and economies sit – is embedded at the heart of that future.

We – the Institute, the members and the wider profession – have a critical role to play in achieving a more sustainable future for current and future generations. We cannot shirk this responsibility. We have much work to do, let us do it together.

Notes

1. https://cieem.net/resources-hub
2. https://cieem.net/i-am/action-2030/
3. https://cieem.net/resource/cieem-strategic-plan-2021-2024/

About the Author

Jason Reeves BSc MSc CEnv MCIEEM is Head of Policy and Communications at CIEEM. He leads CIEEM's policy and advocacy activities, and oversees the Institute's external communications. He sits on the advisory boards of Teach the Future and UK Youth for Nature. He has over 15 years of experience in the ecology and environment sector.

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Thistledown and Buried Acorns: Ghosts of Ecology Past, Present and Future

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Atkins

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John Box
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Keywords: biodiversity crisis, Biodiversity Net Gain, climate emergency, professional environmentalists, sustainable future

Like the Roman god Janus, looking forwards and backwards, three CIEEM members reflect on their lived experiences as professional environmentalists. They explore how this experience has changed over the life of the Institute and our vision of the future. Change in the form of new ideas, concepts and policies can disperse far and wide like thistledown but sometimes needs to grow slowly like oaks from buried acorns.

Introduction

We are lucky. We are professional environmentalists. In the 30 years since our Institute was established, most CIEEM members probably do jobs that they have chosen to do. Many of us get to work with interesting data and solve complex challenges. People think our job involves saving the world. Sometimes it is hard work, and just occasionally it is amazing.

The authors have overlapping careers working as professional ecologists at Atkins (as well as elsewhere), spanning a period from the start of this Institute and, perhaps, as far as the next 30 years.

As we celebrate the 30th anniversary of CIEEM, we want to capture the story of how we see professional ecology and environmental management are

Figure 1. Signposting the future: solar farm owned by Telford and Wrekin Council. Photo: Telford and Wrekin Council.

changing. How has the industry been shaped, and how is it shaping itself? Do we blow in the wind, or (like good *K*-strategists) do we nurture and grow our futures?

John

I was greeted on my first morning as a consultant ecologist by "Oh, no, it's the bugs and bunnies man!", shouted by a senior geotechnical engineer across a crowded office. I had already done research on blue-green algae at the Freshwater Biological Association and the University of Sydney and I had worked as an urban ecologist with Telford Development Corporation and English Nature (now Natural England). We have come a very long way since then. Ecology and environmental management are established as serious professions and sustainability is recognised as fundamental to life on Earth. Exciting new developments are Biodiversity Net Gain and environmental net gain, environmental DNA (eDNA) and DNA metabarcoding for species identification, survey and vegetation monitoring with drones (or unmanned aerial vehicles), and digital data capture, mapping and data management.

The importance of the climate emergency is at last being recognised and must underpin everything that we do, both personally and professionally. Atmospheric concentrations of CO_2 have reached levels that are disruptive and damaging to life. Fossil fuels must be avoided (Figure 1). The emission of further CO_2 into the atmosphere needs to stop now and atmospheric CO_2 levels need to be reduced. Unavoidable emissions of CO_2 must be sucked out of the atmosphere as fast as they are added. Nature-based schemes involving the creation and restoration of habitats and ecosystems can and will contribute to dealing with the interlinked biodiversity crisis.

Large-scale habitat restoration and recreation schemes are needed together with all sorts of rewilding from whole catchments to small urban plots. In the late 1970s and early 1980s, urban wildlife groups were being started in towns and cities. London led the way in urban rewilding: a derelict lorry park was turned into the William Curtis Ecological Park next to Tower Bridge, Camley Natural Park was created on a disused coal wharf, Gillespie Park was created on disused railway sidings and the infilled Russia Dock became a woodland. To this day, these sites demonstrate the social value and political impact that ecology can have, providing places rich in wildlife in densely populated urban areas. The Lawton Report, *Making Space for Nature*, has the mantra "more, bigger, better, joined up", stressing coherent and resilient ecological networks of green and blue corridors extending across landscapes to allow nature to thrive. In addition, successful delivery of habitat creation and ecosystem restoration requires a real understanding of soil chemistry and hydrology.

Biodiversity Net Gain is here to stay and is likely to be encompassed by environmental net gain. It follows that hedges, species-rich grassland, ponds and mature trees should be retained wherever possible in development projects. Translocation can rescue or salvage habitats which would otherwise be lost to vegetation clearance and chipping (Box and Stanhope 2010). Retaining a wildlife habitat, even in a different location, allows its functions to be maintained, such as the landscape structure, visual screening and wildlife corridor provided by a hedgerow. It takes years for newly planted or newly sown habitats to attain the maturity and complexity of established habitats.

We have CIEEM on our side. Our Institute, with its committed and professional staff, is a force to be reckoned with. CIEEM encourages and supports ecologists and environmental managers working to high professional standards and actively assists those who seek to qualify as Chartered Ecologists and Chartered Environmentalists. CIEEM has achieved so much by setting sectoral standards and providing influential guidelines. These standards and guidelines can be likened to a good recipe in that they provide protection from bad advice, set out best practice and make use of the experience of others.

Matthew

Ecological consultancy found me more than I found it. Fresh out of an Ecology MSc, someone asked me if I would like to move some (272, as it turned out) great crested newts from a pond affected by a development on Anglesey (Figure 2). What's more, I was going to get paid! Some 22 years later, people are still paying me to do it. I have learned so much in so many ways and enjoyed passing this learning on whenever I can. Readers who have been around long enough to remember DETR European Protected Species licensing (DETR, or Department of the Environment, Transport and the Regions, was a forerunner to Defra) will know how much licensing and provision for protected species have developed over the years. From the long view, wildlife protection and its application through licensing need to balance issues such as welfare, range and Favourable Conservation Status (FSC) against public perception and acceptance. When decision-makers perceive it to be a burden on national productivity, they will inevitably challenge legislators to look at ways of "removing red tape". Species protection is ever evolving with class- and district-level licensing cascading responsibility to audited practitioners and reviews of primary legislation.

Return of legislative powers to the UK gives the opportunity to consolidate and reimagine how we protect species and habitats. An article in this publication by Karen Regini in September 2000 (Regini 2000) was an important step towards the Ecological Impact Assessment guidelines which are now a mainstay of ecological assessment in the UK. The challenge for the next 30 years is to continue to develop how we practice and legislate in a way that meets land and growth requirements without denuding ecological coherence.

Skip forward a couple of years from a pond on Anglesey and I have a work mobile phone and email account and I'm doing water vole and otter surveys in chest waders, waist deep in the River Trent. Without a doubt, things have got safer over the years and I wouldn't think of doing that now. The advent of useful technology and health and safety rigour have changed our working lives almost beyond recognition. We can monitor where our staff are and check

Figure 2. 'Newting' on the A55 construction site, Anglesey, in 1999. Photos: Matthew Bowell.

whether they get home safely (Atkins' safety system escalates to the Managing Director: remember to log off before getting in the bath!). We are now able to avoid dangerous and costly activities using drones, auto-ID and aerial images, eDNA and thermal cameras and can build common spatial data environments that can capture survey layers as well as information on access and safety. As things continue to become more automated the opportunities are enormous, although robot surveyors are still a long way off and there will be a need to design and safely manage survey work for a while yet. There are a lot of data to manage and our goal should be for an interconnectedness of ecological metadata.

What probably got me to that first Anglesey pond was my childhood love of ponds and newts and nature. The 1980s' fear of nuclear war has been replaced by environmental concerns and now my kids want to pick up plastic when they go to the beach and worry about the global impact of leaving the bathroom light on. My biggest professional contribution to low-carbon energy again had me driving past Llanfairpwllgwyn-gyllgogerychwyrndrobwllllantysiliogogo-goch, working on the Wylfa Newydd nuclear new-build project and trying to unlock the ecological challenges of delivering the project without harming nationally and internationally designated sites. Whether expressed through net zero, carbon reduction or biodiversity offsetting, our challenges relate to sustainable use of finite resources. The nub of the challenge for ecologists and land managers is the on-site delivery of the individual elements that will collectively meet this wider sustainable goal. This doesn't mean we should accept a greater loss now, but it does mean that we need smart thinking in leadership, policy and delivery.

Annoushka

The funny thing about degrees: I thought I'd walk right out of doing an MSc in Ecological Management and Conservation Biology and waltz into a wonderful job in "something environmental". I didn't. I applied for countless consultancy roles, knowing I was excruciatingly under-qualified. I had the grades but I just didn't have the experience.

Figure 3. Meadow vegetation identification and seed collection hosted by the Belfast Hills Partnership. Photo: Lisa Critchley.

At university, we learned about the more global issues: climate change, decreasing pollinator populations, habitat loss and fragmentation. We touched upon environmental economics, evolutionary biology and GIS. I became adept in data analytics and making sure I wasn't accused of plagiarism. But, I had absolutely no idea what environmental consultancy truly entailed, and no amount of training courses and environmental volunteering (Figure 3) could fix that. What did fix that was getting my first ecology job, at a small contaminated-land consultancy in Northern Ireland, which employed no other ecologists….

Don't get me wrong, I was thrilled, ecstatic and over the moon to have finally got my foot in the door. Having absolutely no ecology consultancy experience, the two managing directors and I were learning together. On my first day I realised very quickly how in over my head I was, having no ecologist to guide me. That is until I found CIEEM, Joint Nature Conservation Committee and various best practice guides for protected species!

Boy, did I count my lucky stars that there were countless resources online detailing accepted practices. There were step-by-step guides on how to conduct an extended Phase 1 habitat survey, and on species monitoring, habitat creation, compensation and enhancement. These resources were my bible.

Soon after, I accepted an assistant ecologist job in England with Atkins, and all of a sudden I was a small fish in a very large, very experienced ecology pond. I was finally able to build on the knowledge I had researched. Apart from Phase 1 habitat surveys, much of it was still 'in theory', which made my first encounter with a protected species all the more thrilling: a juvenile slow worm. Looking back now, I was extremely lucky to have started my career in the age that I did.

I was born in a time when saving the environment was the 'subject of tomorrow'. I started my career when it was the 'subject of today'. The whistle-blowers of the previous generations had already paved the way for me. The guidance for preserving our native environments was already there. Environmental awareness has become ingrained in almost every facet of our daily lives, from planning and development of nationwide schemes to deciding what needs to go into the green bin at home.

Instead of trying fight our corner, ecologists and environmental managers can now focus on moving with the times. Our discipline is now able to embrace technological advancements in identification, mapping and modelling software, and innovative survey techniques by using sniffer dogs, drones and 3D satellite imagery. We are able to focus on creating the elusive harmony between development and conservation.

Creating harmony is only becoming easier. Being able to quantify the benefits of certain habitats using new Biodiversity Net Gain matrices we can more definitively say, "Yes. We're can not only compensate for the habitat lost, but also improve upon it. Here are the numbers." Now that carbon net zero is rolling out in many organisations (environmental and non-environmental alike), adopting clean environmental practices is becoming the norm. Needless to say, as time goes on, these movements will continue to be enhanced.

Institutions like CIEEM pay homage to those who fought to reform legislation and open our eyes to the horrific culture of bulldozing the rural for urban with the detriment to global biodiversity. The world is now more aware of the importance of our natural environment. We ecologists and environmental managers are no longer fighting to have our voices heard. We are now hearing the innumerable voices of concern around the world and we are saying, "Don't worry, we're here to save what needs saving. It's our job."

Conclusion

Having set ourselves a brief and had some interesting discussions, we wrote our pieces independently (albeit with some light cross-editing). What stands out is the change in pace: the earliest recollections are of an uphill struggle, educating others and fighting our corner, but slowly the impetus turns and rather than pushing, our industry is being sucked along by a vortex driven by the public, clients and decision-makers. The membership of voluntary and non-governmental environmental bodies is growing and puts pressure on our legislators for effective legal frameworks for biodiversity.

The right words can bring environmental and ecological issues alive (Futerra 2015). To achieve our goals, we need to create clear narratives and promote issues to explain to government, to the public and to other professionals why biodiversity, natural capital and ecosystem services are crucial to the health and well-being of everyone. But we also need to continue to steer and shape the complex real-world delivery of the expectations of a generation.

These are exciting times, with technological methods developing apace. It is crucial to make these work for us and be greater than the individual parts by layering them together in common data environments, and sharing between organisations, disciplines and across the industry. Our industry needs to draw together the different tools that are used to evaluate and interpret data, for example Phase 1/ UKHab habitat surveys, Biodiversity Net Gain and carbon sequestration. These should all be able to use the same basic data to model losses and gains for the environment rather than each tool being used to interpret the data separately.

CIEEM can be on the bow wave of environmentally aspirational democracy but results need to be tangible and meaningful. At times change will be externally influenced and we must help spread it like windblown thistledown; at other times we must wait patiently for our buried acorns and grow our own change. Whether through making the best of technology, innovating or developing comparable 'metric', we should always be guided by professionalism and integrity, underpinned by sound science.

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Viewpoint

How Will Technology Change How Ecologists Work over the Next 30 Years?

Artificial intelligence will revolutionise how ecologists process large, complex datasets.

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Keywords: artificial intelligence, data, future, survey methods

The technology used by ecologists has already come a long way, and not just the transition from press-studs to Velcro on WeatherWriters. Here we take a tour of the cutting edge and attempt to glimpse the technology that will shape how ecologists do their jobs into the mid-21st century.

Introduction

In 1989, I won an Express Dairies competition to design a milkman of the future. Despite winning milkshakes for the school, I was wrong about the dog detectors and hover boards, not to mention failing to predict the dramatic decline of the milk delivery industry. A few decades later and, while lacking the enticement of free milkshakes, I thought I'd have another go at crystal-ball gazing.

Before looking forwards, it's useful to calibrate our crystal balls by considering the technological advances that were occurring 30 years ago. As it happens, 1991 was quite a year, with release of the first HP colour scanner and the first Norton antivirus software, and creation of the first website. While technological progress isn't constant, this look back illustrates the rough scale of change we might expect to see in the next 30 years.

1991 was also the year *Terminator 2* was released; a movie in which the human race is nearly extinguished due to developments in artificial intelligence (AI). While that was fiction, it's worth bearing in mind the potential for very real existential shifts presented by the development of AI and other game changers such as nuclear war, climate change and, as we're now all too aware, pandemics. For now, though, let's keep it light and assume life goes on, more or less as we know it, with AI influencing us in a more useful, less aggressive way.

Another assumption I'm going to make is that the purpose of ecologists in 2051 will be similar to today, which in turn assumes that society continues to value nature conservation and that there is an equivalent system of environmental protection. This is hopefully a safe bet but is by no means certain. After all, it won't just be our gadgets that are different in 30 years; we will change too.

Data, data, everywhere

While traditional ecology survey methods will be with us for some time, and in some instances we might only see a change in the device we use to take field notes, there is potential for technology to revolutionise the collection of certain types of ecological data.

Remote sensing

We are already familiar with having freely accessible satellite and street view imagery at our fingertips, as well as being able to download free light detection and ranging (LiDAR) elevation data for most of the UK and parts of Ireland (Figure 1). It is also becoming increasingly common for high-resolution data to be collected for specific project sites, using fixed-wing aircraft or unmanned aerial vehicles (known as UAVs or drones). Collection may be done as a one-off snapshot or repeated over time, opening the door to a range of opportunities for monitoring.

Infrared and thermal imaging may also be captured, further expanding the possibilities of what can be achieved remotely. Infrared light, for example, is useful in the characterisation of habitats from aerial imagery (Pearson *et al*. 2018), and thermal imaging can be used for efficient location of inconspicuous animals such as nesting nightjar (Shewring and Vafidis 2021).

The ease and affordability of collecting and accessing high-quality remote sensing data is likely to improve further, as satellite and drone technology continues to develop, along with sensor capabilities and the systems for processing and sharing information (Khorram *et al*. 2016). Innovations such as air taxis might also potentially provide other valuable sources of remote data, similar to how the Ordnance Survey is using data from cameras on utility vehicles to map street furniture (Navin n.d.).

We can expect to be able to access a recent, if not live-streamed, digital representation of any given study area. Accessing this 'digital twin' (whether it be via a screen or a more immersive technology) may enable us to find out more about the site than we could achieve from a real-world site visit, reducing the need for travel and the associated environmental impacts and safety risks, and enabling us to virtually access parts of a site that wouldn't otherwise be feasible.

Automated recording

Camera traps and passive acoustic monitoring devices have been around for a while now, steadily improving in terms of battery life, data storage, image/sound quality and triggering/filtering capabilities. The application of camera traps is typically limited to larger mammals and birds, while acoustic monitoring can be used for a much wider range of taxa, including birds, bats, marine mammals, amphibians, Orthoptera and fish (Browning *et al*. 2017). It is also now possible to retrieve data from these devices remotely, something likely to become more common following the roll out of 5G and low-Earth-orbit satellite broadband.

Improvements in automated recording devices are likely to continue over the next 30 years, with our reliance on them increasing accordingly. It's possible that new deployment options will also emerge, with UAVs delivering batches of recording devices to a site, or the recording device becoming part of the UAV, enabling roving transect-style surveys in addition to static monitoring. The data collection capacity of a fleet of such devices could far exceed what is currently possible, enabling levels of spatial and temporal coverage and, in turn, scientific robustness that aren't feasible today.

Another type of automated recording technology that has recently emerged is automatic radio-tracking. Like traditional radio-tracking, it's still necessary to capture and attach a radio transmitter to the target animal. The difference is that arrays of automated tracking stations are used to capture continuous position information,

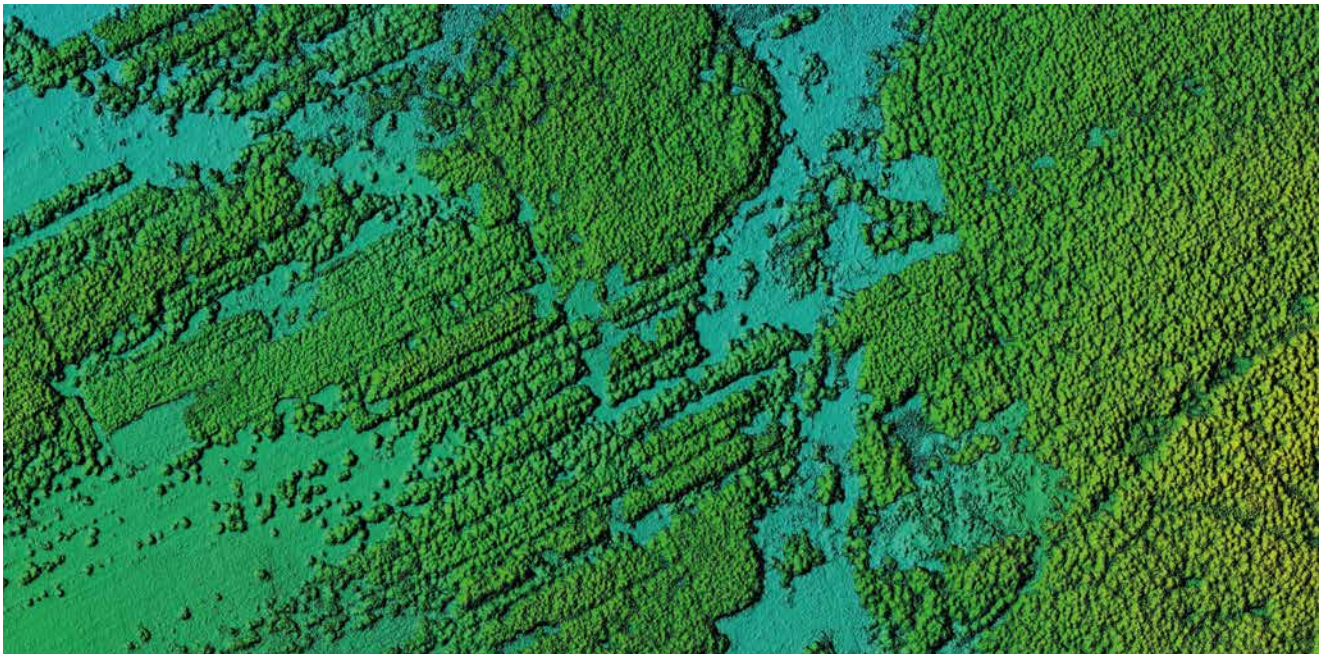

Figure 1. Aerial imagery from a drone has been used to make this digital elevation model of a forest area. Vegetation can be quantified by measuring the difference between near-infrared (which vegetation strongly reflects) and red light (which vegetation absorbs).

providing far more data for a fraction of the effort. Tests with bats indicate that the accuracy of automated tracking compares well to experienced manual trackers (Gottwald *et al*. 2019). This is therefore likely to become a commonplace technique over the next 30 years; until, perhaps, it becomes viable to track small animals from space (Khorram *et al*. 2016).

DNA

As illustrated by the March 2018 issue of *In Practice*, genetic techniques are now an established part of the ecologist's toolbox. Labs offer species identification from DNA extracted from tissue, hair or dropping samples, and confirmation of great crested newt presence using traces of environmental DNA (eDNA) has been an accepted standard survey method since 2014 (Biggs *et al*. 2014).

The range of applications for eDNA sampling to identify individual species or multiple species (known as metabarcoding) is set to increase. There are already labs offering eDNA identification services for crayfish, freshwater pearl mussels and plants, and Natural England is funding projects to explore the use of eDNA to detect species across a range of taxa and ecosystems (Nisbet and Bruce 2018). For certain taxa, eDNA metabarcoding has already been demonstrated to be more effective and efficient than conventional methods in characterising biodiversity (Ji *et al*. 2013). As the technology continues to be refined, it is likely to become an essential part of biodiversity monitoring (Ruppert *et al*. 2019).

Detection dogs

Milkmen never got dog detectors, but ecologists now have access to detection dogs. A review by Wilson *et al*. (2018) identified that over the past two decades dogs have been used to effectively sniff out a wild range of wildlife, with tested applications including searches for bat and bird carcasses, bat tree roosts, bird nests, great crested newts, pine marten scat, water voles and rare plants. Most studies have found the use of detection dogs to be more efficient than established survey methods (Wilson *et al*. 2018), leading to them increasingly being used to facilitate detection and mitigation for protected species on development projects (Gorman and Nisbet 2020), a practice which is likely to become more common.

Citizen science

In addition to professional ecologists with their ever-improving inventory of survey techniques, there is a substantial, growing population of amateur naturalists, for whom it has never been easier to identify species and share records. Field guide information can be accessed on a smartphone at any time and the same device can be used to take a picture to identify later, share to get assistance from the wider naturalist community or, increasingly, let the phone do the identification. Apps such as iRecord and iNaturalist also provide a means of easily submitting records for verification and inclusion in national databases.

While fraught with biases and not a replacement for targeted professional ecological survey, citizen science offers ecologists a vast source of data which, with appropriate coordination and consideration of its limitations, could become of increasing value in providing context to localised studies and enabling analysis of broader trends (Dickinson *et al*. 2010). There is also potential for the scope of citizen science to expand to include collection of eDNA (Ruppert *et al*. 2019).

Rise of the machines

It won't be humanly (or humanely) possible to process the quantities of data generated by the ecology surveys of the future. Fortunately, it won't all have to be done by humans…

Bigger, faster

As described by Moore's Law, the number of transistors on a microchip has doubled roughly every 2 years since the 1960s, with corresponding increases in computing capacity and speed. While the laws of physics mean that this period of packing more and more transistors onto a chip will soon be over, innovations such as specialisation of chips for particular tasks, development of quantum computers and replacement of silicon processors with graphene mean it is likely that computers will carry on improving (Bentley 2018). In the ecology sector, where we're far from exploiting the computing capacity that's already available, there is enormous potential for us to utilise this ever-improving resource.

Smarter

The recent development of a novel group of AI approaches known as deep learning is enabling computers to automatically recognise patterns in ways that are revolutionising the processing of large, complex datasets (Christin *et al*. 2019). There are many potential applications of this data classification power in ecology. Among other things, it has already been used to identify species from camera-trap images, videos and audio recordings, and to classify animal behaviour from telemetry data (Christin *et al*. 2019). Deep learning also has the potential to improve ecological modelling, enabling better prediction of habitat and species distributions and responses to change. The flexibility, accuracy and data-crunching potential of deep learning mean that it is likely to become an essential tool for ecologists over the next 30 years.

In addition to deep learning, there is potential for automated computer processes to assist with many of the tasks regularly performed by ecologists, such as survey scheduling, statistical analysis, data interpretation and evaluation, impact assessment, mitigation design, net gain calculations, reporting and strategic decision-making. Hicks and Mould (2021) provide a good example of how automated processes have been used on East West Rail.

Better connected

COVID-19 has led to a step change in our reliance on computers, with virtual meetings joining email as a dominant format for our professional (and social) interactions. While reduced face-to-face contact has its downsides, there are benefits in terms of logistical feasibility, efficiency and environmental impacts. The format will evolve over the next 30 years, with virtual site meetings increasingly becoming a reality. Avatars of ecologists, other disciplines, clients and other stakeholders will be able to 'meet' in digital representations of sites anywhere in the world, constructed from recent or real-time remote data.

The computing technology of the next 30 years is also likely to provide

improved opportunities in how we share and access data. Advances continue to be made in web-based biodiversity data-sharing platforms, such as NBN Atlas (Judge *et al*. 2018) and Cofnod's eMapper (Tapping 2018), and similar project-scale resources such as that described by Hicks and Mould (2021) are already being used for large infrastructure schemes. The Geospatial Commission (2021) has recently highlighted the benefits of an enhanced species data pathway, making recommendations to improve the UK's biodiversity data framework, including mandating the re-use of species data collected by consultants.

Enhanced data-sharing also creates opportunities for contextualised data analysis, as performed by the online bat data analysis tool, Ecobat (Lintott *et al*. 2018), and evidence-based tools for better-informed decision-making, such as those being developed by Conservation Evidence (Sutherland *et al*. 2021). There are also opportunities to rethink how survey and assessment information is presented to end users, with digital formats allowing us to break free of the traditional paper report.

Conclusion

A lot of the technology we are likely to become reliant on over the next 30 years is already here. We will probably see widespread adoption of today's cutting edge, with ongoing development of capabilities and an increased range of applications.

There will still be a need for human (and canine) expertise to undertake detailed survey work and verification of automated classifications, but the role of machines is likely to increase. This shift will necessitate a corresponding shift in the skillsets of ecologists, or at least increased interaction with computer scientists, geomaticians and microbiologists. Conversely, the machines may also help ecologists and the wider public to all become better naturalists and data-gatherers.

Capacity will exist for capture, analysis and communication of significantly larger volumes of data with greater efficiency and reduced safety risks and environmental impacts. This has the potential to lead to improvements in scientific robustness, decision-making and nature conservation outcomes. The growing bank of accessible ecological and other environmental information and improved modelling capabilities could also lead to fundamental changes in the approaches taken by ecologists and the wider industry.

Our ability to intelligently coordinate, collaborate and adapt will be key to the ecology sector maximising the potential gains that recent and future technological advances could bring. There is a role for CIEEM and all its members to play in making these potential gains a reality. Unfortunately, this is still unlikely to involve hover boards.

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The Next 30 Years: A View from Our Patrons

Professor Roger Crofts FCIEEM

30 years on

Global pandemics, water wars, plant diseases, heat waves, sea level rise, intense precipitation events, rising populations, infrastructure demands, population mobility. These features of current life will not have gone way, and many will be intensified 30 years on. Political leaders globally, nationally and locally will not have addressed these problems or applied the necessary resources for their solution. Is this a counsel of despair or just a more likely scenario? It is easy to point to the rosy picture of what we would like, but in our profession and our Chartered Institute we need to think forward about the disruptive factors, consider different scenarios, preferably with other organisations, and prepare our reaction to them.

Let me give an example: land use conflict. The population may not have grown more, but the cumulative effects of demands on the land for food and fibre, for housing, commercial and infrastructure development, for recreational space and space for nature will be enormous. The arguments for nature-based solutions and living in harmony with nature may be accepted norms in people's heads, but it will be their behaviour which counts most. Can developments and activities with multiple objectives and multiple benefits, the current holy grail, become the norm? Traditional agriculture will be challenged to produce more with less environmental effect. So, does it go indoors and, if so, where will it go when land is so scarce and public attitudes are against it? Will the real value of space for nature and recreation be reflected in decisions when that may well be in conflict with all of the other demands on space?

What should members and CIEEM be doing about it? First, identify what we can do as professionals to mitigate and ameliorate the position as we practise in our everyday activity. We will demonstrate best practice to other professionals and the public who have a lesser understanding of the environment. Secondly, as our knowledge builds with more members drawn from the research and scientific community, alongside the practising experience of our core membership, we should become increasingly sage advisors and advocates of new approaches to build better solutions for society and the environment.

Dr Jane Davidson

Step up, ecologists, your country needs you

I've been reading climate articles for the best part of two decades. Each time I lurch from feeling despondent (the evidence suggests things are (much) worse than previously reported) to being really optimistic (we know what we need to do – we just have to do it). I have often questioned why we don't act on the evidence we have, particularly in relation to enhancing biodiversity.

Last week, I read an article by Professor Mark Maslin[1] about his new book *How to Save Our Planet* where he imagines two different visions of the future – one in which we do nothing to address climate change, and one in which we do everything possible to hold the temperature to 1.5°C by 2050. Our trajectory is very gloomy for current and future generations if we fail to act, but hugely exciting if we do, particularly if we are prepared to devote half of the world's surface to Nature as described in Pulitzer Prize-winning author Edward O. Wilson's *Half-Earth* – a paeon of praise to the millions of invertebrate animals and microorganisms that form the foundations of Earth's ecosystems.

Who are our guides to this new world? Step up, ecologists, your country needs you. Ecology is the knowledge of our planet home and all its species; economy and the management of it. We cannot manage what we do not know – and perhaps it is the lack of this fundamental understanding which has contributed to the crisis we're in. Can ecology lead the way? I think so. Now is the time to fight for Nature; to be bold and ambitious in its defence and uncompromising in its support. After all, as Ernest Hemingway said: "*The Earth is a fine place and worth fighting for.*"

Note

1. https://theconversation.com/climate-change-how-bad-could-the-future-be-if-we-do-nothing-159665

Professor David Goode
CEnv FCIEEM

The next 30 years

What major ecological issues will the Institute face in 2051? Climate change and loss of biodiversity can be expected to dominate the world. Their magnitude is immense. These two global issues are already generating a disparate array of problems, many of which are unprecedented. Judging by the recent pace of change we can expect major environmental impacts by 2051, which no one has yet predicted. Unknown unknowns are likely to be considerable.

Meanwhile members of the Institute strive to make progress utilising current concepts and practicalities. We promote the conservation of natural capital, safeguard crucial ecological services and aim for a net gain in biodiversity. Dramatic advances have been demonstrated through rewilding projects. Key concepts such as biophilia and analysis of urban metabolism are gaining ground, bringing ecological principles into the realm of urban planning and design.

Detailed work on threatened species and habitats needs to continue, but we need to go further. To be effective in 2051 we need the following:

- The balance must shift towards more strategic targets with long-term agendas based on ecological principles. The Institute should provide the rationale for an integrated land use strategy for the UK incorporating both biodiversity and agriculture. This could be a step towards Edward O. Wilson's visionary concept of *Half-Earth*.
- Continuous in-depth metabolic studies of ecosystems will be essential to quantify their performance in relation to greenhouse gas emissions. Peatlands and oceans will be crucial.
- Status of ecology. We have achieved a great deal since 1991, but ecology is still held in less esteem compared with other professions. This has to change. The Institute must position itself to provide intellectual leadership across a wide range of ecological problems facing humanity. It must become indispensible, advising government, academia and key environmental professions. This will require a range of disciplines, including social scientists, working together to find solutions. The Institute should, for example, promote eco-urbanism as a new discipline led equally by ecologists, designers and planners to combat the most severe effects of climate change and promote biodiversity where people live. We need to lift ecology into the heart of humanity.
- We must recognise the urgency for action. There is no time to lose and no room for complacency.

Baroness
Barbara Young

And the environmental managers inherited the Earth!

Pondering on where the environmental management sector will be in 30 years' time is much influenced by which side of the bed I got out of! We will be in 2051 and will know whether we have achieved Net Zero, halted and reversed biodiversity decline, have a genuine circular economy and sustainable land and water use. But even if we have, the impact of the carbon out there already will have had a big impact on the climate and weather patterns, on agriculture and food and on the ability to feed the populations of the world. We will certainly be facing big pressures from population movement. And that's on a good day!

If we fail to tackle the climate and environmental problems we know are existential, they will have been just that.

But whatever happens, the day of the environmental managers has come! The range of skills you offer are already being clamoured for as in short supply and deeply needed. More public bodies are having duties laid on them that will require environmental management skills and more companies are recognising that they need to perform better environmentally to continue to trade. If our wealth is increasingly to be measured as natural capital, then people who can measure, monitor and manage that will be crucial. Young people are hugely more environmentally committed and need to be educated in environmental literacy.

So environmental management will assume the sort of position in government, business and society currently held by lawyers and accountants. They need to be the new knowledge holders, with respect and professionalism, not the rather tawdry image that the older professions have got themselves.

So we need to make sure we have enough skilled professional people in the right disciplines for the future. Some will be old skills – we are desperately short of good field-based ecologists. Some will need to be able to use innovative modelling, artificial intelligence and genetic skills. Let's go for it – there is much at stake.

Viewpoint

How Wild Will We Be in 2050?

Jon Davies
CEcol CEnv FCIEEM
RSK Wilding and Nature Positive

Keywords: Biodiversity Net Gain, BNG, conservation, conservation covenants, ecosystem restoration, ELM, nature, recovery, regenerative farming, rewilding

Where will we be in 30 years? Will the 2020s be seen as a turning point, or is it already too late? This decade has been declared the UN Decade on Ecosystem Restoration, and there is a strong sense that if we don't act now, we could be facing ecological collapse. Here I consider whether the current obsessions with Biodiversity Net Gain, habitat restoration and, specifically, rewilding, will last the test of time such that, by 2050, a significantly greater proportion of the land and sea has been restored to a more natural condition. The concept of rewilding has clearly captured the public imagination, and wider engagement with people will be essential if we are to properly tackle the biodiversity crisis.

Happy 30th birthday CIEEM! Thirty years ago I was about to start a Master's degree in conservation at University College London, full of optimism about how we were going to save the planet. But has that much actually changed over the last 30 years? After all, we are losing biodiversity faster than ever and are also in the midst of a climate emergency. So the key question is, will what we are doing now in relation to Biodiversity Net Gain (BNG), habitat restoration and rewilding make more of a difference over the next 30 years? How wild will we be in 2050? Will we have saved the planet, or will Earth be an ecological wasteland dominated by cockroaches, pigeons, rats and jellyfish?

We are at a turning point in the history of our planet. The decade 2021–2030 is the United Nations Decade on Ecosystem Restoration, and not a moment too soon. At long last, people and governments have twigged that something really needs to be done, and

done *now*. Alongside climate change, biodiversity has muscled its way into the heart of the political agenda. One aspect in particular has captured the public imagination: barely a day goes by without a news story about rewilding. But is this going to be just another environmental fad, or is rewilding here to stay? And do we have the room for true rewilding in the UK, or will it require a hybrid approach combining rewilding with traditional conservation?

Dare we hope that Earth has reached its ecological nadir, and that huge areas of the planet will be returned to nature over the coming decades? As Geoffrey the gorilla might have said in the hit 1980s comedy show *Not the Nine O'Clock News*: "If the UK is not significantly more biodiverse by 2050, I won't be wild, I'll be absolutely livid!"

As my colleagues and I build our new ecological business ventures Nature Positive and RSK Wilding – aimed at assessing the biodiversity impacts of our corporate and developer clients and using rewilding (alongside more active interventions) to provide biodiversity and carbon offsetting – I am struck by the joyous long-termism of it all. We're not looking at a quick fix that could easily be overturned; this is not nature conservation by sticking plaster. England's 25 Year Environment Plan – in parallel with Nature Recovery Plans for Scotland and Northern Ireland, and the Nature Recovery Action Plan (NRAP) for Wales – is an ambitious strategy for enduring beneficial change, and we are more than happy to jump on the bandwagon. We are currently preparing lease agreements for large areas of land that will see them managed (or not!) for biodiversity for at least the next 30 years. On any future sale of the land, the legal requirement to enhance nature will pass to the new owner. The agreements in place, and the ongoing monitoring of the land, will ensure that the increase in biodiversity committed to at the outset is indeed delivered, and then maintained for decades to come.

But what will these first offsetting sites look like in 2050, and what is likely to happen to them then?

We set up RSK Wilding and Nature Positive in early 2020, and you might imagine that starting two new businesses just as the most significant pandemic in a century was taking grip was a stroke of bad luck. However, the public has reconnected with nature so much over the last year, largely through enforced lockdown-induced family perambulations. People are now clearly much more responsive to the idea of the biodiversity crisis and the fact that the wonderful nature that they have rediscovered is at risk. The concepts of rewilding and habitat restoration, and the ensuing reversal of biodiversity loss, are really gaining traction. This is providing the impetus for substantive change in the planning and policy spheres.

Critically, though, this new sense of interest and urgency is not restricted to environmental professionals, but is shared with the population at large. This year's BBC *Springwatch*, for example, came from Wild Ken Hill in Norfolk, and Alladale in Scotland, and focused on how rewilding and regenerative farming could be key in addressing the twin crises of climate change and biodiversity loss. The more we can get the public on board with this conservation crusade, the more likely it is to bear fruit. Literally. And we also need to get away from the erroneous idea that rewilding is all about reintroductions. It is much more about restoring habitats (whether actively or passively) for the benefit of plants and invertebrates, which are the real engine rooms of biodiversity; that's why we chose the stag beetle for the RSK Wilding logo.

BNG and rewilding are therefore two sides of the same coin: making an area wilder, and allowing natural processes to take their course (and yes, sometimes with a gentle nudge from more traditional nature conservation along the way), will increase biodiversity. There continues to be debate about what rewilding is, but this is all just semantics. Ultimately, we just need to do whatever it takes to get us out of this massive biodiversity-shaped hole, and I don't really care what you call it. 'Rewilding' works for me because that is the term that has captured the imagination of the public; and for us to effect the necessary change we need the public on board.

The mandating of BNG through the Environment Act later this year (still with no date available at the time of writing),

"We are at a turning point for our planet. The decade 2021–2030 is the United Nations Decade on Ecosystem Restoration, and not a moment too soon."

alongside the establishment of a national Nature Recovery Network, will firmly establish the principle of species and habitat recovery within the English planning process (with similar measures planned elsewhere in the UK). This will allow farmers and other landowners to see the commercial benefits of managing their land for wildlife enhancement in exchange for offsetting payments. Defra's Environmental Land Management (ELM) scheme will similarly incentivise positive biodiversity-related land uses, providing "public money for public [environmental] goods" at three different scales, through the Sustainable Farming Incentive, Local Nature Recovery and Landscape Recovery.

But perhaps even more significant than these positive policy developments is the recent HM Treasury review into the economics of biodiversity, carried out by the eminent economist Professor Partha Dasgupta. This could well be a game-changer for the environment over the coming decades. Professor Dasgupta wants to see biodiversity (and sustainability more generally) at the heart of financial decision-making by governments, not just in the UK but across the world. No longer will clearing natural habitat and exploiting nature be the cheap and simple option that it has been for hundreds of years; the power of capitalism should now be harnessed in support of the environment, rather than relentlessly leading to its destruction. Similar to the creation of the United Nations and International Monetary Fund in response to the global crisis of World War 2, Professor Dasgupta believes that we now need to establish a similarly ambitious global institution to tackle the twin crises of climate change and biodiversity loss. Since we all depend upon a healthy biosphere, we should all be involved in managing the commons (in particular the open oceans) to ensure they are protected, and there can no longer be a free-for-all on the natural resource we all rely upon.

So, could it be that by 2050 we will be living in a more environmentally equitable world, where a significantly greater proportion of the land is given over to nature, and the planet is no longer farmed or fished to oblivion, careering along a one-way track to catastrophic environmental breakdown?

Turning our attention back to the UK, and the long-term implementation of the principles of nature recovery and rewilding, how might this look? First and foremost, it should be the case that someone flying over the countryside in 2050 (in a zero-carbon plane, obviously) will experience a very different landscape to the one we experience today. No longer will the land be a chequerboard of bright green and yellow fields as far as the eye can see, interspersed only with the odd tiny pocket of woodland or slightly more interesting grassland. Instead, the now firmly established Nature Recovery Network (or its equivalent) will be clear to see: enormous swathes of gloriously messy countryside, linking up across the landscape as if smeared by the thick brush of a particularly exuberant oil painter. There will be national wilderness trails where you will be able to walk enormous distances across the country through nothing but wild land, and once again the countryside will be teeming with a glorious abundance of insects, birds and flowering plants.

And what if we were to go walking along one of these trails? As we climb over a stile, might there be a sign saying 'Beware of the wolves!'? Perhaps as we make our way across the huge expanses of scrubby grassland, we will encounter herds of long-horn cows, bison or even tauros, a new breed of wild cattle specially bred as a modern-day version of the aurochs to bring about what is known as Pleistocene rewilding? And maybe we will pick our way over one of numerous beaver dams as we cross a flooded wetland, or even poke at the carcass of a roe deer, recently felled by a lynx? Even beyond these wild areas, the landscape will look very different. As we look over the neighbouring farmland, we will see that the enormous success of regenerative farming has meant that ground has not been ploughed for 30 years, and that decades of continuous cover will have resulted in farmland

once again buzzing with biodiversity, and a soil throbbing with microbial life.

However, dropping momentarily out of our reverie to focus on the practicalities (pity, I was enjoying that!), once the first 30 year conservation covenants draw to an end in the early 2050s, what is likely to happen then? Will landowners keep the land managed for biodiversity and, if so, what further incentives might there be to encourage this? Perhaps these will be in the form of biodiversity maintenance payments, with the Defra Metric (version 302.0) continuing to be used to calculate the number of biodiversity units accruing from further improvement of habitat condition (e.g. from semi-mature to mature woodland)? Or will the next generation of farmers simply be relieved that the actions of the class of 2020 led to the restoration of healthy and productive soils, and plough up the restored land (or at least some of it) for crops? Would that be so bad? Or will it instead be the case that regenerative farming has taken over to the extent that all our agriculture is now environmentally sound?

Of course, it is impossible to know whether we are at a turning point in the climate and biodiversity debate, and whether the enormity of the crises facing us has been grasped sufficiently to force us to instigate the change needed. What will we be saying about the UN Decade on Ecosystem Restoration in 30 years' time? How will future generations view our response to the existentialist threat of environmental breakdown when we had so much evidence of the risk in front of us? Will rewilding be seen to have saved the planet? Will we be able to hold our heads high with pride, or will we be too ashamed to even look the next generation in the eye? Without wishing to be too gloomy, the potential certainly exists that we will have failed, that this brouhaha will have just been another false dawn, and that the planet will be doomed. If that happens, and assuming I'm still alive, I truly will be livid.

About the Author

Jon Davies BSc MSc CEcol CEnv FCIEEM has been an ecological consultant for over 25 years, specialising in Ecological Impact Assessment, Habitats Regulations Assessment, Biodiversity Net Gain and invertebrates. He set up RSK Wilding in early 2020 with the ambitious aim of helping to reverse catastrophic biodiversity loss and climate change. By 2050 he intends to be long retired, ideally living in a rambling cottage and tending to the bison on one of RSK's rewilded sites….

What has Changed for Ecological Consultancy and What Does the Future Look Like?

Clare May
CEnv MCIEEM
Tetra Tech

Keywords: Agricultural Act, Biodiversity Net Gain, biodiversity, decline, Environment Bill, Natural Capital

Returning from maternity leave made me reflect on the ever-changing world of ecological consultancy and the UK's biodiversity and ecosystems. The year that I was on maternity leave (October 2018–October 2019) felt like one of the most crucial and fast-changing years, potentially ground-breaking for the future of our industry. My intention had been to keep on top of new policies and guidance, but the reality of juggling a toddler and a baby who woke hourly did not make that easy. My return to work was rather daunting, as I felt I had missed so much and I had a lot to catch up on. I began reminiscing about undertaking bat surveys using a Batbox Duet and was rather amazed at how far the sector has come. Reflecting on whether my work has had a positive impact on biodiversity has made me think about the exciting future that lies ahead for us as ecological consultants.

What has changed since starting my career as an ecologist?

There is no doubt that the ecological consultancy world has moved in a positive direction:

- Technology is smaller, cheaper, more portable and more accurate. Field data are collected using tablets or mobile phones. Specialist equipment such as bat detectors is more accurate and user-friendly, offering a wider range of recording styles and built-in features such as GPS, and even real-time identification and sonogram analysis. Drones are now heavily used to capture landscape accurately in a fraction of the time needed for a site survey.
- We are no longer dependent upon humans to detect protected species but we can use detection dogs to detect great crested newts, water voles and hedgehogs, among others.
- Scientific advancements such as environmental DNA analysis have made significant cost savings for clients and reduced delays to programmes by avoiding traditional presence/likely absence surveys.
- Developments in case law have changed the way we work; for example, in the 2018 *People over Wind and Sweetman v Coillte Teoranta Case C-323/17*, the Court of Justice of the European Union ruled that it is not correct to take into consideration mitigation measures, i.e. any factors intended to avoid or reduce harmful effects at the initial screening stage of a Habitats Regulations Assessment. Rather, such measures should be considered in the second stage of assessment under Article 6(3) of the Habitats Directive, termed Appropriate Assessment. This resulted in us seeing a significant increase in Appropriate Assessments.

These developments are to name a few, but all of the points above would and should be a benefit to biodiversity and ecosystems. But the reality is that the Biodiversity 2020 strategy, which aimed to halt overall loss of England's biodiversity by 2020 (Defra 2011), just did not succeed. The UK failed to meet 14 of the 20 UN biodiversity targets (Joint Nature Conservation Committee

"Ecological consultancy has moved in a positive direction: technology is smaller, cheaper and more accurate, and scientific advancements have made significant cost savings for clients."

Figure 1. A Tetra Tech ecologist collecting field data using a tablet. Photo: Harriet Baber.

2019), which were agreed in 2010. Subsequently the Royal Society for the Protection of Birds (RSPB) has done its own review suggesting that progress was over-estimated for many targets. Hayhow *et al.* (2016) described the result of Biodiversity 2020 as "a lost decade for nature" and found that between 1970 and 2013, 56% of UK species declined, with 40% showing strong or moderate declines and 15% becoming extinct or being threatened with extinction in Great Britain. Hayhow *et al.* (2016) suggested that the UK has lost significantly more nature over the long term than the global average and the index suggests that we are among the most nature-depleted countries in the world.

What went so wrong and are we doing enough?

Something has gone horribly wrong for the UK. As ecological consultants the majority of the work we do relates to legislation and policy to protect sites, habitats and species, which are considered to be of high value, either in isolation or within a protected area network (CIEEM 2019). Work has progressed in some respects to look at protected species at a landscape level, such as district level licensing. Naturally, as ecological consultants we apply the mitigation hierarchy, firstly avoiding impacts where possible and then reducing/mitigating impacts with offsetting or compensation as the last resort. Despite this, UK biodiversity continues to decline. We all want to contribute to improving the environment and hearing that we failed to meet so many objectives of the Biodiversity 2020 strategy is upsetting and demoralising.

I can't help question whether our biodiversity would be in this situation if decisions were based on facts, legal duties and policies. We often find that what happens to nature is a result of political power and decision-making.

The COVID-19 pandemic has resulted in many people re-connecting with and reconsidering their relationship with nature. The Office for National Statistics (2021) said that shifts in personal and corporate attitude could mean that post-lockdown the UK population will value and interact with nature much more than before the pandemic. A study by Cardiff University and Cardiff Metropolitan University (2021) found that people with access to green space report better health and well-being. With the greater recognition of the value of nature to our social well-being, along with Brexit providing an opportunity to create our own policies and laws independent of the EU, I hope this will lead to a new level of engagement with biodiversity issues to drive real and sustained change.

What changes have been put in place?

In January 2018, the Government launched the 25 Year Environment Plan, setting out action to deliver cleaner air and water, protect threatened species and provide richer wildlife habitats. It calls for an approach to agriculture, forestry, land use and fishing that puts the environment first (HM Government 2018) and has Natural Capital at its heart.

The Environment Bill (2019) builds on the 25 Year Environment Plan and is a key driver to deliver on its targets. In part, the Bill seeks to fill the governance gap following Brexit, but with important measures to tackle biodiversity loss and the climate crisis, which we know are interconnected (Committee on Climate Change 2018). For ecological consultancy, a large change is the introduction of mandatory Biodiversity Net Gain (BNG) of 10% for new developments in England. Along with this there are various other benefits from legally binding targets for England to halt the decline of wildlife, to creation and restoration of new habitats including woodland and peatland, recovering threatened species and reintroducing species along with establishing a new Office for Environmental Protection. Some concerns which are discussed below.

In November 2020 the Agricultural Act (2020) was given Royal Assent, and replaces the EU's Common Agricultural

Policy (CAP). It is another positive Act that will hopefully act as a vehicle for achieving the goals of the 25 Year Environment Plan alongside the Environment Bill. The CAP historically paid farmers for the total of land farmed rather than any public benefits, resulting in the largest landowners receiving the largest payments. The European Court of Auditors (2020) stated that the CAP was not effective in reversing the decades-long decline in biodiversity and intensive farming remains a main cause of biodiversity loss. The Agricultural Act sets out a new Environmental Land Management Scheme, which shifts towards the principle of 'public money for public goods'.

What do the next 30 years look like for ecological consultants?

The fields of BNG and Natural Capital gained traction during my maternity leave and have progressed ever since. This aspect of ecological consultancy in particular has kept me interested and engaged upon my return to work. Both BNG and Natural Capital have received some negative press as there are questions over how we apply a monetary value to nature (and if we should). However, while accepting that there are still uncertainties, one thing is for sure: we don't have time to procrastinate as our biodiversity continues to decline. What other options do we have?

For me, BNG and Natural Capital will allow us to make a significant difference by creating and connecting our green infrastructure, as well as enhancing our natural and social capital. This will leave a lasting positive impact on our countryside, biodiversity and local communities. It encourages joined-up thinking. Isolated mitigation and enhancements at a site level will likely be a thing of the past.

There is frequent positive news and commitment from the Government to combat the biodiversity and climate crisis. For example, the Government's response to the 2021 Dasgupta Review has committed to extending mandatory BNG requirements in the Environment Bill to include new Nationally Significant Infrastructure Projects. Furthermore, the House of Commons Environmental Audit Committee (2021) raised a series of concerns and I do feel that these issues are being discussed and changes made, to some degree.

Many ecological consultants are concerned that BNG should be extended beyond 30 years and maintained and secured in perpetuity to gain long-lasting nature recovery. This has been raised by the House of Commons Environmental Audit Committee (2021). I am also uncertain

"BNG and Natural Capital will allow us to make a significant difference by creating and connecting our green infrastructure, as well as enhancing our natural and social capital."

Figure 2. Bluebell woodland, Micheldever woods, Hampshire. Photo: Clare May.

about how the success of BNG will be monitored and enforced: we all know that funding is often lacking for monitoring and enforcement.

Further, I am nervous about the Environment Bill, in particular the 're-focus' of the Habitats Regulations, the most significant piece of legislation giving legal protection to much of our biodiversity. My hope is that this review will not weaken these protections, as this would work against the targets to combat biodiversity loss and the climate crisis. However, the proposal by the Quinquennial Review that the eligibility criteria be changed for which species are included on Schedules 5 and 8 of the Wildlife and Countryside Act does not fill me with confidence. The Bill also looks to re-introduce species, which sounds wonderful, but I hope that these efforts do not divert resources away from conservation of species on the brink of extinction, which I would expect to remain the focus of the Environment Bill.

I feel somewhat reassured, given that there is a legally binding target for species abundance. While I recognise that Biodiversity 2020 didn't work, it was not legally binding. Nor, in many respects, were the targets measurable, making it difficult to assess progress and performance. Clearly we need more prescriptive targets and perhaps this is something that will be addressed from the lessons learned to date.

There is still significant work to be done to get us to where we need to be, but given the traction and discussion time that biodiversity loss is receiving along with a detailed list of concerns raised by the House of Commons Environmental Audit Committee (2021), I have my greatest confidence to date that things are changing for the better. The Environment Bill and Agricultural Act will hopefully drive the 25 Year Plan forward to preserve, restore and protect the environment and biodiversity for future generations.

I start the next 30 years of ecological consultancy feeling more positive that the work we do will be for the benefit of biodiversity overall, rather than focusing purely on key species and habitats covered by legislation and policy. I am hopeful that in 30 years our landscape will be greener, with increased tree planting, natural habitats and green spaces, interconnected by green and blue infrastructure. Realistically, 30 years is a short time in which to establish this change, but I am hopeful we are moving in the right direction.

I think our role as ecological consultants will change but our work will become more important than ever. Yes, we need to be technologically advanced and we will be led by science in terms of research and technology improvements. However, I think the shape of ecological consultancy service offerings will change forever through the application and delivery of BNG and Natural Capital. I do hope this encourages collaboration between consultancies, sharing knowledge and reaching the best solutions for our environment, biodiversity, the public and our clients.

Most of all, I hope I am sat here in 30 years reflecting again, and I am able to say what a positive contribution the Environment Bill and other polices have made to the state of the UK's biodiversity.

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Carbon Offsetting to Achieve Net Zero by 2030

Figure 1. Hummocks of *Sphagnum* moss amidst characteristic bog plants at Fenn's, Whixall and Bettisfield Mosses National Nature Reserve. Photo: Stephen Barlow.

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Amber Connett

Keywords: carbon offsetting, climate emergency, CO_2 emissions, nature-based solutions, net zero, offsetting principles

Atmospheric concentrations of CO_2 have reached levels that are disruptive and damaging to life on Earth. Emissions of greenhouse gases must be swiftly and substantially reduced. Fossil fuels should be avoided. Unavoidable emissions require the rapid removal of equivalent amounts of CO_2 from the atmosphere.

Carbon offsetting schemes involving nature-based solutions can be used to compensate for unavoidable emissions. This article sets out principles for individual and corporate offsetting schemes. Future action is not an option: real-time offsetting is needed now. The best action is to stop emitting greenhouse gases.

Offsetting for CO_2 emissions

Targets to achieve net zero emissions of CO_2 by 2030 (Box 1) mean that adding CO_2 (or another greenhouse gas such as methane) to the atmosphere requires an equivalent amount of CO_2 to be removed from the atmosphere or prevented from entering it. Efforts must always be focused on the earlier stages of the carbon management hierarchy – that is, eliminate, reduce and substitute – rather than the final stage: compensate (IEMA 2020). Unavoidable emissions can be offset (or balanced) by carbon credits purchased from credible

schemes, ideally involving nature-based solutions. Offsetting is a way of paying for others to reduce emissions to the atmosphere, or absorb CO_2 from the atmosphere, in order to compensate for one's own emissions.

Box 1 Global heating

Average global temperatures are currently 1°C higher than in preindustrial times due to human activities. The UN Intergovernmental Panel on Climate Change special report (IPCC 2018) states that global heating could be kept to a maximum of 1.5°C by 2100 if we all act now. A further rise to 2°C by 2100 would significantly increase the risks of drought, floods and extreme heat and the resultant poverty, hunger and disease for hundreds of millions of people. Restricting global heating to 1.5°C above preindustrial levels requires halving global emissions of greenhouse gases by 2030 and ending emissions by 2050.

The urgency is clear. Only a further 420 billion tonnes of CO_2 can be released into the atmosphere globally if the average increase in global temperature is to be kept to a maximum of 1.5°C (IPCC 2018). The current global emissions of 42 billion tonnes of CO_2 every year blows this 'carbon budget' in only 10 years. We have to act now.

Carbon offsetting schemes can include carbon reduction, energy efficiency, renewable energy, and habitat creation and restoration projects. Many of the projects are in developing countries and provide additional benefits such as biodiversity, education, jobs, food security and clean drinking water, and they also promote health and well-being.

Reductions in CO_2 emissions through energy efficiency or renewable energy supplies are necessary projects, but CO_2 needs to be removed from the atmosphere now. New CO_2 emissions will increase CO_2 levels, resulting in further consequences. CO_2 can be removed from the atmosphere by creating habitats such as woodlands or by restoration of habitats such as peatland or coastal salt marsh (Anderson and Morris 2021, Environment Agency 2021, Gregg *et al*. 2021).

Offsetting schemes have a part to play in delivering funding for these projects at the scale and speed needed to make a real difference. The costs of formal offsetting schemes vary and there are certification frameworks to ensure schemes are verifiable and registered. It is vital that offsetting schemes are viable and effective and are delivering the scale and timeframe of the CO_2 storage that is claimed.

We must be realistic. It is not possible to offset current UK emissions through better environmental management alone. Deep cuts in emissions across all sectors are required with nature-based offsetting schemes playing a crucial role in compensating for the absolutely unavoidable residual emissions.

What is CIEEM doing?

In 2019, CIEEM committed to achieving net-zero carbon emissions by 2030. Since 2016, the greenhouse gas emissions produced by Secretariat and formal committee travel, along with energy usage at the office in Winchester, have been recorded and converted into a carbon footprint using carbonfootprint.com. CIEEM has now expanded the 'scope' of the emissions being recorded to include wider services and emissions produced along the supply chain using a bespoke carbon calculator based on official conversion factors (BEIS 2020). CIEEM's carbon emissions and the steps being taken to reduce the emissions were summarised in this publication by Connett and Box (2020).

Since 2016, CIEEM has offset its unavoidable emissions every year by making a donation equivalent to the average cost of offsetting the annual carbon emissions determined by carbonfootprint.com to support environmental projects:

- Plantlife wildflower meadow habitat conservation in England (www.plantlife.org.uk/uk)
- The Native Woodland Trust planting programme in Ireland (www.nativewoodlandtrust.ie/)
- Trees for Life Caledonian Forest restoration in Scotland (https://treesforlife.org.uk/)
- Project Seagrass in Wales (www.projectseagrass.org/)

These projects are providing long-term carbon sequestration and significant benefits for biodiversity. From 2021, a selection of projects that meet the new CIEEM offsetting principles (further details below) will be put to a member vote to choose the project to be supported each year. This will raise awareness among CIEEM members about offsetting and how CIEEM is dealing with its unavoidable residual carbon emissions.

The CIEEM Carbon Reduction Plan (CRP) was approved by the Governing Board in June 2021 and published in July (https://cieem.net/resource/cieem-carbon-reduction-plan/). The CRP sets out the baseline carbon emissions, how they are recorded, the projects for reducing emissions and how unavoidable emissions will be offset. The CRP will be updated annually to recognise actions taken. The principles for carbon offsetting set out below are included in the CRP to guide future offsetting projects.

Principles for carbon offsetting

Unavoidable CO_2 emissions each and every year require high-quality offsetting schemes that follow offsetting principles for the removal of equivalent amounts of CO_2 from the atmosphere.

PAS 2060 (British Standards Institution; www.bsigroup.com/en-ID/PAS-2060/) is an internationally recognised specification for carbon neutrality that sets out requirements for quantification, reduction and offsetting of greenhouse gas emissions. The Oxford Offsetting Principles (Allen *et al*. 2020) provide a framework of general principles for credible offsetting schemes that can be linked to achieving net zero; these principles include existing best practices for offsetting schemes. The Environment Agency (2021) has reviewed approaches to offsetting using a set of eight characteristics.

The principles below take account of PAS 2060, the Oxford Offsetting Principles and the Environment Agency (2021) review.

- Additional: it is fundamental that offsetting funds do not pay for work that would have happened anyway.

- Verifiable: verification and certification of the CO_2 offsetting in a transparent and accountable process.
- Remove CO_2 from the atmosphere: nature-based solutions that create new habitats and restore existing habitats and ecosystems that will help to address the biodiversity crisis and deliver ecosystem services.
- Permanent: the CO_2 removed from the atmosphere should not be released in the future except through natural processes.
- Undertaken in real time: CO_2 emissions should be offset simultaneously with their generation or over a defined short period of time.
- Based locally: offsetting schemes should ideally be based in Britain or the island of Ireland.
- Avoid negative impacts: offsetting schemes should have a very low risk of creating unintended consequences for people or the environment.

Offsetting CO_2 emissions now and not in the future

Offsetting can appear to be an effective way of dealing with CO_2 emissions released by our activities and operations. However, many offsetting schemes can be categorised as 'deferred offsetting' in that the scheme will not deliver its claimed benefits until some point in the future, for example the several decades needed for trees planted now to mature and effectively absorb CO_2. The Oxford Offsetting Principles recognise this issue of timeliness: "…any time gap between the purchase of the offset and the successful execution of the emission reducing or carbon removing activity must be minimised" (Allen *et al*. 2020, p. 5). The Environment Agency review of offsetting includes 'speed and scale' as one of the eight evaluation characteristics and concludes that a critical factor is how quickly the offsetting approach produces emissions reductions or CO_2 removals (Environment Agency 2021).

The real-time offsetting principle stating that unavoidable CO_2 emissions should be offset simultaneously with their generation or over a defined short time period involves complex issues. What does such a real-time offsetting scheme look like? What would this mean for our landscapes and the wider countryside and the relationship between agriculture, forestry, landscapes and amenity? Verification and certification of both the ecological and carbon performance of such schemes must be involved. These difficult questions cannot be avoided and will focus efforts on the earlier stages of the carbon management hierarchy – eliminate, reduce and substitute – rather than the final stage of compensating through offsetting or carbon credits.

Offsetting CO_2 emissions through habitat creation and habitat restoration schemes

Soils, vegetation, freshwater and marine ecosystems are carbon sinks in complex and dynamic equilibrium with atmospheric CO_2. These carbon sinks are not necessarily full but may not be able to absorb CO_2 as fast as it is being released from the use of fossil fuels and from the destruction of habitats that already store carbon.

New CO_2 emissions will accumulate in the atmosphere and will require new habitats and newly restored habitats to become effective carbon sinks. This can be done by creating habitats, such as mixed deciduous or native pine woodlands on poor-quality agricultural land, and by restoring existing habitats, for example naturally functioning peatlands (Figures 1 and 2), salt marshes or seagrass meadows (Figure 3). The

Figure 2. An area of the National Nature Reserve being restored by bunding peat into cells with pipes installed to direct excess water into other areas. The restoration is part of a £5 million EU LIFE-funded Marches Mosses BogLIFE Project. Photo: Stephen Barlow.

Figure 3. Seagrass beds form a globally significant carbon store. Photo: Lewis Michael Jefferies/WWF-UK.

restoration of degraded peatlands will initially reduce the losses of CO_2 from the degraded peat into the atmosphere but will subsequently remove CO_2 from the atmosphere; naturally functioning peatlands provide great biodiversity gains. Coastal and marine ecosystems have an extremely valuable role to play in sequestering CO_2.

Nature-based solutions must play a key role in mitigating against and adapting to climate change and reversing ongoing declines in biodiversity in tandem (CIEEM 2020, Committee on Climate Change 2020, Natural Capital Committee 2020, The Wildlife Trusts 2020, Environment Agency 2021, Gregg *et al*. 2021, Stafford *et al*. 2021). Carbon reduction or offsetting schemes must utilise the full suite of high-carbon habitats available (Gregg *et al*. 2021) in areas where they are most suited to the environment and to support local biodiversity.

“Over the last 30 years governmental and public consciousness of the climate emergency has grown significantly. Achieving net zero by 2030 is a real contribution to the need to restrict global heating to 1.5°C above preindustrial levels.”

Resilient ecological networks are needed that join habitats with green and blue corridors, extending across landscapes to enable species to colonise new areas. The Lawton report *Making Space for Nature* (Lawton *et al*. 2010) has the mantra of “more, bigger, better, joined up”. England is the focus, but the principles apply to all contexts and geographies. Everyone needs contact with natural environments every day for physical and mental health and well-being (Lovell *et al*. 2020).

Habitat restoration and habitat creation schemes must be ambitious and large scale to make a real impact on reducing CO_2 levels and tackling the ongoing losses of biodiversity. Nature-based solutions can deliver carbon reductions and can enhance the stocks of natural assets and the associated ecosystem services (Natural Capital Committee 2020, Gregg *et al*. 2021, Stafford *et al*. 2021). Integrated approaches are required and nature-based solutions must deliver multiple benefits. An excellent example is the review of recent ecological research by Di Sacco *et al*. (2021) who propose 10 golden rules for forest ecosystem restoration to maximise rates of both carbon sequestration and biodiversity recovery while improving livelihoods.

Landowners, occupiers and managers with extensive landholdings have a crucial role to play as land management decisions affect the ability of different habitats to absorb and store CO_2. The Woodland Carbon Code and the Peatland Code are accredited offsetting standards and provide essential guidance.

Individuals with a small patch of land such as a garden can plant trees and create ponds and marshy areas, and can help with practical work on nearby green spaces such as parks, wildlife areas, nature reserves and local rewilding areas.

Conclusions

Over the last 30 years, and particularly in the last 2 years, governmental and public consciousness of the climate emergency has grown significantly. However, rapid reduction of greenhouse gas emissions is urgently needed to halt the ongoing rise in global heating. Initial efforts by individuals and organisations must concentrate on eliminating or reducing CO_2 from their operations and activities. Subsequently, CO_2 emissions must be reduced by using renewable energy, improving energy efficiency and making behavioural changes. Finally, unavoidable emissions of CO_2 require the removal of equivalent amounts of CO_2 from the atmosphere as fast as the CO_2 is added, each and every year. Achieving net zero by 2030 is a real contribution to the need to restrict global heating to 1.5°C above preindustrial levels (Box 1).

Carbon offsetting is complex and can be seen as a controversial issue, as shown by the online opinions of Greenpeace, Friends of the Earth, Greta Thunberg and George Monbiot. Nature-based offsetting solutions can deliver CO_2 reductions and enhance the stocks of natural assets and the ecosystem services they provide and deal directly with the biodiversity crisis. Integrated approaches are required and nature-based solutions must deliver multiple benefits. Well-planned and effectively implemented offsetting schemes, combined with verification and certification, need to deliver offsetting now rather than in the future.

Future action is not an option, real-time offsetting strategies are needed now. The best action is to stop emitting greenhouse gases.

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The Next 30 Years: A View from Our Vice Presidents

Will Woodrow
CEcol MCIEEM
CIEEM Vice President (Ireland)

I often grumble that we are still talking about the same ecological issues as when I was first working in the mid-1980s (yes, I know!). However, while we were considered a 'fringe interest' then, there is now certainly a groundswell of opinion that action on biodiversity conservation and enhancement and better environmental practice is urgently required. While a strong voice (often from our sector alone) has helped make the case for urgent action, successful action will require a true collaborative effort, and that is the key determiner in my view of how we are likely to see the next 30 years developing for the ecology sector.

I expect we will be working more closely with a variety of sectors (such as engineering, planning, architecture and agriculture) to develop collaborative training, policy advocacy (notably to remove obstacles to achieving common goals), and effectively embedding ecological considerations more within those professions. While many ecologists are already employed in these sectors and respective practices, their roles often relate to statutory obligations, such as inputs into assessments or due diligence checking of them. I expect, and hope, that there will be an increased emphasis on advisory roles, with ecologists increasingly involved at the heart of the development of new designs, schemes and initiatives.

I also expect, as we become more involved in designing biodiversity into projects and initiatives, that there will be an increasing emphasis on long-term monitoring to inform success.

Another significant development in Ireland is the increasing emphasis on habitat restoration, especially on state-owned land. Required input into this area (as well as biodiversity-rich agriculture) is only going to increase, and we need to upskill in order to serve this need.

I expect the ecology profession to develop significantly over the next 30 years, both in terms of the breadth of services we provide and the number of people employed. A cautionary word of warning though is that we do not have enough ecologists to service the current need, so the first thing we need to do is to attract people into the profession.

And not a single word about drones and tech.

Penny Lewns
CEcol CEnv MCIEEM
CIEEM Vice President (Wales)

My career as an ecological consultant started in 1990. At that time, despite legislation such as the Badgers Act and Wildlife and Countryside Act, the concepts of having an ecological survey and providing mitigation were not routine. If a developer sought advice, it was driven largely by their own morals and the risk of adverse publicity – headlines such as "Housebuilder Bulldozes Badger Sett" were considered highly damaging (amazingly, badgers were popular back then!).

I was fortunate to be working in and around Bristol, where a forward-thinking Avon County Council had an ecologist (Mike Oxford!) who championed the need for ecological input (there were only a handful of Councils doing this at that time). This encouraged developers to seek advice, and one of the County's own road schemes was the first to employ an Ecological Clerk of Works. Alongside this 'nudge' from Local Government, Statutory Nature Conservation Organisations were publishing guidance and working with NGOs to draft legislation and implement licensing to assist compliance.

Into this was added the final piece of jigsaw: a group of ecologists who suggested setting up a membership organisation. I remember wondering, when they first sounded me out about the idea, if there would ever be enough people doing this type of work to make it viable! I certainly couldn't have imagined how CIEEM would grow in scope and number.

I am immensely proud that, as a Chartered Institute, we are recognised for our professionalism. Ecology is now mainstream – graduates now can choose 'Ecologist' from a dropdown menu when stating their occupation (I used to have to put 'Other' and 'Professional Services' which always sounded a little dodgy!), and I can see how much value there is in a body of ecologists coming together to address challenges – we can influence policy, legislation, regulation and quality.

So, what is in store for the next 30 years? I can't say for sure, but progress requires teamwork – without the push of legislation, the oversight of planning and enforcement, the pull of wanting to make our best effort, we risk not achieving our goals.

Caroline McParland CEnv MCIEEM
CIEEM Vice President (Scotland)

It's 2021: We're exceeding our planetary boundaries on climate and biodiversity[1]. Our continual encroachment into the natural world is considered a factor in the emergence of 75% of new zoonotic diseases[2]. COVID-19 has thrown the urgency of achieving a just transition to a greener, more sustainable society into sharper focus. Scotland's *State of Nature* report states that over two decades, 49% of Scottish species have decreased and 28% have increased in abundance[3]. Biodiversity is seen as needing protection from development, or a constraint on development. This dichotomy informs much of our work as ecologists and environmental managers. But nature's needs aren't separate from those of people. Nature's our greatest asset[4].

The Scottish Government's position statement on the incoming Fourth National Planning Framework (NPF4) states: *"The climate and nature crises are intrinsically linked … around a third of the global mitigation effort needed to deliver the goals of the Paris Climate Agreement could be achieved through nature-based solutions."* The same statement recognises the *"fundamental role that a healthy and resilient natural environment plays in supporting Scotland's economy and the health and wellbeing of our communities"*.

What of our sector in 2051? Hard to say! We have seen much technological change in just a decade, as some articles in this edition discuss. Rewilding and natural capital projects are gaining traction[5]. Eurasian beaver, once extinct, are now seen across multiple Scottish river catchments. White-tailed eagles have been spotted at Loch Lomond[6]. The Clyde Climate Forest[7] has just been launched.

Considering so much change, a glance at the past gives us a clue to our possible future: LiDAR analysis helps reveal that some ancient cities were *"extensive, interspersed with nature and combining food production with social and political function"*[8]. An ecosystem-level approach for the sector, to support thriving habitats for nature and people rather than protecting individuals of single species, may become our new normal. Our focus will change from protecting biodiversity from development to ensuring that it is treated as the fundamental asset for sustainable development that it truly is.

Notes

1. www.weforum.org/agenda/2017/04/the-new-economic-model-that-could-end-inequality-doughnut/
2. www.unep.org/news-and-stories/statements/preventing-next-pandemic-zoonotic-diseases-and-how-break-chain
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Lisa Kerslake CEcol FCIEEM
CIEEM Vice President (England)

In the 35+ years I've been working in conservation and ecology there has been considerable change, to an extent that I could not possibly have predicted. If you add to that the uncertainty we're currently living through, it becomes even more impossible to predict now what the sector and the profession might be like in another 30 years. So in this short piece I'll have to stick to what I would like to see happen, and consider how likely that is, given both where we are now and the various drivers for change.

In terms of the profession, I hope that by 2051 there will be formal regulation, ensuring that anyone working in ecology – whether public sector, consultancy or NGO – would have to be able to demonstrate competence, by professional assessment, in order to practise. Such regulation should help address problems such as poor standards of work and the shoddy treatment of early career ecologists, although it is by no means a panacea. Steps are already being made towards this, via various accreditation and earned recognition initiatives, and I hope that these are merely the forerunner to something much wider.

On its own, however, regulation will only do so much and in terms of the wider environment I would like to hope that some of the initiatives that are being developed now in England would bear fruit in years to come. The 25 Year Environment Plan[9], if coupled with *appropriate* agriculture and planning reform – by which I mean systems that give proper weight to environmental considerations – has the potential to deliver robust protection for our best and most valued sites, landscapes and species; incorporating the Sustainable Farming Incentive, Local Nature Recovery and Landscape Recovery schemes[10] to ensure local and national strategies are firmly in place for nature's recovery everywhere. However, at the time of writing, we are seeing worrying indications that the very foundations on which our precious and fundamental protections have long been based – the Habitats and Species Directives, and the Wildlife and Countryside Act – are being eroded. We must defend them at all costs.

Notes

9. www.gov.uk/government/publications/25-year-environment-plan
10. www.gov.uk/government/publications/environmental-land-management-schemes-overview/environmental-land-management-scheme-overview

Feature

Are We Delivering Biodiversity Net Gain?

Do Broad Habitat Metrics Mask Biodiversity Net Loss and Can a Focus on Invertebrates Help?

Richard Wilson
CEnv MCIEEM

Keywords: biodiversity loss, Biodiversity Net Gain, invertebrates, survey interpretation

In Britain, biodiversity is in decline, despite promises to deliver better outcomes. This article argues that the reliance of the current Biodiversity Metric 3.0 on habitats as a proxy for wider biodiversity overlooks invertebrates and risks biodiversity net loss. A way forward is suggested with an approach to achieve better outcomes for biodiversity through site-specific survey design.

Introduction

The first major international effort to stem biodiversity loss materialised with the Convention on Biological Diversity in 1992. Yet, almost 30 years later, biodiversity decline is routinely reported (Defra 2020). In Britain, policies have developed with the intention of delivering sustainable economic growth through recognising the natural world as an essential asset (natural capital) and developing biodiversity offsetting or carbon credits; yet biodiversity is still in decline, despite promises to deliver better outcomes.

When the Government introduced the Environment Bill in October 2019, it proposed a mandatory 10% increase in biodiversity through planning consents within 2 years of the Bill receiving Royal Assent, anticipated in autumn 2021.

Baker *et al*. (2019, section 1.5) provides practical advice for achieving Biodiversity Net Gain (BNG), which importantly includes a key point of avoiding "…pitfalls when quantifying losses and gains in biodiversity such as:

- focusing on numbers to only outweigh losses of biodiversity with gains without generating meaningful benefits
- missing opportunities to benefit key species that are affected by a project but not directly accounted for within a biodiversity metric
- showing a quantified net gain in biodiversity but the project causes a critical loss of, for example, ecological connectivity, a rare habitat, green space or some other key feature, or
- replacing highly valuable features with features of lower ecological value or replacing locally important features with features further away."

This article argues that the current Biodiversity Metric 3.0 (hereafter 'the Metric') relies on habitats "…as a proxy for wider biodiversity with different habitat types scored according to their relative biodiversity value" (Panks *et al*. 2021, paragraph 1.5) and does not include species explicitly. This risks pitfalls if inappropriate attention is paid to other supporting ecological information. A way forward is suggested with an approach that has the potential to achieve better outcomes for biodiversity through site-specific mitigation design, which can be better informed by invertebrate survey and not just the Metric spreadsheet's output.

Why the concern?

Reliance on habitats as a proxy has the potential to introduce an unacceptable level of risk to the process and suggests the Metric's output will automatically bring about BNG. However, invertebrates may be disproportionately affected as they have multiple habitat requirements within and between generations, or dependence on specific elements of a habitat that are overly simplified (and risk being overlooked), under-valued or identified as a detrimental feature by the Metric when the opposite could be the case.

This is not to say that BNG is bad as a mandatory requirement for development, but it is important to ensure that this is achieved by considered inclusion of species data too (see below), rather than relying on potentially subjective assumptions about perceived habitat quality. This latter point is important, as the perception of the relative importance of a habitat breaks down when considering the multiple obligate habitat requirements of many animal species.

Our understanding of relative importance is influenced by either habitat scarcity, such as lowland heaths, upland mire and bogs, ancient woodland or species-rich grassland, or the subset of legally protected fauna such as bats and amphibians. However, the broad-brush application ignores the detail of any habitat and it is here that most biodiversity exists, including many uncommon invertebrates.

Attribution of value

How habitats are valued is an integral component of the Metric. The Metric is insensitive to the presence of scarcer invertebrate species, or unusual assemblages, which can be assessed using Species Quality Scores or indices. Therefore, the broad characterisation of habitat values risks over-simplifying matters. Certain macro-habitats such as coarse grassland swards with limited floristic species richness but abundant tall flowering plants such as umbellifers are potentially under-valued; and important invertebrate habitat elements such as still-air habitat or bare ground may be entirely overlooked.

In applying the condition criteria for the relevant habitat, the practitioner may deem the habitat to be in poor condition in the absence of other supporting ecological information (e.g. see condition tables for grasslands in Panks *et al*. 2021, pp. 157–158). Relevant micro-habitats, mosaics, ecoclines or specific habitat elements such as nectar resource, structural patchworks or bare ground may be overlooked or misclassified when assessing the condition of a habitat.

Policy and legislation have historically influenced how ecologists have defined valuable habitats. The legal obligation driving these decisions has led to a taxonomic dissonance as two relatively species-poor groups, amphibians and bats, take a disproportionate level of survey effort – and therefore cost – distorting practitioners' and decision-makers' views on what constitutes a valuable habitat. For example, an old-growth tree lacking evidence of a bat roost receives limited legal and policy protection. But the tree, alongside those in fields, hedgerows and woodlands that pepper our rural and urban environment, will support hundreds of invertebrate species, some of them Nationally Scarce or rarer, dependent on the various deadwood habitat associated with the treed landscape. While the Metric broadly describes features such as rot holes or fungal fruiting bodies, thus extending what is ecologically valuable beyond bat roost presence, in the absence of species data there remains limited instruction linking wood decay with other habitat that could raise the value of such habitats in the calculation.

Reconfiguring value

If BNG is to work meaningfully, ecologists require more data to inform the valuation stage and escape the legal blanket that has created a safe, but potentially misleading, demarcation between high- and lower-valued habitats. I put forward the case for invertebrates as a mega-diverse group that increases data resolution and can plug the gaps that a broad-brush approach fails to fill. I do so by way of illustrated examples, and flag recent publications that provide a means for non-specialists to justify further survey (Jukes 2021, Dobson and Fairclough 2021) that can encourage the leap of faith and conviction for ecologists appraising a habitat parcel that important biodiversity and key species risk being overlooked.

Examples

To illustrate the above concerns, I refer to three habitat examples where applying the Metric is likely under-valuing or failing to take proper consideration of a site's biodiversity.

Wood decay

Woodland is perceived to be in good condition by the Metric if it scores more than 32 points from 13 indicators in the relevant condition table, which includes evidence of dead wood (Panks *et al*. 2021, pp. 198–199).

The Metric acknowledges that various types of dead wood can be present on a single living specimen, but they may not be immediately obvious. Some sap runs issue from discrete wounds caused by goat moth (*Cossus cossus*) larvae in a tree and whose entrance hole may be approximately 20 mm. This attracts a range of invertebrate species of nature conservation concern, including Priority Species such as a vinegar fly *Phortica variegata* (Figure 1), and a substantial fauna associated with the fungi that drive the decaying process.

Dead wood is estimated to support a diverse invertebrate fauna of at least 1800 species in Britain and 615 species in Ireland (Alexander 2002). Pantheon's database (Heaver *et al*. 2017, Webb *et al*. 2018) lists 788 invertebrate species which are dependent on the presence of dead wood, of which just over half (430 species) have a nature conservation

status. Importantly, many adult wood decay invertebrates are also dependent on a rich flower resource and may time their emergence to coincide with tall umbellifers (Falk 2021). This emphasises the value of habitat mosaics, or edge habitat, in close proximity to the wood decay. Some of these critical flower-rich habitats are not identified by the Metric as being of sufficient distinctiveness (see below) and there is no longer a means within the Metric to account for connectivity (Natural England 2021). The Metric also fails to recognise habitat age and continuity of conditions, which invertebrate species survey can often reveal through the use of species quality indices such as the Index of Ecological Continuity for beetles (Alexander 2004).

Figure 1. Invertebrates such as the Nationally Scarce hoverfly *Brachyopa pilosa* (left) and the vinegar fly *P. variegata* (right), a species of Principal Importance, are attracted to sap runs emanating from tree wounds. Different tree species may attract a different fauna. Photos: Steven Falk.

Species-poor grassland

When completing a Preliminary Ecological Appraisal, ecologists are likely to classify grass-dominated swards with restricted floristic diversity, limited to taller perennials such as the umbellifers common hogweed (*Heracleum sphondylium*) and cow parsley (*Anthriscus sylvestris*), as B2 neutral grassland or B6 poor semi-improved grassland, based on the Phase 1 habitat survey classification (Joint Nature Conservation Committee 2010), or within the new UK Habitat Classification, as g3c (other neutral grassland) (Butcher *et al*. 2020). They are generally considered to be ubiquitous, occurring on roadside verges, woodland rides or field margins, and thus of lower nature conservation value.

These grasslands' familiarity influences the Metric's classification of Medium Distinctiveness but in Poor Condition in the absence of other ecological information. This is partly based on

Figure 2. Pollinators on hogweed. Top left: *Ectemnius lituratus* (a solitary wasp); lower left: *Lucilia silvarum* (a greenbottle); right: *D. graminum* (a picture-winged fly), a Priority Species dependent on tall grassland with abundant common hogweed. The larvae mine the stems. Photos: Steven Falk.

failing various criteria including the probable presence of undesirable species including thistles (*Cirsium* spp.), creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*) and cow parsley (Panks *et al*. 2021). Inclusion of these species is also cause for concern as they are all food plants, or pollinator resources, for several invertebrate taxa with a nature conservation status, including the Critically Endangered hoverfly *Paragus albifrons* whose larval foodplant includes creeping thistle (Ball and Morris 2014) and the Critically Endangered leaf beetle *Galeruca laticollis*, which is dependent on thistles in fens (Hubble 2014). Thus an invertebrate's pre-adult phase is as important as the adult. Their ecological requirements must be accounted for to ensure genuine BNG.

These swards can have a dual purpose, providing a reliable succession of nectar resources for pollinators such as flies, bees and sawflies, and their predators including wasps (Figure 2), despite relatively low botanical species-richness. During prolonged dry spells where more open grasslands, unshaded by any canopy, become heat stressed, they provide a refuge and a resilient landscape feature. They not only provide temporal connectivity, but link otherwise disparate habitats not readily considered bedfellows. Ancient woodland is acknowledged as being irreplaceable, yet many adult insects whose larvae are dependent on saproxylic species require this umbellifer-rich vegetation for feeding (Falk 2021). This under-rated habitat also supports taxa of nature conservation concern in their own right, such as the phoenix fly *Dorycera graminum* (a picture-winged fly; Figure 2) and the leafhopper *Euscelis venosus*, both being species of principal importance and flagship taxa for what might otherwise be a habitat dismissed as relatively low value.

Without proper consideration of habitats, the Metric risks not just enabling biodiversity loss but, alarmingly, becoming a procedural threat to certain species' nature conservation status by under-valuing habitats if reliance is solely placed on perceived botanical interest or a habitat's frequency of occurrence in the landscape.

Figure 3. Natural examples of extensive bare ground with complex topography are a sand quarry (top) and arable field margins (bottom). Photos: Richard Wilson.

Bare ground

Bare ground is only identified as a feature with which to assess a broad habitat's condition in the Metric, not as a habitat itself. It is a positive element in grassland, heathland, orchards and wetland, providing it accounts for no more than 10% cover, although sand pits and quarries, or arable field margins, are considered to be in poor condition by default with no assessment required (Panks *et al.* 2021), despite many supporting highly valuable habitat features and for invertebrates including the priority habitat Open Mosaic Habitat on Previously Developed Land. The narrative is confusing, including the assumption that more than 10% cover is an undesirable element. Bare ground is a complex habitat, forming inter-relationships with substrate, hydrology, topography, aspect and vegetation. For some habitats, such as sand dunes, soft cliffs in a natural setting, or exposures in sand pits, quarries or brownfield sites, extensive areas interwoven with vegetated slopes and faces at the landscape scale is a fundamental component of the habitat's value (Figure 3).

> **Species survey data should be integrated into better habitat mitigation, reflecting actual site biodiversity and not simply relying on broad habitats as a proxy for real data.**

In Britain, there are 1227 invertebrate species associated with bare ground, of which 756 are restricted to this habitat for part of their life cycle (Webb *et al*. 2018). Almost two thirds of these dependent species have a nature conservation status, compared to approximately 35% of all invertebrates, emphasising the disproportionate effect that the current BNG Metric could have if bare ground habitat is not properly accounted for.

A way forward

Ensuring BNG is genuinely achieved will be a necessary and essential outcome, but in the absence of other ecological supporting information there is a risk that the desired outcome may fall short. The forthcoming 'Phase 1 for Bugs' (Dobson and Fairclough 2021) clearly offers non-specialist ecologists the opportunity to recognise a site's potential importance for invertebrates, leading to greater confidence in requiring invertebrate survey to inform Ecological Impact Assessment. However, it is hoped this article has stimulated readers to appreciate how invertebrate survey data can also deliver better and meaningful BNG by identifying key habitats and habitat elements. Species survey data should be integrated into better, more joined-up and site-specific habitat mitigation, reflecting actual site biodiversity and not simply relying on broad habitats as a proxy for real data.

Historically, I have listened to the oft-repeated but regrettable argument that there is no meaningful legal mechanism for invertebrate survey. However, now that there will be a mandatory requirement to deliver 10% net gain this argument is substantially weakened and the opportunity invertebrates can offer to achieve the Metric's desired outcome is hopefully a more powerful contention. This is not to say that every site put forward for development will require invertebrate survey work; Dobson and Fairclough (2021) will provide initial guidance to identify those that do. But practitioners may be better able to deliver genuine and meaningful BNG by increasing the prominence of invertebrates in any Phase 2 ecology survey work being considered.

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Biodiversity Data: Showcasing Wales' Approach and Encouraging Better Data Sharing

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Keywords: Aderyn, biological data, biological records, data sharing, desk study, record centres

In this article we discuss how Wales has approached the collection and collation of biological records in a collaborative way. We make some suggestions about how consultant ecologists can get better at sharing their data for the benefit of all.

We have come a long way with recording, collating and making biological records available to consultant ecologists and other environmental professionals over the last 30 years. Gone are the days of writing letters to individual recorders, posting them (or faxing them, if you were lucky enough to have such mod cons) and waiting a few weeks for a response. The development of a network of local environmental records centres (LERCs) across the country, at the same time as huge technological advances taking place globally, has revolutionised gaining access to the data you need. In 2021, and in Wales, it's never been easier.

The Welsh network of four LERCs[1] has been complete for nearly 15 years and since 2015 has collaborated more closely than ever through a consortium company, Local Environmental Records Centres Wales Ltd (LERC Wales). Foremost among the many benefits of working so closely have been the creation of an all-Wales merged species database and the pooling of technical skills and resources. The most visible outcome of this collaborative working by the LERCs has been the development of the LERC Wales Biodiversity Information and Reporting Database, Aderyn[2]. Aderyn provides access to over 14 million species records collated by the four LERCs and allows data to be consumed in a wide range of ways, including fully interactive online maps (via eMapper; Tapping 2018), access to raw data or GIS file downloads.

Why use LERC data?

LERCs in Wales aim to give a one-stop service to directly access the most up-to-date, comprehensive and accurate biodiversity data available. This is collated from many different sources and is otherwise unavailable in one place. The National Biodiversity Network (NBN) Atlas (see https://nbnatlas.org) is a fantastic resource for gaining a broad picture of the national distribution of a species and highlighting relevant data sources. However, while the Atlas includes a vast amount of open data, the majority of records are only shared at coarse resolution and their use is restricted by the CC-BY-NC data licence, a non-commercial licence which prevents use by most 'commercial' organisations, including LERCs and environmental consultancies.

As well as sharing our records with the NBN Atlas, the LERCs in Wales also strive to incorporate all open data that they can from the NBN Atlas. In addition, we also hold agreements with some national recording schemes and societies that enable us to share data that are unavailable via the NBN Atlas, while other agreements permit licensed sharing of capture-resolution data for commercial use, despite only being shared via the CC-BY-NC licence on the Atlas.

LERC Wales also provides the most up-to-date available data for many taxon groups. The shared LERC Wales database (which sits behind Aderyn) receives at least weekly automated updates from individual LERCs, meaning the lag between an electronic record being submitted to a LERC[3] to it appearing on Aderyn will typically now be 2 weeks or less (and we are continually striving to reduce these time lags even further).

The completion of a desk study as part of a Preliminary Ecological Appraisal (CIEEM 2017) is required for almost every project and can provide significant insight into the habitats and species likely to be present or nearby, even before a site visit is completed. For example, as a result of completing a data search, you may already know that a maternity roost of lesser horseshoe bats is located within 500 m of the building you are about to visit, and that there is a reasonable chance there may be satellite roosts on your site. Or you may discover that a designated site with valuable habitat is located right next to your client's planned housing development and that there may be some elements of habitat on your site that are similar. It all helps to build a picture about the land you are working on, so you can make informed and appropriate recommendations for additional targeted species surveys, buffer zones on a constraints map or enhancements that are relevant to the local area.

Completing the jigsaw: improving the flow of consultants' data

LERCs access and collate data from a wide variety of sources; however, recent analysis of data held by SEWBReC showed that records from consultants made up only 1.9% of all data held (just over 90,000 of over 5 million records). From a consultant's point of view this can be hugely frustrating, because often we know about projects, plans or surveys that have been completed by colleagues and friends, records of which do not come up in a data search when we know a particular species has been found. For LERCs it can also be frustrating as we are always striving to supply the most comprehensive data possible, as well as ensure good value for money for all our clients.

The CIEEM Code of Professional Conduct (January 2019) includes the professional obligation to: "share, wherever possible, data and other relevant information". An old adage of biological recording is to "record once, use many times" and this is what we want to achieve: to maximise the value of every record that is gathered for the benefit of biodiversity and conservation. It is therefore important that we try to more fully understand the reasons why data are often not shared so we can work to break down the barriers to doing so.

Barriers to data sharing

There are lots of reasons why some consultants don't get around to submitting their records, and many of these issues are easily addressed. Here we highlight some of the most commonly cited reasons for not sharing data, alongside a few suggestions of how to address those reasons and/or explain why they don't always stand up to scrutiny.

"Our data are publicly available because all our reports are held on the local planning portal."

This is true, but laws around intellectual property do not allow the extraction of those records and their inclusion in a database, such as Aderyn. Records are only permitted to be used for the purpose for which they were published, for example to inform a planning decision.

"The data we collected belongs to our client, and we don't have permission to share it."

In many cases this can easily be overcome by inserting a clause into your terms and conditions. Something like this may be appropriate: "it is considered good industry practice to submit data gathered during surveys to the relevant LERC, which may include appropriate records from your surveys such as species and general location. By commissioning any works where this applies, you agree to this data sharing taking place, unless you instruct us in writing not to do so."

"We are so busy, we don't have time to share data with LERCs."

In our opinion, the cost and time needed to prepare and share data should be included in overall contract costs and passed on to your client wherever possible. Data management really should be a core task for consultants and consideration should be given to setting aside time during quieter periods of the year to prepare and share records from the previous field season. If there are no quiet times for you, this task could form part of work given to an intern or someone on a work experience placement, or indeed a less experienced member of staff. Skills gained from the discipline of sifting through and collating data, as well as dipping in and out of various reports, can be hugely valuable to those just starting out in ecology and help them demonstrate their suitability for the next exciting job opportunity that comes along. And of course, if data can be captured and stored in a more efficient manner in the first place, so

> **"In another 30 years we would like to see seamless data sharing across the ecology sector, where high-quality information and data are accessed by all to inform decisions, policy, legislation and good practice."**

that minimal time is needed to prepare records for sharing, even better. Data that ends up in a PDF file is far less versatile than that held in a database or spreadsheet, for example.

"Sharing data with LERCs is too complicated. We work across county/country borders and there are different LERCs covering each."

LERCs are usually happy to receive a larger data file and only import the data that is relevant to them; some consultants organise their data into worksheet tabs for each LERC area or Vice County they cover. You can also send all of your data to your closest/main LERC and ask them to pass it to others, or you can use the services of the Association of Local Environmental Records Centres (ALERC) to help share data to relevant LERCs.

"I've no idea how much detail or information is required. It all sounds like a lot of hard work."

The key elements of any biological record are 'what, where, when and who'. Provided this basic information is included, records can be passed to your LERC in any format, including on paper, electronically (such as in an Excel file or Word document), or via an app on your phone (such as the LERC Wales app). LERCs can provide templates as well as further advice and training on all aspects of record submission.

Looking ahead for the next 30 years

LERCs are always striving to improve their ways of working to further aid data sharing, from helping consultants, researchers and naturalists share their records with the LERC, to ensuring LERC-held data form a key part of the biodiversity evidence base and that they are used to inform decisions at all levels, from individual planning applications to national indicators and nature recovery strategies. As we capture and share more and more data digitally in the future, it will be increasingly important to collaborate, as well as develop and improve tools to manage records with as few barriers as possible.

In another 30 years we would like to see a situation where seamless data sharing takes place across the ecology sector, where high-quality information and data are even more readily available and are routinely accessed by all to inform decisions, policy, legislation and good practice. We hope that whatever your interest in ecology and nature recovery, you can be part of making this happen, by embracing some of the suggestions we have made, and by continuing to help improve record sharing for nature for (at least) another 30 years.

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Notes

1. The four individual LERCs are the Biodiversity Information Service for Powys and Brecon Beacons National Park (BIS; www.bis.org.uk), Cofnod, North Wales Environmental Information Service (www.cofnod.org.uk), South East Wales Biodiversity Records Centre (SEWBReC; www.sewbrec.org.uk) and West Wales Biodiversity Information Centre (WWBIC; www.wwbic.org.uk).

2. See https://aderyn.lercwales.org.uk for the public view of Aderyn. LERC staff, Service Level Agreement holders, county recorders and others can gain enhanced access to a range of additional Aderyn modules which are hidden from public view. Please note that summary data which can be viewed via the public view of Aderyn may not be used for commercial purposes.

3. Each LERC has its own record submission portal: WiReD, the BIS Wildlife Recording Database (record.bis.org.uk), Cofnod Online Recording System (www.cofnod.org.uk/register), SEWBReCord (www.sewbrecord.org.uk) and WWBIC Wildlife Recording Database (record.wwbic.org.uk). In addition, data are also regularly imported from the LERC Wales app (www.lercwales.org.uk/app.php) as well as iRecord (www.brc.ac.uk/irecord) and the iRecord app (irecord.org.uk/app).

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Feature

The State of No Net Loss/ Net Gain and Biodiversity Offsetting Policy in English LPAs

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No net loss and net gain in environmental planning have been a policy focus in a growing number of countries since the early 1980s. The limited academic work on this topic has often been disconnected from policy practices and implementation gaps on the ground; this study is part of research conducted since 2016 seeking to understand the development and limitations of net gain policy in England from the perspective of the working-face planners and ecologists who will implement it. This brief report is excerpted from the full survey analysis, which is available on the CIEEM website at https://cieem.net/resource/lpa-survey-morgan-robertson/.

Introduction

Net gain of biodiversity has become a major policy issue in English planning, with former Secretary of State Michael Gove announcing his full support for a policy of mandatory net gain of biodiversity in September 2019. It appears that some version of this policy will be implemented in the current Environment Bill. No net loss and net gain (NNL/NG) policies are planning goals aimed at ensuring development leaves biodiversity in the same or better (respectively) condition as an acceptable reference condition. Although NNL polices have largely given way to NG policies in national discussions, local governments lag behind such discussions and it is still common for them to refer to NNL as a planning goal. NNL and NG incur the same implementation challenges, and differ mainly in whether development is expected to achieve biodiversity gains beyond the narrow amelioration of

its own impacts; it was not fruitful to distinguish between them for survey respondents, and they will be referred to jointly in this report. NNL/NG were implemented unevenly throughout England even before the 2012 reorganisation of planning policy in the National Planning Policy Framework (NPPF), and experimentation with the metrics and offset policies needed to achieve NNL/NG was seen with the 2012–2014 Defra Offsetting Pilot. Since the pilot there has been ongoing experimentation and diffusion of the practices and policies of NNL/NG at the local planning authority (LPA) level. This occurred through informal networks of colleagues and was more or less invisible at the national scale, but has been crucial to building the capacity of LPAs to respond to the anticipated NG policy.

Much information about how NNL/NG has been used by LPAs comes from a few high-profile regions or LPAs. To observe the broader state of NNL/NG practice across England, from May 2019 to December 2020 a survey was conducted of England's 352 LPAs on the topic of NNL/NG of biodiversity and the use of biodiversity offsetting (BDO) as a compensatory mechanism. Responses were received from 306 LPAS for an overall response rate of 86.9%. Not all LPAs responded to all questions.

It is generally *practical* for LPAs to administer and deliver NNL/NG

A question of primary interest for NNL/NG policy is whether LPAs view it as practical, not just possible, to administer and deliver it. Responses indicate that, for most LPAs (55.9%), it is indeed practical to do so. However 37.5% of LPAs responded that it was not practical (see map in full report, which indicates that LPA resistance may significantly continue to obstruct the uptake of NNL/NG policy). It is evident that many LPAs await firmer steering from national planning policy.

For those 112 LPAs reporting that it is not practical to administer and deliver NNL/NG, the reasons fall into three categories: lack of resourcing, lack of political permission structure and lack of information and experience (see Table 1).

The lack of resourcing, especially the lack of in-house ecological expertise, is clearly a major obstacle to the practicality of NNL/NG. The lack of 'political will' or policies which require NNL/NG may dissipate as an obstacle with the passage of a national NG mandate.

Table 1. Reasons LPAs report that it is not practical to administer and deliver NNL/NG

If it is not practical, why not?	**No. of responses**	**Percentage of LPAs**
Lack of resourcing		
Insufficient land	7	6.3%
Lack of in-house ecologist	24	21.4%
Insufficient resourcing (does not mention ecologist)	46	41.1%
		Total 68.8%
Lack of political permission structure		
Local/regional policy does not require it	39	34.8%
NPPF does not require it	17	15.2%
Lack of political will	4	3.6%
Planning balance and process	12	10.7%
		Total 64.3%
Lack of information/experience		
Gain/loss metric inadequate or lacking	8	7.1%
LPA is inexperienced with concept	14	12.5%
No strategy to identify appropriate sites	7	6.3%
		Total 25.9%
Total reasons from 112 LPAs	**178**	

Most local plans already incorporate NNL/NG goals

A considerable number of LPAs already have NNL/NG goals embedded in their local plans: 202 out of 306 responding LPAs (66.0%). Because of the flurry of policy activity around offsetting with Defra's 2012 Pilot, many LPAs have had time to issue local plans referencing NNL/NG as a goal, and this is reflected in the data.

The existence of NNL/NG goals in a local plan does not mean that NNL/NG is *mandatory* in that plan. It is often stated as an aspirational goal, to be sought "where feasible" or "where possible". This is not unusual; *where possible*, *seeks* and *proportionate* are all words allowing the planning officer to justify failure to achieve biodiversity NG as they consider the planning balance between many potential competing considerations.

Of the 202 LPAs with NNL/NG provisions in their local plans, more than 50% have adopted them since 2017 and there has been a clear acceleration since 2015. A handful have had policy on NNL/NG for more than 20 years: City of Worcester (1992), Peak District National Park (1994), London Borough of Southwark (1995), Telford and Wrekin Council (1995) and Wealden District (1998).

Ultimately, an LPA's NNL/NG policy will only apply where an ecologist provides input to the planning officer handling the case. This is some unknown percentage of the whole. Each LPA has a different set of practices concerning how and when ecological input is solicited, even where they have in-house ecologists. A County Project Officer serving LPAs in an East Midlands county explained: "I'm trying to [apply NG] with all applications, however I only become involved in applications when requested by the authority so many get missed."

"A survey was conducted of England's LPAs on NNL/NG of biodiversity and the use of biodiversity offsetting as a compensatory mechanism."

LPAs report applying NNL/NG to 17,712 planning applications

Responses to this query depended on the respondent's ability to access a tally of planning applications, which many were not able to do. Of the 202 LPAs which have an NNL/NG policy,

104 responded with usable estimates, and the results are highly uneven even among districts with relatively longstanding NNL/NG policies. St Albans (which established a NNL/NG goal in 2017) and South Ribble (2015) report applying the policy to fewer than 10 projects. At the other end of the spectrum, Uttlesford (2016) and Stroud (2015) report having applied NNL/NG to 1660 and 5000 projects, respectively. Of these 104 LPAs, 53 have applied NNL/NG to 20 or fewer applications, and only 15 have applied NNL/NG to more than 200 applications.

The reported total number of planning applications to which NNL/NG has been applied is certainly a massive undercount; the true number is much larger and could be proportionally estimated at approximately 40,000 if the LPAs which did not respond to this question have applied NNL/NG to a proportional number of planning applications. However, this does provide an absolute floor in estimating how wide and deep experience with applying NNL/NG is among English LPAs.

Nearly 33% of LPAs treat NNL/NG as *mandatory* on at least some types of application

A broad range of LPAs treat NNL/NG as mandatory in planning, as shown in Figure 1. Since not all LPAs responded to this question in the survey, this chart indicates that 32.3% of the 306 LPAs who submitted any response to the survey consider NNL/NG mandatory for some or all cases. It is significant that nearly 100 of England's 352 LPAs already have experience in treating an NNL/NG goal as mandatory on some or all planning applications.

Many LPAs use metrics in assessing the ecological impact of development, whether or not there is an NNL/NG goal in their local plan. Of the 297 LPAs completing the survey, 102 (34.3%) used some kind of metric in considering the ecological impact of planning applications, while 184 (62.0%) did not. More information on this topic can be found in the full report.

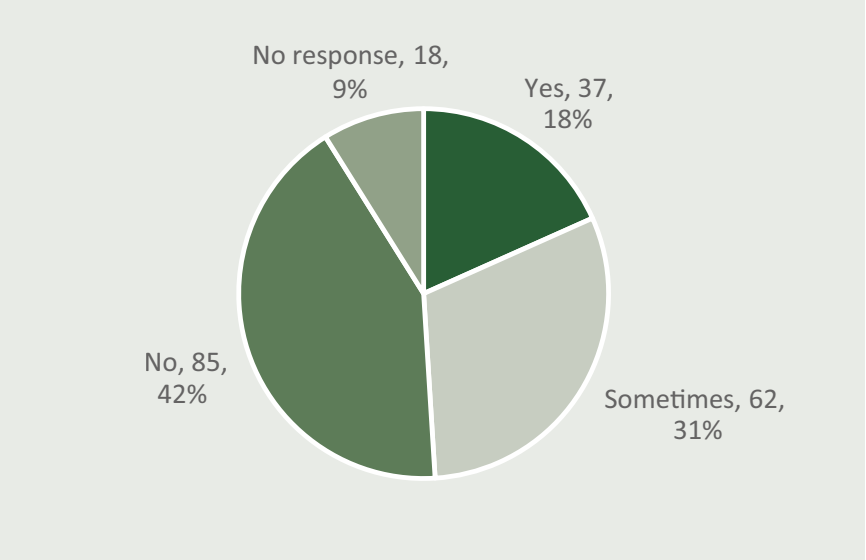

Figure 1. Have the NNL/NG goals in the local plan been treated as mandatory on applications by the LPA?

LPAs have required 1886 ha of biodiversity offsets and fully delivered 361 BDO projects

Out of 150 LPAs responding to this question, 70 LPAs have required the creation of a total of 1886 ha of biodiversity offsets in association with planning permissions. Due to the variable meaning of 'biodiversity offsetting' used by respondents, this number is certain to include some species-specific habitat measures as well as some projects that are not quantified using a biodiversity metric.

The survey also asked how many offset projects had been "secured and delivered": 159 LPAs responded, showing 361 BDO projects delivered in 53 LPAs. Because many LPAs responded that they didn't know or that the question required further research, these numbers are certainly an undercount.

Only 15 LPAs report creating more than 20 ha of BDO, and only 17 report the securing and delivery of more than five BDO projects. These numbers describe an overall national experience with BDO that is still in the early stages of experimentation. However, it is also true that the geography of experience with BDO extends far beyond the acknowledged hubs of expertise.

BDO is "encouraged" or "required" by a majority LPAs to meet NNL/NG goals

A substantial majority of LPAs said they "encouraged" or "required" BDO to meet their NNL/NG goal, although for many LPAs it was only with regard to certain kinds of impact or situation. Only just over a quarter of LPAs reject the use of BDO out of hand. This suggests a high degree of penetration and legitimacy of the concept at the LPA level. Overall, 63 LPAs reported requiring BDO, while 128 encouraged its use in plan permissions (see Figures 2 and 3).

It was clear that LPA respondents don't have a unified idea or definition of what counts as BDO, and it was not possible to enforce one in the context of the survey. All agreed that BDO involves off-site ecological improvements. However, for some, financial contributions to off-site ecological work constitutes an offset. For others, habitat amendments off site aimed at specific species, rather than "non-habitat biodiversity", counts as a biodiversity offset. For still others, off-site work can only be BDO if it is quantified through a standard metric; if it is not, it is merely "compensation". This last usage is closest to the Defra and NPPF concept of BDO, but to restrict the survey to such a narrow usage would prevent it from showing the broad use of off-site ecological improvements which are considered BDO by planners, ecologists and the development community.

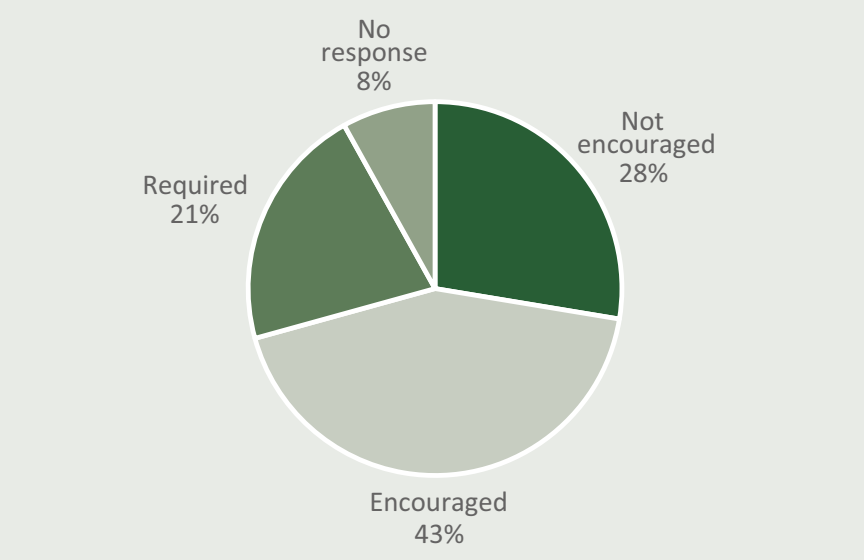

Figure 2. LPA use of BDOs to achieve NNL/NG goals (among 306 LPAs).

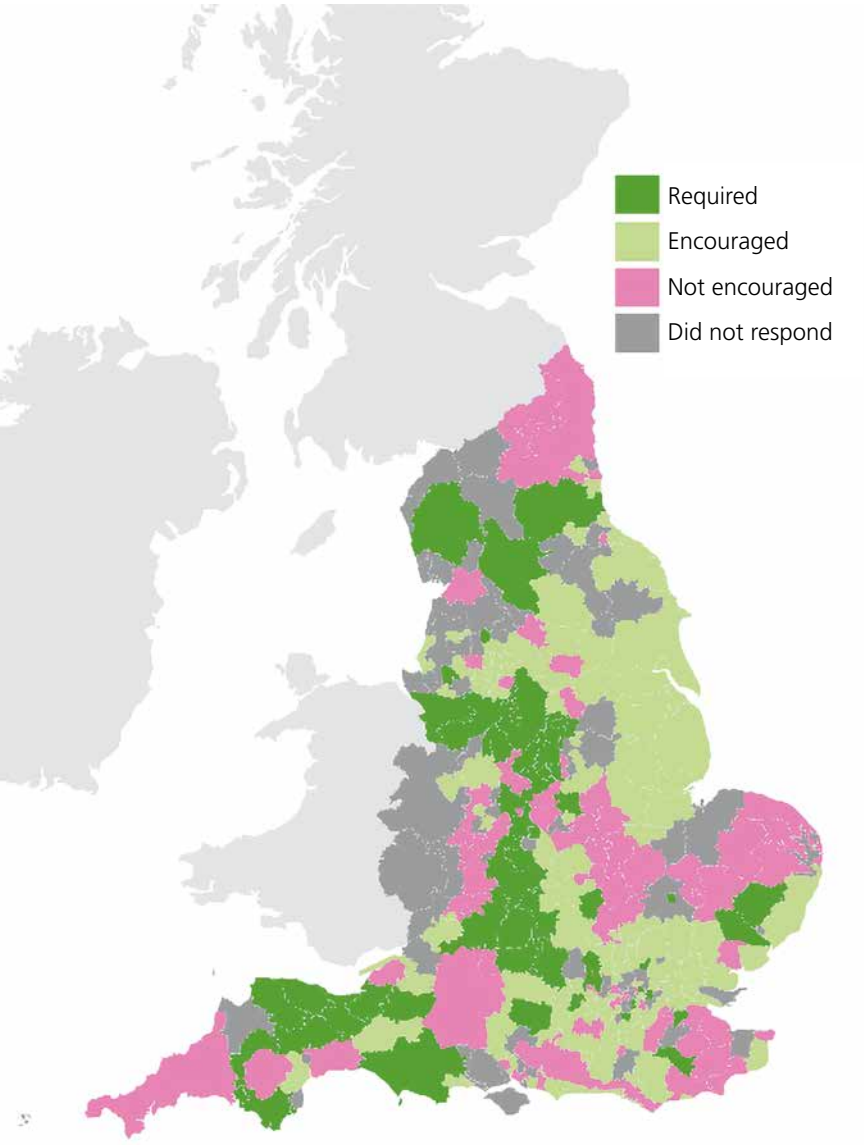

Figure 3. Does the LPA encourage or require the use of BDO where on-site compensation and mitigation is unable to achieve NNL/NG?

The frequency with which LPAs use BDO varies dramatically

A few LPAs report using BDO on more than 50% of planning permission applications, but most employ it in a very limited fashion, and the majority of responses are from LPAs which may approve the use of BDO in concept, but have used it only a handful of times if at all. Of 170 responding LPAs, 88 reported using BDO fewer than 10 times in total, for fewer than 5% of applications, very rarely or didn't know. BDO may be recommended by an ecologist but not be incorporated into a planning permission, and often LPA experience with BDO is from only one or a few projects from which no general principles have been formulated.

The survey asked about five kinds of performance standards attached to BDO. It is important to remember that many of these responses represent untested policy positions. BDO is still quite infrequently used and so these standards may be more or less theoretical or unimplemented policy. More information on this topic can be found in the full report.

For those 82 LPAs reporting that BDO is "not encouraged", nearly a third said that they could not encourage it because there was no provision for BDO in the local plan. The preference to compensate for all impacts on site was the second most frequent answer.

Most BDO sites are arranged for by LPA staff, and secured through Section 106 agreements

The work of spending the money to secure an offset site continues to be largely that of the LPAs themselves, with just over half of 155 responding LPAs saying that it is their own staff using developers' money for offset sites which they then own and manage. Developers are also known to secure and manage their own offset sites, and LPAs frequently turn to Wildlife Trusts, local committees or special local non-governmental organisations such as the North Devon Biosphere Foundation to receive funds to establish offset sites. Thus far only 5.4% of LPAs report using a third-party broker such as the Environment Bank to arrange for offset siting.

> **For BDO to be implemented in ways that meet the goals of NG, planning officers must benefit from the experiences of their peers across England and lessons learned in different landscapes should become a generalised set of principles.**

Although it is possible to secure BDO obligations from a planning permission applicant by use of contributions to a Community Infrastructure Levy (CIL) or a planning condition, LPAs overwhelmingly (87%) prefer to use Section 106 agreements, creating a financial obligation to the LPA, or Section 106 unilateral undertakings to pay an obligation to which the LPA is not party. When counties act as LPAs they are both applicant and planner: in such cases it is not possible for them to enter a Section 106 agreement with themselves and so they create bespoke legal arrangements.

Conclusion

Use of NNL/NG and BDO has diffused widely across England, although expertise and familiarity is still spatially concentrated in the south west and West Midlands. While much of the national discussion has centred around NG as a planning goal, in many areas LPAs are still reconciling themselves to NNL goals articulated in the 2012 NPPF and wrestling with the policy and resourcing challenges it posed. At present, 56% of LPAs consider it "practical" to implement and deliver NNL/NG and 66% of LPAs have a NNL/NG provision of some kind in their draft or final Local Plan. However, the lack of adequate resourcing is a major barrier to implementation, with respondents citing lack of land, expertise and political permission. The subset of planning applications to which NNL/NG applies, even in LPAs which consider it practical, varies widely, and it is clear that in most cases that NNL/NG is variously enforced and measured. Only a third of LPAs reported using a metric to measure NNL/NG. In the full report it is shown that only 39% of LPAs have in-house ecological expertise and about 82% respondents provide advice to only one LPA, meaning that expertise is thin and decentralised.

The use of offsetting sites to achieve either NNL or NG has been a key part of the policy debate since the 2012 Defra pilot, and however controversial offsetting is, it remains central to most calculations considering how NG can be achieved. Wherever offsetting becomes a common practice, its availability will exert pressure on the requirement to avoid and minimise impacts: the first two steps of the hierarchy by which the mitigation of environmental impacts is considered in the planning process. This was seen in the USA in the 1990s, and strong policy barriers are generally necessary to ensure that NNL/NG policies do not entirely rely on offsets.

The uptake of BDO has been uneven but has spread broadly from the initial centres of practice. At a minimum, LPAs have required 1886 ha of biodiversity offsets and fully delivered 361 BDO projects. BDO seems to have a relatively high degree of legitimacy and implementation, at least in concept. Only a quarter of responding LPAs reject the use of BDO. However, acceptance is mainly theoretical at this point: only 15 LPAs report creating more than 20 ha of BDO and only 17 report the securing and delivery of more than five BDO projects. Awareness of BDO appears broad, therefore, but actual use of BDO is in the early stages of experimentation. For BDO to be implemented with integrity, and in ways that meet the goals of NG, support for ecology in planning will be required to ensure that planning officers can benefit from the experiences of their peers across England and that the lessons learned in different landscapes can become a generalised set of principles grounded in real offset projects shown to achieve planning goals.

Acknowledgements

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Pioneering Practice with Great Crested Newt District Level Licensing: Learning Through the Woking Pilot

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Keywords: conservation, development, DLL, Favourable Conservation Status, gain, GCN, habitat compensation, monitoring, planning

Five years on from commencing the country's first district level licensing (DLL) project – to develop and trial a new way to support great crested newts, working in partnership with Natural England – Woking Borough Council and project ecologists ADAS reflect on the Pilot's successes, learning and links to the wider DLL rollout, and consider the project's future.

Introduction

Great crested newts (GCN; *Triturus cristatus*) have been much maligned in the past for impeding development and, despite Europe-level protection, over those same years their numbers have significantly declined. There was a clear appetite for innovation to proactively deliver better conservation outcomes for the species, improve certainty and reduce costs for developments likely to impact upon GCN habitats.

As others have ably explained (Law 2016, Tew *et al.* 2018, Cameron *et al.* 2019), Natural England chose Woking, Surrey, as the first test bed for a new approach and the Woking district level licensing (DLL) Pilot project was born.

Informed by a baseline of 2015 pond surveys, project partners Natural England and Woking Borough Council (WBC) developed a GCN conservation strategy involving the upfront provision of compensation habitat. Natural England issued WBC with an organisational licence, enabling it to issue permits direct to developers. Developers can opt into this route as an alternative to traditional licensing, an opportunity offered through WBC's Natural Woking biodiversity strategy (WBC 2016a, 2016b). Developers must, however, first adhere to the 'avoid – mitigate – compensate' hierarchy.

From the outset, the Council saw the Pilot as an investment, providing upfront funding to support future development while delivering biodiversity benefits; aquatic and terrestrial habitat enhancement for GCN in a Woking location that provided the greatest opportunity to reconnect GCN populations. A map of the site concerned is shown in Figure 1. DLL commits WBC to create and maintain this habitat for at least 25 years, but in practice its maintenance will be ongoing. As accessible Common Land and a Site of Nature Conservation Importance, this approach for the site aligns well with WBC's existing management responsibilities for the land and helps deliver and demonstrate its ongoing commitment to biodiversity and green infrastructure.

Compensation site design

The new habitat (strategic compensation) site design identified for Woking – to offset the level of impact on GCN likely to arise from planned development in Woking until 2040 – was based on data collected via environmental DNA (eDNA) to determine the distribution of the GCN populations within the borough. At the time this was considered an innovative approach (WBC 2016b). These eDNA data were to be used to understand better the potential future opportunities to improve connectivity of fragmented newt populations.

To deliver the compensation an area of Woking was identified, Westfield Common (Figure 1), which based on the data, supported three discrete populations of GCN. These were fragmented by minor roads and residential dwellings. An agreed design (the Improvement Plan; see ADAS 2016) was put together to meet both the requirement of the compensation and to deliver opportunities to reconnect the GCN populations. In doing so this would improve the Favourable Conservation Status (FCS) of GCN. The compensation works as per the design were completed in 2020, the project's fourth year.

Gauging conservation success

In relative terms the project is small compared to other DLL schemes that have been developed since. Woking saw a total of nine ponds created or restored by year 4 of the project. As a comparison, in total Natural England created or restored 386 ponds across their existing and newly launched DLL schemes in 2019–20 (Almond 2020). By the end of 2020, two (approximately 22%) of the Woking ponds restored and created became occupied, compared with 34% of Natural England's collective first-year monitoring results (Almond 2020). GCN pond occupancy is a key factor in meeting the FCS of any DLL scheme and the occupancy rates will not only vary between schemes but within schemes as well. The Woking project has been no exception. Population surveys between 2017 and 2021 showed that, where there was at least a moderate GCN population, with a peak count of 33, colonisation of connected new and restored ponds was relatively quick, within 1 year of habitat works. However, in areas where the population is very small, or where there are more issues relating to connectivity, there were no signs of occupancy within the first 3 years. However, in the fifth year since works began, surveys in 2021 have shown occupancy in one additional restored and one new pond, increasing the scheme's occupancy rate to four, or approximately 45%.

GCN landscape design based on eDNA data and habitat suitability was considered sufficient to provide an accurate picture of GCN throughout Woking Borough (WBC 2016b) and provide enough information to make the appropriate level of conservation decisions. While this may provide an overview strategy for the district this level of information is considered insufficient to determine time frames for future occupancy of new and restored ponds because of the unknown size of the source population. Therefore the focus, in certain situations, will be more on arresting the existing GCN decline rather than future pond occupancy in the first instance. Gaining a greater GCN population awareness within a scheme provides increased certainty over future pond occupation and focuses the priorities on either range expansion or restoring known GCN ponds from being a sink to a source population.

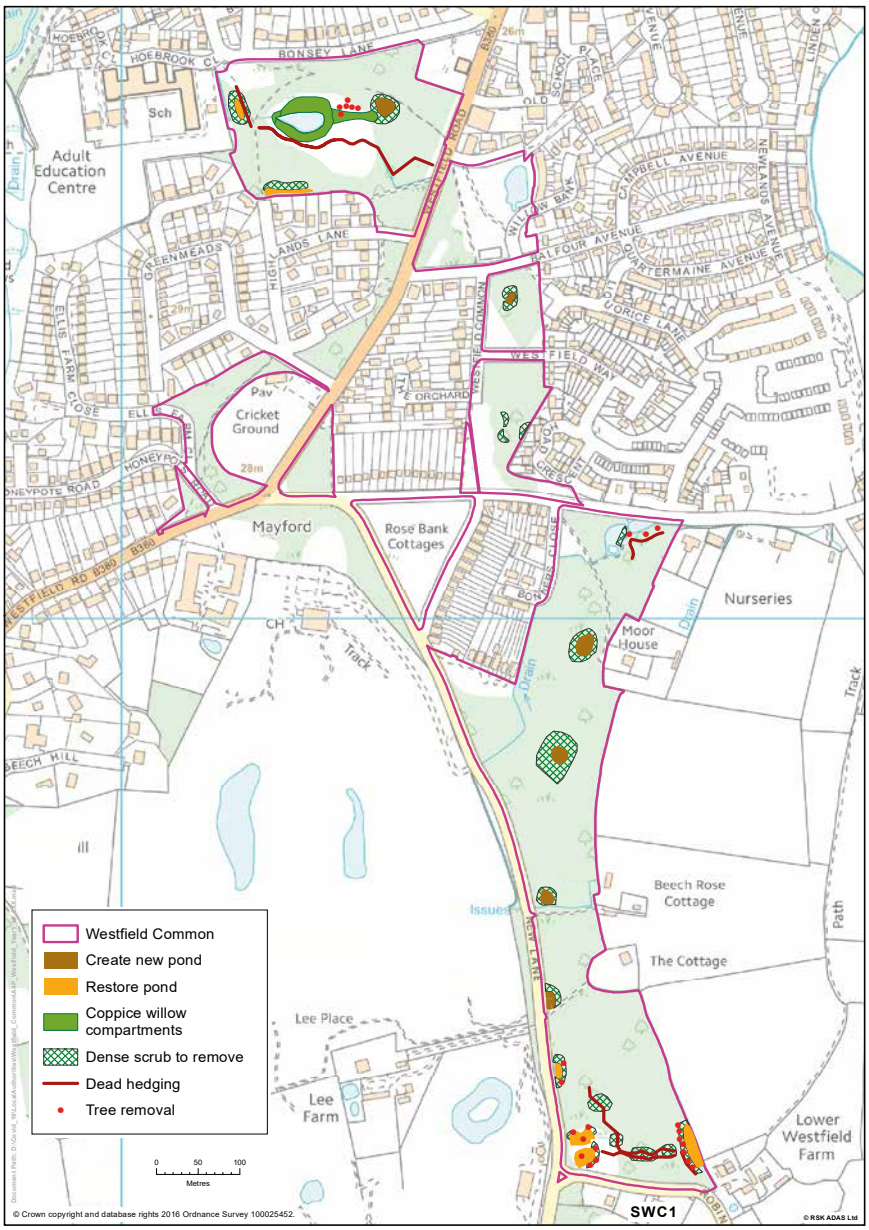

Figure 1. A map of the Woking Pilot compensation area, Westfield Common.

Urban contexts and opportunities for connecting people with nature

GCN populations in more urban environments may be considered as a challenge and not such a priority for certain DLL schemes due to the potential threats and the limited opportunities for range expansion. However, in a more urbanised district these fragmented populations may be a significant contributor to the overall GCN distribution. In the Woking Pilot, the population enhanced (at Westfield Common) was in an urban environment

surrounded on three sides by residential development with only marginal connectivity to the wider landscape. There were many negative factors including neglect, household rubbish and high footfall. In these microenvironments, greater investment is required to protect ponds and work with local residents to achieve a positive outcome.

The Woking project has involved volunteers in delivering practical tasks and in population monitoring (see Figure 2; data are available from annual reports; ADAS 2017–2020). The Improvement Plan dovetailed habitat works with existing conservation volunteering overseen by Surrey Wildlife Trust. As well as benefiting human health and well-being, this engagement enables local residents to feel more involved in the project, building local capacity and providing a gateway into learning about ecology for the community, whereas more rural DLL schemes, with greater opportunities for range expansion, may have limited engagement opportunities.

GCN have had a lot of negative press and are often singled out as a species that requires policy change (UK Government 2017). Changing hearts and minds towards GCN is important in transforming our overall approach to wildlife: "simply put, humans don't protect what they don't know and value" (Hayhow *et al*. 2019). To date, DLL does not have a target to engage with local residents or volunteers; such a focus could encourage greater investment, particularly in urban districts where natural environments and GCN are likely to be more limited. Connecting the environment and people is important for reversing a general continued wildlife decline and could further encourage people to promote wildlife in their own gardens and larger landowners to be more proactive in supporting environmental initiatives.

In September 2020, WBC began its Planet Woking initiative. Following on from much earlier work, Planet Woking is dedicated to all things relating to climate change, sustainability and biodiversity and, through it, Woking is helping residents lighten their environmental footprint. The Planet Woking launch video was an ideal opportunity to share with residents what the Woking Pilot is about and how they can make a difference to wildlife. The video can be accessed at https://planetwoking.co.uk/.

Figure 2. Volunteers and project staff, April 2019 GCN surveys. Photo: Woking Borough Council.

Strategic opportunities

One significant drawback of the Woking scheme is the inability to access third-party land to promote GCN habitat improvement works. The scheme is reliant on the land holdings of the Council. This has been significantly addressed by later schemes and WBC will look to such opportunities in the future. Based on the most recent Strategic Opportunity Area (SOA) map produced in 2020 by Natural England, it identifies 2515 ha of core and fringe GCN habitat of which WBC own 255 ha, or approximately 10%. In addition, the Council's land ownership is fragmented, making the long-term viable option of connecting sections of the borough through DLL, using ecological green corridors, as identified in the SOA map, a challenge. However, even with greater access to more land there will always be a dependency on sympathetic landowners willing to cooperate in the scheme(s). Therefore, while a strategic landscape approach presents a baseline of what may be possible, in reality the design of future GCN habitat conservation works and connectivity may be due to luck or the ability to take local opportunities. Conservation covenants provide a possible future route to securing third-party landowner conservation for GCN; this again emphasises a need to engage with as wide a range of the public as possible to generate such opportunities and the social need in delivery of this type of DLL project.

Other wider benefits

Evidence in the recent past has shown a significant drop in the number of ponds across our landscapes (Heath and Whitehead 1992), and observation has identified that many ponds are neglected. DLL has the potential to be a significant contributor to reversing this trend. The Woking project has been a great opportunity to restore and enhance an area of common land to support a greater range and diversity of habitats with an increase in features that support plants and animals. There has been a noticeable increase in both terrestrial and marginal habitats and an improved visitor experience has been achieved. Periodic negative issues that include invasive species, littering and unwanted behaviours like quad biking have been significantly addressed, reducing the associated risks to the future prospects of GCN.

GCN have in this instance been used as a keystone species on the back of which other wildlife will benefit. However, perhaps there is an argument that ponds should be the focus and act as a keystone habitat. In this way DLL might be more attractive to the whole of England and not just selected areas where a return of GCN can be seen due to their presence.

It is unequivocal that DLL will benefit biodiversity and it is fantastic to see a significant investment in so many ponds in places where previously such funding would not reach (for example see Figure 3) and which, based on the landscape design approach, will be delivered on the broad principles of "more, bigger, better, joined up" (Lawton *et al.* 2010). DLL is currently very focused on a single species and its roll out will be restricted to those areas likely to benefit from such a scheme, leaving some GCN populations in districts with small or isolated populations to continue to decline. There is potential that this will be

Figure 3. New pond establishing, created February 2019, Westfield Common. Photo taken August 2019. Photo: Woking Borough Council.

addressed under the Environment Bill and the roll out of the Local Nature Recovery Strategies, which will cover the whole of England. Alternatively, the existing DLL schemes could support less favourable areas for GCN where GCN returns might be limited but where there would be greater social engagement opportunities.

Future steps for Woking

The Woking Pilot has been informed throughout by the views of key stakeholders. We really appreciate the willingness of the organisations acknowledged below to share knowledge and constructive feedback about this and other DLL schemes. The Pilot will continue to build on this positive dialogue, underpinned by a shared commitment towards achieving FCS.

Over the next 25 plus years, the Woking site implemented under DLL will be managed to continue to support GCN populations in the borough and, as and when possible, additional areas will be brought into management. As we plan for the future, we are drawing on both our own learning and that across the breadth and variety of wider DLL experiences and we will develop the project where appropriate. An ongoing challenge remains the Pilot's relatively limited uptake of licences by developers, which is largely a consequence of low GCN numbers; hence the few instances of development on sites with GCN presence.

In this period of increased financial constraints on local authorities, WBC will need to identify how best to maintain the existing compensation landscape while continuing to expand the GCN habitat network. A related issue is the ability to access ecological expertise, as this particular DLL model does not provide for the employment of a GCN expert in the medium to long term.

Ecology today is going through an exciting time with a plethora of ideas, principles, policies and legislation to promote the field holistically, with DLL being just one. The greatest opportunities for nature will almost certainly be a combination of the various ideas presented, whether it will be by increasing the level of funding via private investors or creating greater opportunities for landowners to pursue a more biodiversity-rich agenda.

The provisions of the Environment Bill, including Biodiversity Net Gain, will accelerate efforts by all organisations to address climate change, and continuing mitigation measures such as provision of Suitable Alternative Natural Greenspace (SANG) all promise to strengthen green infrastructure networks, in Woking Borough and elsewhere. Westfield Common is one of a number of proposed new SANG sites being allocated in Woking Borough so adherence to Natural England's SANG guidelines, GCN and other site management, conservation and access objectives will require careful alignment.

Woking DLL has been a pioneering scheme from which the multitude of later schemes, now operating across 163 (as of July 2021) English local authorities, have been able to adapt and evolve. This DLL has provided an opportunity to invest in conservation, benefiting nature, including GCN and the environment for the local community, which will have many benefits for the longer term.

Acknowledgements

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Managing Railways and Newts with Better Licensing: A Conservation-led Future

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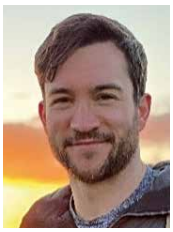
NatureSpace Partnership



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Network Rail

Mike Bull
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Keywords: Biodiversity Net Gain, great crested newts, organisational licence, strategic compensation

Network Rail's new organisational licence provides a fast and efficient approach to license activities which might impact great crested newts during the maintenance and enhancement of essential railway infrastructure. Delivered through NatureSpace and the Newt Conservation Partnership, the Licence provides both a positive step-change for great crested newt conservation and a streamlined, delay-free regulatory process for Network Rail.

Introduction

In 2018, when NatureSpace were first delivering the district licensing[1] approach to bring planning and licensing together for great crested newts (GCN; *Triturus cristatus*) and deliver compensation for impacts strategically, we wondered whether the same principles could help a major infrastructure operator like Network Rail. A pilot project was devised by Network Rail (Eastern Region) and NatureSpace to develop a strategic approach for Network Rail's work, outside of the local planning system but utilising the protocols, processes and partnerships already established in district licensing and agreed with Natural England. This pilot – the first of its kind – has now been granted an organisational licence[2] by Natural England, applying the strategic district licensing principles to an organisation other than a planning authority. The strategic approach to both impact and compensation significantly streamlines the process for Network Rail and delivers far more funding for habitat creation, management and monitoring. The assessment of impacts and delivery of compensation under this approach is completely separate to wider Biodiversity Net Gain assessments: the GCN requirements satisfy statutory licensing requirements for the species and are delivered in response to a conservation strategy designed to improve the conservation status of the species at a regional level. The scheme is currently operational along the Midland main line between London St Pancras and Market Harborough (see Figure 1) and further roll-out of this approach should see Network Rail's entire eastern region granted an organisational licence within a year.

The past

Network Rail is responsible for managing, maintaining and improving the majority of Great Britain's railway infrastructure, a critical function that broadly combines routine maintenance, enhancement projects and emergency operations. Impacts on GCN can often arise through the course of this work, although they are usually low level. Identifying potential impacts in the first place can be challenging, and the subsequent mitigation, compensation, management and monitoring requirements encumber Network Rail with obligations that are difficult to meet in the context of an operational railway. With strategic licensing, the goal, shared by Regulator and Operator, is to direct resources away from bureaucracy and towards conservation.

It is widely acknowledged that records of GCN often do not reflect true distribution, with a lack of records often more indicative of a lack of survey than a lack of presence (e.g. Isaac and Pocock 2015, Prendergast *et al.* 1993). The need for seasonal surveys, especially when unexpected, can result in major delays to works. Where GCN

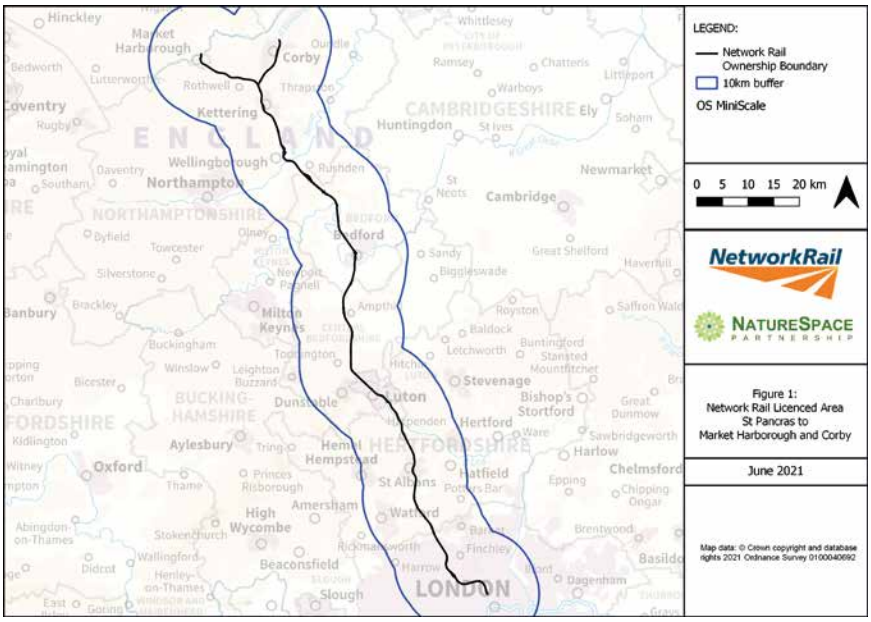

Figure 1. Network Rail licensed area, St Pancras to Market Harborough and Corby.

are identified and licensable impacts are likely, the standard European protected species mitigation licence (EPSML) application requirements can add further delays, operational challenges and rigid mitigation and compensation requirements. Further, long-term responsibilities arising through EPSMLs can be difficult and impractical within the linear nature of the railway estate, with necessary but complex health and safety requirements for every element of habitat mitigation, compensation, management and monitoring. Previously, a range of non-licensed approaches may have been applied but usually offer little conservation gain.

The future

Network Rail's relationship with the natural environment has at times generated controversy; a statutory responsibility to ensure a safe and reliable railway has generated some less-than-desirable outcomes, with ensuing local and national press coverage. In 2018 this reached a head when the Rail Minister commissioned John Varley to undertake an independent review into Network Rail's approach to vegetation management; ultimately, he recommended that Network Rail should view lineside vegetation and habitats as an asset (Varley 2018). This initiated a dramatic

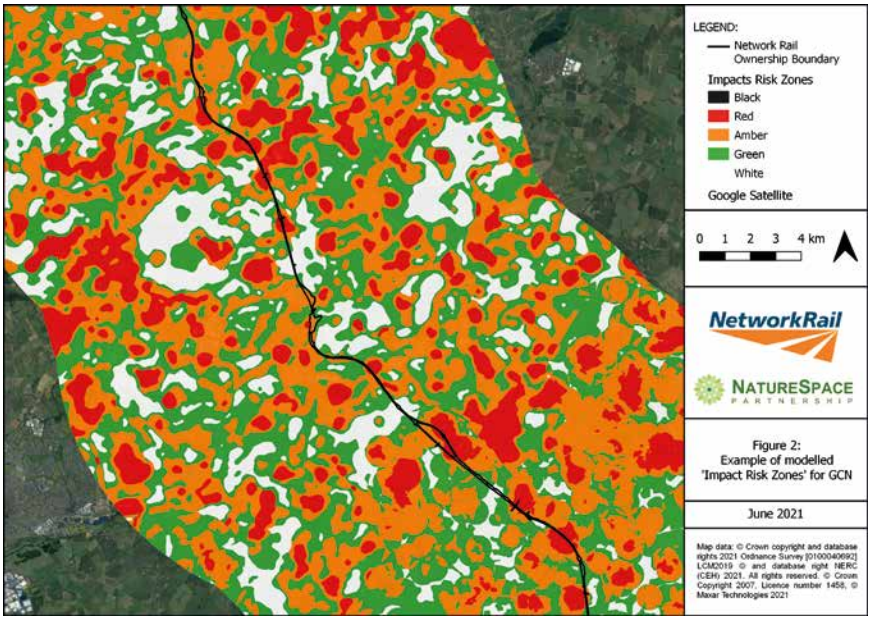

Figure 2. Example of modelled impact risk zones for GCN.

and rapid change within the industry including the setting of ambitious targets to achieve biodiversity no net loss by 2024 and a net gain by 2035, and the implementation of a Sustainable Land Use Programme that has resulted in new biodiversity standards and wide engagement, both internally and with partner organisations, to improve training and awareness. In 2020, Andrew Haines (CEO, Network Rail) stated as part of the programme: "Our vision is that Network Rail will be a responsible and environmentally sustainable leader in land management delivering an estate managed sustainably for safety, performance, the environment, our customers and neighbours." The strategic and innovative approach of a new type of organisational licence contributes to this vision by providing a better way to protect GCN habitats, delivering better conservation outcomes and aligning with Network Rail's new sense of environmental purpose.

Identification of potential impacts on GCN can now be done very reliably, using modern species distribution modelling (SDM) techniques and habitat suitability mapping to characterise the landscape and its relative value to GCNs. The Amphibian and Reptile Conservation Trust and the Durrell Institute for Conservation and Ecology are leaders in this field and bring world-class expertise to the project, which is imperative because the resulting map underpins the approach. With enough good environmental data (including extensive records of presence and absence), the SDM mapping works especially well for newts, which are widespread and mobile colonisers with known habitat requirements, often living in metapopulations, and it removes the requirement for any further spring-time survey work. The modelled output is used to create a colour-coded map, with assigned impact risk zones, depending on the modelled suitability of the habitat for GCN (where red is highest suitability, amber is moderate, green is low and white is lowest; plus a manually added black zone which represents protected sites for GCN). More than 35% of this modelled region is predicted to be suitable GCN habitat (black, red or amber). Network Rail and its contractors have instant access to a map that shows, at a glance, where the risks to GCN and GCN habitat are highest and

can therefore be taken into account in a proportionate way (see Figure 2).

Mitigation

As with NatureSpace's district licensing scheme, the Network Rail organisational licence fully embeds the mitigation hierarchy, with consideration of both on-site mitigation to reduce impacts and compensation to address remaining impacts. In high-risk areas, where newts are highly likely to be present (see Figure 3), all works that are undertaken follow best practice requirements to reduce risks to individual newts and to minimise impacts on existing habitats of value to GCN. These requirements include reasonable avoidance measures and site working protocols, vegetation management, timing restrictions on impacts to ponds or potential hibernacula and capture methods (hand/destructive searches). The cost of compensation provides clear financial incentives to minimise impacts but the impact assessment also takes a pragmatic approach to the consideration of long-term impacts and increased threats (such as increased risk of pollution, invasive species, disturbance, etc.), some of which are much less of a risk in maintenance of an existing and well-established railway than might arise through, for example, building new infrastructure or other new development.

Within the Network Rail estate, it is recognised that rail-side habitats can in fact have considerable ecological value for amphibians, reptiles and a range of other species (Neeves 2017, Network Rail 2020), and that this does not have to conflict with operational requirements of the railway itself (Varley 2018). The rail-side habitats often provide important connectivity through the landscape – not always lateral but often along the railway – providing good-quality foraging and dispersal habitat, and resting places and hibernacula. In areas where there is a high degree of existing development or intensively farmed agricultural land, these long linear corridors of connecting habitats may be critically important for populations that would be otherwise disconnected and so existing habitats for GCN are brought under new best practice guidance to reduce impacts and ensure continued ecological functionality. Long-term connectivity through degraded landscapes is vital, allowing populations to maintain/expand their range, maintain a healthy gene pool and respond to the challenges of climate change.

Compensation

For any moderate- to high-risk works (depending on zone, distance to ponds and the type of works), site- and operation-specific impacts are assessed using a system of bespoke metrics to calculate the proportionate compensatory payment. This is based on the impacts (including the type, scale and duration of the activities) and their context in the wider landscape (including proximity of ponds, quantity and quality of terrestrial habitats for GCN and connectivity). Each new submission is assessed individually, allowing for new projects to come forward and for emergency works to be included and quickly licensed (the paperwork takes days, not months). Ongoing activities such as railway maintenance and routine vegetation management are also included in impact assessments as required. Network Rail makes the proportionate compensatory payment to NatureSpace who manage the administration, tracking and reporting of all activities under the licence and pass 80% of the compensation payment directly to the Newt Conservation Partnership, a not-for-profit Community Benefit Society set up to deliver conservation for GCN steered and staffed by expert secondees from the UK non-governmental organisations the Amphibian and Reptile Conservation Trust and the Freshwater Habitats Trust. Compensation monies are spent on creating and restoring high-quality GCN habitats as well as putting aside sufficient funds for long-term management and monitoring (as described in Tew *et al*. 2018, Tew and Nicolet 2019).

The Newt Conservation Partnership ensures high-quality, appropriate habitat creation and restoration in the right places – to strengthen, expand and re-connect newt habitats across the landscape – with clean water and good surrounding terrestrial habitats. Aquatic and terrestrial habitat creation and restoration sites are located outside of the Network Rail estate to avoid access and health and safety issues when working in proximity to the line, meaning both initial works and long-term maintenance, management and monitoring are straightforward.

The objective of the organisational licence is to improve the conservation status of the species, considering all parameters: range, population, habitats and prospects. Compensation delivery is strategic, guided by a wider spatial conservation strategy that embeds the principles of the 2010 Lawton Review ("more, bigger, better, joined up"; Lawton *et al.* 2010) and the Government's 25 Year Environment Plan (including creating and restoring wildlife-rich habitats, taking action to recover threatened, iconic species and increase woodland cover).

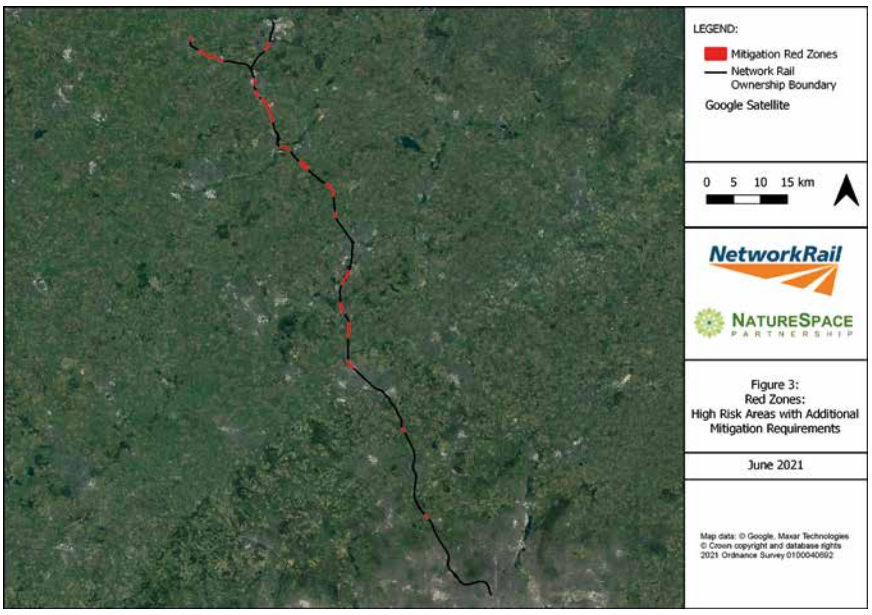

Figure 3. Example of high-risk working areas where best practice mitigation will be employed to reduce impacts to GCN.

Monitoring and management

All off-site habitats created under the Network Rail organisational licence will be managed and monitored by NatureSpace and the Newt Conservation Partnership for at least 25 years, as is also the case for the NatureSpace District Licensing Scheme. Funds are set aside from the outset and are held by the Newt Conservation Partnership, protected and secured for that management no matter what the future holds. NatureSpace and the Newt Conservation Partnership enter into an agreement with Natural England, and Network Rail are free from long-term liabilities. Landowners are paid to maintain and manage created/restored habitats for newt conservation and the approach is an attractive, reliable and long-term option for land management, in an increasingly uncertain environment for farmers. Pond and habitat creation not only guarantees income for those landowners, but also delivers good-quality wildlife habitats, contributing to Biodiversity Net Gain, flood-risk alleviation and carbon sequestration. It is intended that the monitoring and management will be continued beyond the 25 year agreement, with funds building over the next 25 years to secure even longer-term management and maintenance: the vision is 'in perpetuity'.

Conclusion

For Network Rail, the scheme provides a simple, quick and cost- and operationally effective way of meeting its requirements with regard to this protected species. While other protected species must still be dealt with under the standard approaches, the issues associated with GCN are often seen to be the most problematic. This approach cuts through all of the 'problems', providing instead an effective, sustainable solution that delivers real net gains for the environment while also improving rail performance and safety. The ability to quickly identify and deal with any potential impacts without delay or any need for conflict or compromise is paramount, not only for the ongoing operation, maintenance and improvement of the railway infrastructure but also for responding to emergency situations. NatureSpace provides Network Rail with a fast and efficient service to utilise the new licence and provides professional oversight, management and responsibility for all the requirements that arise through the licence so that Network Rail is freed of administrative burdens and long-term obligations. In addition, by removing the hurdles usually associated with newt licensing, this approach will encourage and create opportunities to further enhance line-side biodiversity, helping Network Rail to realise its significant ambitions.

Rail is among the most efficient and lowest-emitting modes of transport (especially on electrified lines) and Network Rail aims to build on this further, with a target for net zero emissions by 2050; this approach to addressing impacts on GCNs delivers multiple environmental benefits and facilitates the future development Network Rail must deliver to help the UK decarbonise transport and the wider economy.

NatureSpace's work with the Newt Conservation Partnership is helping to redress the imbalance of environmental action from reactionary to proactive, delivering net gain for newts and benefits for many species, through the creation of a variety of habitats, both terrestrial and aquatic. This approach could herald a new perspective in species protection where positive conservation-led outcomes drive streamlined regulatory process. We believe the approach could now be applied to many other types of infrastructural or national projects.

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Notes

1. A district licence is an organisational licence that is granted to a planning authority for use alongside the planning process for their administrative area. District licences have been granted to district, borough and county councils as well unitary authorities. District licensing for great crested newts was introduced by Natural England in 2016 in Woking Borough Council (see page 49 in this issue) and was then trialled in 2018 by the NatureSpace Partnership and a group of local planning authorities in the south Midlands. It is now being implemented by NatureSpace in partnership with 20 English local planning authorities, with another 30 LPAs joining this year, and also independently by two councils (see www.gov.uk/government/publications/great-crested-newts-district-level-licensing-schemes and https://naturespaceuk.com/).

2. An organisational licence is granted to an organisation to permit certain activities that would otherwise be unlawful, in this case relating to great crested newts and activities permitted under the Conservation of Habitats and Species Regulations 2017 (as amended) and the Wildlife and Countryside Act 1981 (as amended).

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The UK Overseas Territories: Outstanding Treasures

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Keywords: endemic, UK Overseas Territories

This article, from the Overseas Territories Special Interest Group, highlights some of the conservation success stories of, and challenges faced by, the Territories. It puts their biodiversity 'value' into context by considering them alongside the UK, the findings of the 2019 *State of Nature* report and the Government's commitment to undertake natural capital assessments across the Territories as part of the 25 Year Environment Plan. Finally, to highlight a few examples of just why the Territories are so important for biodiversity, we detail some important and charismatic species endemic to the Territories, from woodlice and ducks to endemic trees and seaweeds.

Why CIEEM is supporting biodiversity in UK Overseas Territories

This article is produced by members of CIEEM's Overseas Territories Special Interest Group (or OT SIG). The group was formed in 2012 with the aim of promoting the work done in the OTs, as well as the Territories themselves. In addition, we aim to raise awareness of the importance of the OTs and their biodiversity and how significant these areas are for achieving the UK's Strategic Biodiversity priorities and for the UK meeting the Convention on Biological Diversity's Aichi targets.

The land and marine environments comprising the UK OTs are internationally recognised for their biodiversity value. Furthermore, a Foreign and Commonwealth Office report in 2012 noted that "[the Overseas Territories] contain an estimated 90% of the biodiversity found within the UK and the Territories". The 2019 *State of Nature*

UK Overseas Territories photo locations. See larger figures for details.

(Hayhow *et al.* 2019) report provided more detail on this biodiversity 'value', reporting that "32,216 native species have been recorded across the OTs; however, information is patchy, and the actual number is estimated to exceed 100,000 species". In terms of their global significance, the *State of Nature* report continues: "the OTs in the South Atlantic and Antarctic are of global importance for their seabird colonies and contain one third of the world's albatrosses and a quarter of its penguins". In terms of conservation status, 5898 OT (and Crown Dependency) species have now been assessed against the IUCN global Red List criteria. It has been recognised that 560 (10%) of the extant species, for which sufficient data are available, are classified as threatened (Critically Endangered, Endangered or Vulnerable), and therefore at risk of global extinction. Of the different taxonomic groups, 40% of cartilaginous fish – sharks, rays and skates – 36% of reptiles and amphibians, 11% of mammals, 8% of birds and 2% of bony fish are assessed as being threatened with global extinction. Sadly, activities such as habitat loss/degradation, inappropriate development and introduction of invasive non-native species is taking its toll on the wildlife of the Territories.

Thankfully, there are many successful, inspirational and aspirational conservation initiatives taking place in the OTs. These are also helping to promote (to the wider world), recognise and document the value of the OTs' natural capital, while also protecting the habitats and species present. For instance, the Blue Belt programme is one of the largest conservation initiatives ever undertaken: the UK Government provided almost £20 million for long-term protection for 4 million km² of ocean across the OTs in 2016–2020. Large-scale Marine Protected Areas have already been designated around St Helena, Ascension Island, the British Indian Ocean Territory, the Pitcairn Islands, and South Georgia and the South Sandwich Islands. In addition, work is being done on many OTs to remove invasive species (e.g. see Pitman and Carr 2021, Soanes and Mukhida 2021). The most significant recent achievement, as noted in the *State of Nature* report, is the clearance of rodents from South Georgia. Here, the spread of other non-native species, such as plants, is also being tackled

The Government's 25 Year Environment Plan, acknowledging that the OTs "boast some of the world's most delicate and complex ecosystems and habitats", also sets out that natural capital assessments for the OTs are being undertaken to improve understanding of the full value of these unique environments. Many of these assessments have now been undertaken, with benefits ranging from fisheries and tourism (e.g. noted in the assessment for Anguilla) to coastal flood protection and soil erosion regulation (e.g. noted in the assessment for the British Virgin Islands). Interestingly, several of the OTs have assessed the habitats present on their ability to sequester carbon, a value beyond the Territories themselves. The assessment for Anguilla alone predicts that the habitats present sequester more than 7000 tonnes of carbon equivalent each year (with a predicted value of EC$834,000).

A piece on the OTs would not be complete without acknowledging the incredible number of endemic species across all the Territories. As many of the OTs are isolated oceanic islands, they typically hold high numbers of endemic species. At least 1549 have been documented to date, with 30% found on St Helena alone. This compares to 348 known endemic species in Great Britain. The following highlights just a select handful of endemics recorded across the OTs.

St Helena: invertebrates

St Helena is known as the Galápagos of the South Atlantic because of its unique wildlife. It supports 437 endemic invertebrate species, including our rarest invertebrate, the spiky yellow woodlouse, *Pseudolaureola atlantica*; there are only 90 pairs. Sadly, the charismatic giant earwig *Labidura herculeana* is probably already extinct (it was last seen alive in 1967). One possible reason that has been cited for this extinction event is habitat loss "by the removal of nearly all surface stones...

Figure 1. *T. ebenus*, St Helena's national flower. Photo: Katie Medcalf.

Figure 2. Common gumwood, *C. robustum*. Photo: Katie Medcalf.

for construction" (Hance 2014). In total, the UK OTs have 1044 known endemic invertebrates and if you want to find a new species to science, within the UK, the OTs must be the place to look.

St Helena: endemic plant species

The UK OTs support at least 180 endemic plant species, of which 49 are flowering plants, including *Trochetiopsis ebenus*, St Helena's national flower (see Figure 1). There are also 13 endemic fern species.

One endemic species that has made a very successful come back following the decimation of natural habitat by introduced goats is the distinctive halophytic succulent species known as babies' toes (*Hydrodea cryptantha*), which is found in large numbers in areas of saline semi-desert. It grows alongside an endangered endemic called St Helena bone seed (*Osteospermum sanctae-helenae*), which also appears to be regenerating naturally following removal of the goats. Less secure from extinction is the large bellflower (*Wahlenbergia linifolia*), which is critically endangered. Tree fern thicket habitat has declined and what is left has become invaded with exotic plant species, resulting in only three small populations of *W. linifolia* surviving. To save further endemic species from extinction a plant nursery has been set up by conservationists to propagate native species. This nursery has been instrumental in the propagation of the common gumwood *Commidendrum robustum* for the Millennium Forest, an ongoing project to restore the woodland that covered much of the island before the introduction of goats (see Figure 2).

Bermuda: birds

While folk tales report of aircraft and ships disappearing in the Bermuda Triangle, thanks to concerted conservation efforts the Bermuda petrel, also known as the cahow (*Pterodroma cahow*), has not. This is the only endemic bird species to Bermuda (see Figure 3). It has an eerie call, and was thought extinct for 300 years, but 18 pairs were discovered in 1951. It faced threats from predation by non-native predators and poor nesting habitat. The introduction of predator control and provision of artificial nest sites, along with a translocation to establish a new breeding colony on Nonsuch Island, means the global population had reached around 142 established breeding pairs in 2021, with 27 pairs on Nonsuch Island. The greatest threat now is accelerating storm damage and erosion because of anthropomorphic climate change. In total, the UK OTs have 22 endemic bird species.

Figure 3. The cahow (*P. cahow*), the only bird species endemic to Bermuda. Photo: Jeremy Maderios.

Bermuda: endemic trees

In Bermuda there are three endemic trees species. The Bermuda cedar (*Juniperus bermudiana*) was once one of the most common trees on the island until the cedar scale insect was accidentally introduced in the 1940s. This destroyed approximately 95% of Bermuda cedars. Bermuda has introduced a native breeding programme to replace and replant the trees.

Figure 4. Bromeliad plants on the Virgin Islands are used by the Virgin Islands coqui (*E. schwartzi*) as places to breed. Photo: Katie Medcalf.

A similar devastating introduced pest has resulted in the destruction of the Caicos pine (*Pinus caribaea* var. *bahamensis*), which is endemic to the Turks and Caicos Islands and some neighbouring islands. Losing the main canopy species from the Pine Yards had a dramatic effect on the ecology of the area. Several projects have been undertaken to breed new plants and to introduce managed burns to control the pest scale insect and allow restoration.

Anguilla: Lesser Antillean iguana and endemic scrub

Located to the north of the Antilles islands in the Caribbean, Anguilla is home to a range of fascinating wildlife. Of these, the Critically Endangered Lesser Antillean iguana (*Iguana delicatissima*; see Soanes and Mukhida 2021) stands out as a flagship species for the island. Once widely occurring throughout the Antilles, the Lesser Antillean iguana has been extirpated from many of the islands it used to call home and is now considered one of the most endangered iguanas in the world. Overexploitation and habitat loss are significant drivers of decline in the species, as well as the introduction of the invasive green iguana (*Iguana iguana*).

In Anguilla, there is only one endemic scrub species, *Rondeletia anguillensis*, which is an important component of a habitat that supports other significant species. Mapping of its distribution has shown that there are only certain areas of the island where it will flourish. This type of 'opportunity maps' provides valuable context for conservation actions.

British Virgin Islands: Virgin Islands coqui

Well known across the British Virgin Islands for their distinctive 'coqui' calls, the frogs of the genus *Eleutherodactylus* can easily be heard from among the vegetation. Of this group of small-bodied frogs, one species native to the islands is the Virgin Islands coqui (*Eleutherodactylus schwartzi*). Found in dry scrub forests, the Virgin Islands coqui breeds in bromeliad plants (see Figure 4). While males often call from the bromeliad to attract a mate, the female will lay fertilised eggs on the leaf of the plant, with the young hatching fully formed and skipping the typical amphibian larval stage of development. Unfortunately, the species is currently recognised as being Endangered, primarily due to habitat loss and the introduction of predators.

The Falklands Islands: intertidal endemics

The Falkland Islands supports a fascinating array of species, including 82 endemic species. As well as the more obvious endemic bird species, lesser known endemic species include the Falkland flightless steamer duck (*Tachyeres brachypterus*; known locally as the logger duck) and Cobb's wren (*Troglodytes cobbi*), and plant species including Antarctic cudweed (*Gamochaeta antarctica*) and Falkland rock-cress (*Phlebolobium maclovianum*). These all reside in the intertidal zone. Intertidal endemics include benthic macroalgae (seaweeds; Figure 5), which are a common and visible feature on the Falklands coastline. However, despite their obvious presence little is known of their diversity and distribution around the Falkland Islands. Due to the relatively remote situation of the Falkland Islands there are likely to be a number of endemic seaweed species. Seaweeds have a major role in capturing carbon; kelp specifically is known to act as a significant carbon storage sink in temperate and polar seas. There is a clear need to document both the species diversity, including any endemism, and current and potential value of the ecosystem services of this resource, not just in relation to carbon capture but in also for animal nutrition as an organic fertiliser and as a source of alginates.

Figure 5. Benthic macroalgae (seaweeds) are a common and visible feature on the Falklands coastline. Photo: Katie Medcalf.

Marine life: the Great Chagos Bank

The OTs support over 4712 km^2 of coral reefs. This makes the UK the nation with the 12th largest reef system in the world. The Great Chagos Bank is one of the world's largest and richest atolls. It supports over 300 species of corals and related reef-building species such as the brain coral *Ctenella chagius* and endemic Chagos clownfish (*Amphiprion chagosensis*). The area was one of the first Marine Reserves designated in 2010 and was the largest protected area in the world until 2016 (see more about this in Pitman and Carr, 2021).

Looking ahead

Looking ahead to the next 20–30 years, the OTs endemic species could face significant challenges. Climate change is already impacting the islands: in the Caribbean the intensity and number of hurricanes hitting the islands has started to increase, and sea level rise will affect many of the wetland and intertidal areas. Warming oceans are already very problematic for the coral reefs, not only for the biodiversity but also for the coastal communities that are situated nearby. Tourism is often the main source of income. Planning regulations tend to put more weight on short-term economic potential with less attention given to the wider ecological impacts, both short- and long-term. There could be a role here for CIEEM in providing assistance with Ecological Impact Assessment guidance. The government of each country is responsible for its own environmental and planning legislation and has its own unique culture and values, but insightful guidance could assist all. Robust laws and guidance, supported by research and active management, will be essential to meet the challenges ahead.

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About the Overseas Territories Special Interest Group

CIEEM's Overseas Territories Special Interest Group was formed in 2012. The aim of the Group has been to promote the work done in the OTs, as well as the OTs themselves. The Group continues to explore ways in which CIEEM can work with, learn from and support the OTs. Do get in touch with a member of the Steering group if you would like to be involved.

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Supporting Early Career Practitioners and Freelancers

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It is saddening that in an issue of *In Practice* that reflects on what has changed in our profession over the past 30 years, I also need to highlight our ongoing work exploring the treatment of early career practitioners and freelancers within our profession. This summary paints a picture that will shock some of you but will disappointingly resonate with others. The good news is that we can do, and are doing, something about it. It is a clarion call for all those who care about creating a fairer, safer, more attractive and welcoming profession. Please read on.

The background

Following our health and well-being conference in 2019 we became aware of concerns around the experiences of early career members and we welcomed the articles by Marcus Kohler and Tilly Tilbrook in the March 2021 issue of *In Practice* that shone a spotlight on the issues. These were then discussed at both CIEEM's Governing Board and Advisory Forum. It was recognised that, whilst these are problems affecting the sector as a whole and not just CIEEM's members, CIEEM has an important role to play in helping to find solutions.

We contacted all of our early career members and invited them to take part in one of two confidential meetings so that we could hear, first-hand, about their concerns. We set up a separate meeting for freelancers registered on our Sub-contractors Directory. Finally, we arranged two meetings with employers representing small, medium and large organisations.

The issues: early career members

From our early career members there were some shocking examples of bad practice, alongside some very good examples of considerate and supportive practice. For the former, the biggest issue was their experience of an overwhelming lack of concern from employers regarding their health, safety and well-being (primarily during the survey season but, from some employers, all year round). Participants reported:

- Long, unsocial hours, especially during survey season (e.g. 4/5 night-time surveys a week plus office work and being 'on call' during weekends)
- Regularly feeling unsafe (e.g. driving long distances whilst exhausted)
- No time off in lieu (TOIL)/overtime (or promised but not delivered)
- Threatening behaviour of some line managers (also under pressure)
- Organisational culture pressures to accept this as 'the norm' or a 'rite of passage'
- Nobody listening when they asked for help, or being made to feel 'weak'
- Lack of support, advice or help from managers, feeling isolated, not feeling able to do their best work
- Lack of welfare provision (e.g. overnight accommodation between dusk and dawn surveys) or subsistence allowance

Participants consistently noted that when coming into the profession they were very unprepared for the reality of the experience. They had been shocked by how much they were expected to do unsupervised, with little or no investment in training or ongoing support. Some regarded themselves as 'cannon fodder' or 'disposable resources'. They had come into a profession to do good for the environment and to have a fulfilling and successful career. The reality was proving to be very different. It was also noteworthy that several mature career changers spoke about their surprise and disappointment at the difference in experience compared with their original profession/career.

Yet there were also examples of good practice from similar-sized organisations. Whilst there was little awareness of CIEEM's *Good Working Practices* guidance (https://events.cieem.net/Portal/Publications/Professional_Guidance_Series.aspx) there were employers that had clear policies around workloads, amount of unsocial hours working (e.g. night-time surveys), TOIL and provision of support, and implemented these policies effectively. So it clearly can be done.

Participants also reported concerns about a lack of interest from some employers with regard to the individual's career progression. There was little training or other professional development available to them, other than in their own time and cost, and

they were finding it difficult to see how they would move on from the slog of where they are now.

Pay was a concern, although not the main concern. It was noted that some were working for little more than the minimum wage despite having spent 3 or 4 years at university and having the concomitant debt hanging over them. The prospect of saving up for somewhere to live, or a car that wasn't held together with glue and string, seemed a long way away. Companies offering 'graduate training courses' where participants effectively pay to learn whilst being charged out to clients were felt to be especially exploitative.

The issues: freelancers

For freelancers the main issues were pay and poor communication. There was a disparity between more experienced freelancers who had built up sufficient reputation, confidence and contacts to charge a reasonable hourly rate to consultancies and who could choose who they work for, compared to many early career freelance ecologists, forced into the role through the lack of alternative work opportunities or personal circumstances, who were having to take whatever was offered in order to earn some money.

The latter were typically being offered little more than the minimum hourly wage, or living wage, for surveys and reports, often with no travel expenses (or low rates) and with no allowance for all of the other costs of being self-employed. They would have to accept as much work as they could get to try and make financial ends meet. The overall impact, in addition to the effect on their personal health and well-being, was to drive down the costs of freelance work in order to support the lowering of costs charged to clients in order to make consultancies more competitive – the so-called 'race to the bottom'. This, in turn, impacted on the earning potential of freelancers overall.

The other main issue for freelancers was the poor communication between consultancies they were working for and their clients, or between the consultancies and the freelancers. This often led to delays, 'lost' (and therefore unpaid) time or unpaid time spent trying to resolve resultant problems.

So what can we do?

Like all of you, I want to be proud of this profession. I want it to be fair, inclusive, rewarding and exciting. The work we have done over the past few months has been sobering but the good news is that there are plenty of people out there who are ready to support change. We know that this requires a long-term, sustained approach to bring about the cultural shift that is needed, but we also know that we have to deliver some quick wins.

Within CIEEM we will be setting up and supporting two new Member Network groups, one for early career practitioners and one for freelancers, so that we can provide ongoing opportunities for dialogue, peer to peer support and knowledge exchange. We will be engaging with universities and final year students to help them prepare for the world of work, to understand what are, and are not, acceptable working practices and to know what questions to ask of potential employers regarding working practices. We will also be including information about acceptable and unacceptable working practices in all new member packs.

We will be adapting the mentoring platform to provide a means for those members experiencing these kinds of work pressures to find support and advice from senior members in the profession. We will support larger organisations to look at their supply chain and the steps they can take to ensure employees of contractors and sub-contractors are being treated appropriately.

We will be reviewing our Registered Practices scheme and the associated Code of Practice to ensure that it sufficiently covers the kinds of employer behaviours and practices we expect to see. We are introducing an auditing system so that we can be confident that we can more actively promote these companies and organisations as good employers. We will also look at our *Code of Professional Conduct* to see if it sufficiently covers individual responsibility to treat people fairly.

But the best news is that there are plenty of employers out there who want things to change too, and they need to be at the forefront of change because this goes beyond the CIEEM membership.

A group of concerned employers have met again, after our initial meetings with them, to identify actions they will take to lead change. As a result we are hoping to set up an employers working group this autumn. This group will explore and develop a number of options including:

- a checklist for good employers to follow
- sharing more examples of good working practices
- developing template policies for all employers to use
- the potential for a considerate employer scheme.

At a time when we are also working on initiatives to create a more diverse and inclusive profession it is incredibly important that it is a profession to be proud of. By working together we can transform the experiences of those joining us. That would be a great legacy from our 30th year.

About the Author

Sally Hayns is CIEEM's Chief Executive Officer. In addition to overseeing the running of the Institute she currently leads on CIEEM's professional standards and professional development work and is actively involved in policy engagement and outreach work. Prior to taking on this role in 2010, she had worked for a number of environmental charities including the Field Studies Council, the Wildfowl and Wetlands Trust and a local Wildlife Trust. She also spent 6 years working for the City of London Corporation at Epping Forest. As well as being a Fellow of CIEEM and a Chartered Ecologist, Sally is also a member of the Chartered Institute of Fundraising and a Trustee of The Mammal Society.

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Innovation and the Nature Recovery Network

Play it again?

The need to recover nature at a landscape scale is not a new concept. For many years ecologists and many others involved in conservation have recognised the need to increase, improve and connect wildlife-rich sites to improve resilience to climate change and to ensure that species can thrive. However, for the past seven decades nature conservation in England has been founded in large part upon the identification and protection of our most important habitats. At the core of this effort has been the notification of Sites of Special Scientific Interest, covering more than a million hectares or over 8% of England. Many are further protected as National Nature Reserves, or through additional legal safeguards operated under international legal obligations.

The controls to protect this network of key areas have been vital in safeguarding many of our best wildlife and geological areas. But ultimately, as repeated surveys have revealed, including the *State of Nature*[1], this is not enough to see nature thrive and to meet the needs of society. We now need to act collaboratively at scale, taking the step from protection into active restoration of the natural world to address the crises facing biodiversity, climate, and public health.

Sir John Lawton's 2010 *Making Space for Nature* report[2] set a blueprint for action through the advice to create more, bigger, better and connected areas of wildlife-rich habitat benefiting nature and people. That vision was furthered by some organisations, who developed a variety of landscape-scale conservation programmes. It has also inspired a state level response. Lawton's recommendations are reflected in the Government's 2018 25 Year Environment Plan (25YEP)[3] which aims to leave nature in better shape for future generations – and it lies at the heart of Government's policy for a new national Nature Recovery Network (NRN).

So, what's new?

The ambition is to deliver nature's recovery at a scale that we have not seen before. This is nature recovery as a movement, where we work collectively, across sectors, to amalgamate policy, skills, knowledge and resource to deliver one national NRN. The NRN is committed to by Government nationally, spatially planned on a local scale, delivered collaboratively it is underpinned in law and supported by targeted policies, delivery mechanisms and funding streams.

This is the first time:

- we have moved from conservation into active restoration of the natural world
- land management policy is being aligned to support nature recovery
- development will be required to leave habitats for wildlife in a measurably better state through the Environment Bill's introduction of mandatory Biodiversity Net Gain
- nature's recovery will be underpinned by new laws that run through the Environment Bill via a new legally binding target for biodiversity; a requirement for all areas to have Local Nature Recovery Strategies (LNRS); and provision for landowners to set up voluntary conservation covenants
- Natural England have set up a formal national partnership for nature's recovery, involving diverse cross-sectoral organisations, recognising that together we are greater than the sum of our parts

What is the Nature Recovery Network[4]?

The NRN will be a national network of wildlife-rich places that benefit wildlife and people. Our aim is to expand, improve and connect these places across our towns, cities and countryside to help us deal with three of the biggest challenges we face: biodiversity loss, climate change and public well-being.

Enhanced sites designated for nature conservation and other existing wildlife-rich places will be at the heart of the NRN. Additional, newly created, and restored wildlife-rich habitat, corridors and stepping stones will help wildlife populations grow and move. Establishing the network will improve the landscape's resilience to climate change. It can also provide natural solutions that reduce carbon emissions, manage flood risk, and sustain vital ecosystem components such as improved soil, clean water and clean air. Its creation will reinforce the natural and cultural diversity of our landscapes, helping to protect our historic environments, and enable us to enjoy and connect with nature where we live, work and play - benefiting public health and well-being, and tackling environmental inequality.

NRN objectives

Through our collective work to create the NRN, by 2042 we will meet the 25YEP targets to:

- restore 75% of protected sites on land (including fresh water) to favourable condition so nature can thrive
- create or restore 500,000 ha of additional wildlife-rich habitat outside of protected sites
- recover threatened and iconic animal and plant species by providing more diverse and better-connected habitats
- support work to increase woodland cover
- achieve a range of environmental, economic and social benefits, such as carbon capture, flood management, clean water, pollination and recreation

Delivery of the NRN will align with the requirement to expand and improve our existing network of protected areas to achieve our planned Convention on Biological Diversity (CBD) target of 30% by 2030[5].

How we will set up the NRN

1. **Spatial planning** – mapping and data, specifically LNRS, introduced via the Environment Bill, which will agree priorities locally across the country and map specific proposals for nature's recovery and wider environmental benefits
2. **Collaboration** – create cross-sectoral partnerships, including the NRN Delivery Partnership (see box, below)
3. **Integration** – of our goals for nature with funding streams and land management duties

1. Use of mapping and data

Local Nature Recovery Strategies

LNRS are a new system of spatial strategies for nature, covering the whole of England. Each strategy will, for the area that it covers:

- agree priorities for nature's recovery
- map the most valuable existing areas for nature
- map specific proposals for where action could be taken for nature's recovery as well as where nature-based solutions can help address wider environmental problems (for example climate change mitigation, flood risk management or improving water quality)

LNRS have been designed to drive more coordinated, practical and focused action to help nature and support the NRN. They will be evidence-based, locally led and collaboratively produced.

Following Royal Assent of the Environment Bill, Defra's Secretary of State will look to appoint responsible authorities to lead the preparation and publication of LNRS. It is envisaged there will be around 50, county-sized, LNRS.

Pilots

Natural England has supported the delivery of five LNRS pilots during the last year, in Buckinghamshire, Cornwall, Cumbria, Northumberland and Greater Manchester. Led by responsible authorities, the pilots have tested the process for developing LNRS, generating prototypes and exploring the context of LNRS in the land use planning system alongside other environmental spatial plans. The pilots, which reported in June, have generated important learning which will inform regulations and statutory guidance ahead of national roll out next year, following Royal Assent of the Environment Bill.

Evidence and data

The Environment Bill sets out a requirement for the Secretary of State to provide a national habitat map as part of the framework which will support responsible authorities in preparing LNRS. The map will identify existing national conservation sites and other areas of importance for biodiversity. Natural England will support the development of LNRS by offering relevant evidence and analysis to all responsible authorities. They will build on this with local data and proposals for delivering priority outcomes. The LNRS pilots have provided an opportunity to test how national and local data can be used to inform the preparation of prototype LNRS.

2. Create partnerships

Collaborative action is essential to deliver the NRN. We need to work in partnership with organisations and across sectors, sharing skills, knowledge and resources to help achieve the objectives of the NRN.

This partnership working includes government, landowners and land managers, businesses, developers, local communities and conservation groups. We all have a part to play.

3. Integration of funding and land management duties

A range of delivery mechanisms, funding and duties are being established to underpin the NRN. These mechanisms will include three new schemes[8]: Sustainable Farming Incentive, Local Nature Recovery and Landscape Recovery. They will support sustainable farming practices, and local environmental priorities such as reducing carbon emissions, creating and preserving habitats and making landscape-scale environmental changes. The Countryside Stewardship scheme will continue to be available for existing and new applications until 2024.

Multiple government-led funding opportunities have been made available. The £80m Green Recovery Challenge Fund kick-started a pipeline of nature recovery projects across England, led by environmental charities and their partners. The Nature for Climate Fund provides significant funding to create, restore and manage woodland and peatland habitats.

Opportunities for broadening the funding base for the Network are also being explored, for example by encouraging private and third sector businesses to invest in the natural environment. In particular, the government is incentivising action for businesses in the development sector by mandating Biodiversity Net Gain. (see box, top of page 66)

NRN Delivery Partnership

Launched on 5 November 2020[6], the NRN Delivery Partnership is a broad network of cross-sectoral organisations who work together to carry out action for nature. The partnership is managed by Natural England, supported by the partnership management group[7].

Organisations within any sector who are willing to commit to nature's recovery can join this partnership. This includes private business, charities and the government sector. The partnership is central to planning and delivery of the NRN.

Biodiversity Net Gain (BNG)

The introduction of a minimum 10% mandatory BNG requirement for development aims to secure positive outcomes for biodiversity, improve the process for developers and create better places for local communities. BNG is one of the policies that will help put us on the path to nature's recovery.

There is a hierarchy in terms of the options available to developers to achieve net gain:

1. **Avoid or reduce** biodiversity impacts through site selection and layout.
2. **Onsite** – developers will be able to create or enhance space for nature within the development site, for example through green infrastructure provision.
3. **Offsite** – developers will be able to create or enhance offsite habitats, either on their own land or by purchasing biodiversity units on the private market. There will be a financial incentive for offsite net gain to support the delivery of LNRS through an uplift in the calculation of biodiversity units created at sites identified by the strategy.
4. **Statutory biodiversity credits** – as a last resort, developers will be able to buy statutory biodiversity credits from government where they can demonstrate that they are unable to achieve net gain through the available onsite and offsite options, in order to prevent unreasonable delays in the planning system. Revenues from credit sales will be reinvested to deliver strategic habitat creation and enhancement in line with the priorities of the NRN and LNRS.

Delivery underway

The NRN and the tree and peat action plans are being delivered in advance of the delayed Convention on Biological Diversity Conference to signal the Government's domestic commitment to biodiversity. Progressing local delivery while policy is still in development is complex, but is already yielding significant gains for nature's recovery across the country. See boxes below and right for examples.

G7 Legacy Project, Cornwall

Led by Natural England and Cornwall Wildlife Trust but delivered through a public/private partnership including Imerys, the China Clay company, private landowners, farmers and local communities, this G7 legacy project will restore nature across a complex lowland landscape of towns, villages, farmland, active and post-industrial land. The area is challenged by economic and social deprivation with high levels of environmental, health and education inequality. It builds on the investment already in place at Goss Moor NNR, on land owned by Imerys and the many reserves managed by Cornwall Wildlife Trust where work is in hand to restore nature and improve flood resilience. The project will protect and improve the natural environment; enhance access, provide health, well-being and employment opportunities for local communities; diversify Cornish tourism; and offer new economic opportunities for farmers and local businesses.

Wigan Flashes[9]

With 2.8 million people on the doorstep, the proposed declaration of a National Nature Reserve 'Flashes of Wigan and Leigh' is a potential catalyst for developing a resilient landscape of Great Manchester wetlands, which sits between Greater Manchester and Liverpool City regions. This cluster of Sites of Special Scientific Interest and Local Nature Reserves in the Flashes is central to local nature recovery ambitions. It also provides extensive access and recreational infrastructure, offering opportunities for engagement and science in a highly urbanised environment.

The project is the product of collaboration including Wigan Council, the Wildlife Trusts, Natural England, the University of Manchester, the National Lottery Heritage Fund and Greater Manchester Ecology Unit.

Monitoring and evaluation

Natural England is developing advice on a monitoring and evaluation framework for the NRN. Evaluation will be informed by data gathered across the delivery process at a national and local level. This includes spatial prioritisation (what is mapped, what the ambition is), local delivery (how and what local partnerships are delivering on the ground) and funding (the deployment of resources into the network via key mechanisms). Work to develop the framework is ongoing, supported by Defra and the NRN Delivery Partnership.

Next steps

The CIEEM membership has an essential role in driving nature's recovery. We would welcome your input and expertise as partners. We will be holding a seminar to discuss the NRN in greater detail in the autumn, but would encourage you to contact us if you have further queries. Most importantly, please join us.

Notes

1. www.rspb.org.uk/our-work/state-of-nature-report/
2. www.gov.uk/government/news/making-space-for-nature-a-review-of-englands-wildlife-sites-published-today
3. www.gov.uk/government/publications/25-year-environment-plan
4. www.gov.uk/government/publications/nature-recovery-network/nature-recovery-network
5. www.gov.uk/government/news/pm-commits-to-protect-30-of-uk-land-in-boost-for-biodiversity
6. www.gov.uk/government/news/biggest-ever-nationwide-initiative-to-restore-nature-in-england-set-for-launch
7. www.gov.uk/government/publications/nature-recovery-network/nature-recovery-network#partnership-management-group
8. www.gov.uk/government/publications/environmental-land-management-schemes-overview/environmental-land-management-scheme-overview
9. www.wiganflashes.org/web/

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Interesting Times: Insurance for CIEEM Members

CIEEM Insurance Services, provided by MFL Insurance Group Ltd

Many of us will have heard the expression *"may you live in interesting times"* and, whilst the origin of the phrase may be dubious, it is hard to argue that the events over the last couple of years have been anything other than *"interesting"* to say the least.

As any review of the insurance market for the construction industry and related fields will attest, the position in respect of obtaining insurance cover is becoming more challenging, with increasing premium costs for cover that is being significantly reduced. Nevertheless, where does that leave you, the CIEEM member? We would like to address that point in this article, which we hope will reassure you that both CIEEM and CIEEM Insurance Services (a trading style of MFL Insurance Group Ltd) are taking steps to safeguard and protect the position of members.

As a brief reminder, CIEEM Insurance Services has a long working relationship with CIEEM, established in the late 1990s, and, having gained an understanding of the risks facing your profession, we have taken steps to provide the widest cover with a bespoke policy wording to protect your practice and its reputation. However, we would like to take this opportunity to address some of the issues that are likely to be of concern for most members.

Pricing

In the majority of professions, we are seeing a marked increase in the premiums charged by insurers. However, given our understanding of the risks involved in your profession,

> **"A significant reduction in premiums in respect of Professional Indemnity has now been agreed with insurers, reflecting the confidence that both we and insurers have in the skills and professionalism of CIEEM members."**

we have reviewed the market position in terms of the cover provided and premiums charged. As a result of this exercise, we are pleased to announce that a significant reduction in premiums in respect of Professional Indemnity has now been agreed with insurers, reflecting the confidence that both we and insurers have in the skills and professionalism of CIEEM members. The changes came into effect from 1 August 2021 and, subject to qualifying criteria, any policies renewed after that date will benefit from this reduction.

Criminal prosecution defence costs

Unlike many professions, CIEEM members face the risk of being investigated by the police and may face prosecution under the various statutes or statutory regulations that govern ecological matters. Whilst Professional Indemnity Insurance deals primarily with civil liability, it is important to note that the cover arranged through CIEEM Insurance Services includes cover for the costs incurred in dealing with defence of any criminal proceedings. This means that, if you receive notice that you are to be investigated, interviewed or prosecuted, there will be some assistance under the terms of the cover being provided, with the provision of defence costs. As a result, there would be no need to instruct your own solicitors or incur the legal costs involved in defending your position.

Run off cover

One factor that can often be overlooked until the last minute is the need to maintain cover to protect yourself after you retire or cease trading. In this instance, your Professional Indemnity policy is converted into a 'run off' policy. Whilst the cover under this type of policy is limited to past liabilities only, subject to qualifying criteria, the policy can be in place for a period of 6 years. If you decide to cease trading during the course of an ongoing policy then, on receipt of your instructions, we should be able to convert the current policy at no additional cost. If you wait until the renewal of the policy, then it is possible that the run off cover could be provided from the renewal date at no cost, subject to certain qualifying criteria. As always, we would discuss matters in detail once we are advised of your decision to cease trading.

Brexit and its impact on members outside the UK

Brexit itself has, unfortunately, affected the services that CIEEM Insurance Services can provide to some members. Unfortunately, as financial services were not included within the Withdrawal Agreement, CIEEM Insurance Services is no longer authorised to provide advice or assistance to members based outside the UK. However, to ensure that the position of members is protected and that there is some continuance in the cover provided, we entered into partnership with Burke Insurance

Group based in Galway, Ireland, to assist in placing the cover on behalf of members. At the renewal of the policy, we will contact you in the first instance to arrange an introduction to Burke Insurance Group and they will be able to assist in dealing with your insurance needs. However, whilst we would recommend Burke Insurance Group, you are of course free to obtain advice and assistance from any other broker provided they are authorised to provide advice in the EU.

Other insurances

In addition to your Professional Indemnity Insurance, CIEEM Insurance Services can also assist in placing other insurance covers to help protect your practice. These can include:

- Office Insurance, which includes the use of bat detectors, bat boxes, cameras and traps left on site, and public liability insurance.
- Liability Insurance, to provide cover for damage to third party property (if this is required separately).
- Cyber Insurance, to protect against the impact of a data breach or cyber-attack.
- Directors and Officers Insurance to protect you against claims made against the directors or officers of the company, or against the company itself.

Other services

Whilst the focus of this article has been on the placement of your insurances and the benefits under the policy itself, we would like to take the opportunity to remind you that we also offer several additional services to policy holders to assist you and your practice, including:

- Providing advice and assistance in the event you receive a claim.
- Assisting in the review of any Contractual Documents provided by your clients to identify any aspects that may give rise to potential issues.

The future

We are very impressed with the resilience of members purchasing cover from the exclusive scheme arrangement. From a high point in 2019, the reduction in numbers over the last 18 months is only 3%.

However, just as the position within your profession is ever changing, to ensure that the insurance available keeps pace we are working on several ongoing projects to help improve the cover provided under our facility. To demonstrate our ongoing commitment to CIEEM members, we would like to highlight the following two examples:

Limits of indemnity

The main driver of increased costs involved in the purchasing of Professional Indemnity Insurance is, in many instances, the totally disproportionate limits demanded by clients. In our experience, these demands frequently disregard the low-risk nature of the work being undertaken.

To highlight the issue, we have analysed the correlation between the work undertaken, the size of the firm and the limit of indemnity purchased. Our findings suggest that there appears to be little to no correlation:

Limit of Indemnity Purchased	Percentage of Scheme Members
£100,000	11%
£250,000	16%
£500,000	11%
£1,000,000	35%
£2,000,000	15%
£5,000,000	13%

I. 37% of Scheme Members buy under £1m of cover.
II. 63% of Scheme Members buy between £1m and £5m of cover.

Since 1998, we have not dealt with any claims in excess of £250,000. We will be working with CIEEM to explore why some clients feel it necessary to impose unrealistic limits, with a view to reducing those requirements.

Improving communication

We are in the process of improving our lines of communication with members to ensure that they can more easily discuss insurance issues relevant to their business. Again, we are working closely with CIEEM to achieve this.

MFL Insurance Group Ltd

We are:

- An independent Insurance Brokers owned by the working directors and based in Leeds and Manchester.
- Specialists in the provision of insurance products and services to the professionals sector.
- Currently undergoing a re-brand and creating a new website.
- Making a major investment in IT systems to help improve the services we can provided, which is intended to go live in early 2022.
- Regulated by the Financial Conduct Authority.

Our objective is to:

- Remain independent in this intense period of consolidation.
- Continue to invest in both our IT and staff resources to enable us to improve the provision of services for all of our clients.

STEM Ambassadors: Could You Inspire the Next You?

Stuart Parks
Head of Membership and Marketing, CIEEM

Much of this 30th Anniversary issue of *In Practice* reflects on what has changed in the sector since IEEM was first formed in 1991. Indeed, there is a good chance that many of you were working in the sector at that time and have witnessed, or even played a part in creating, this change. You may also have read an article about some of the more sobering feedback we have received recently from young professionals starting out on the journey many of you have undertaken (see page 62).

We have committed to shining a spotlight on those issues and to facilitate a collaborative approach to tackling them. Right now, however, as well as improving this picture we also need to focus on attracting more young people to consider careers in ecology and environmental management. So let us also look forward. There has never been a better time to engage with young people who are so aware of and engaged in the climate change and biodiversity loss debate. But how best to do that?

We have started working in partnership with STEM Learning – a programme created to raise awareness of the importance of, and opportunities in, careers related to STEM (Science, Technology, Engineering and Mathematics) subjects. What we already know is that careers in our sector are often invisible to young people, especially if they lack a role model with a background in our sector at home. That is where you can come in – and there is plenty of room for you!

> **"Only just over 1% have job titles that suggest they work in our sector."**

From STEM Learning, we have learned that of 35,000 current volunteers ('STEM Ambassadors'), only just over 1% have job titles that suggest they work in our sector. Of those, only 57 have declared CIEEM membership. Our sector – your role – is massively under-represented in schools, and you can change that. The commitment need is small, the gains for you are great and the impact can be huge. We will be delivering a webinar with STEM Learning in the coming weeks so that you can find out more, and we will be working with them to create some resources for teachers and young people. In the meantime, you can start inspiring them straight away – please read on to find out how.

Dan Smith, Project Officer (STEM Ambassadors) at STEM Learning, explains more about the programme:

"At STEM Learning our commitment to STEM education is part of everything we do, whether that's delivering teacher CPD in STEM subjects, bringing STEM Ambassador role models into schools or providing bespoke, long-term support for groups of schools in collaboration with companies. In our 2020 Impact Report, 92% of schools, colleges and community groups reported increased enjoyment and interest in STEM subjects from young people engaging with STEM Ambassadors. What's more, 90% of teachers that work with us report that STEM Ambassadors boost their own knowledge and confidence and their ability to bring STEM to life by linking lessons with careers and real-world contexts."

"STEM Ambassadors get involved in a wide variety of activities. It could be online or in person, in schools or in community groups, by supporting lessons or extra-curricular activities and working with young people or their educators. Every area of the UK has a local STEM Ambassador Hub to support you with finding volunteering activities that work for you. As a STEM Ambassador, you only need to do one per year to remain 'active' - allowing you to volunteer in a way that suits you. You could get involved in a monthly or weekly programme, or just give an hour you have available around other commitments. That one hour you may be able to give could inspire a young person into STEM in their future!"

"We have tons of useful tips and advice and a range of online training

modules that STEM Ambassadors can access to upskill themselves and gain the confidence they need to deliver impactful volunteering. Ambassadors can also contact their local STEM Ambassador Hub for advice, support or guidance. STEM Ambassadors also have access to an online library full of step-by-step guides to deliver pre-made activities that they can use in schools and community groups."

"Signing up to become a STEM Ambassador is easy. Firstly, register as a STEM Ambassador on www.stem.org.uk and complete our online induction and DBS check. Our induction normally lasts between 30–40 minutes. Once you've completed your induction, all you need to do is complete a free enhanced DBS/PVG check, using three forms of ID. Once you've completed your DBS and have received your DBS certificate, you can start volunteering with us."

To give you more of an idea of what being a STEM Ambassador is all about, we spoke to three CIEEM members to find out about their experiences to date.

Gareth Mason MCIEEM, Environment Ranger, Forestry and Land Scotland

Why did you become a STEM Ambassador?

To encourage the next generation to take an interest in careers I didn't know existed when I was younger.

What do you find most rewarding about the experience?

Teaching kids about the environment, especially things they haven't heard of/seen before that's often right on their doorstep. Also talking about the forestry sector as a future career path – there are lots of roles in the sector, and lots of ways in, but it is on very few kids' radar as an option usually.

Has anything about the role surprised you?

How much fun it is!

Has being an Ambassador taught you anything about yourself?

That I enjoy working with children, and giving talks can be fun!

Ashleigh Kitchiner, Marine Mammal Observer (MMO) and Passive Acoustic Monitoring Operator (PAMO)

Why did you become a STEM Ambassador?

I was in my last year of university and already volunteering for a local Wildlife Trust. I wanted to broaden my scope and get involved with as much as I could before entering the big wide world of employment. My main focus was to develop my public speaking skills and become confident in this arena.

What sorts of activities do you typically get involved in/deliver?

I have sat in a high school library and conducted mock interviews with pupils in their last year, I have presented in a biology laboratory, I have delivered a lecture whilst sat at home, and I have been a mentor for 18-year-olds in India and the UK. STEM Ambassadors cover a diverse array of activities to suit your own personal skills and goals, it is worth getting involved as you will find something that suits you or that challenges you.

What do you find most rewarding about the experience?

Mentoring students for several months was very rewarding, this was completed online due to the global pandemic, but I endeavoured to contact them at least 2–3 times a week. I would check on how they were, ask about future ambitions, share information about their chosen career pathways, highlight areas they may want to develop… the list is endless. I thoroughly enjoyed engaging with those students and they provided absolutely lovely feedback after the programme which has spurred me on to look into mentoring again.

Sum up your STEM Ambassador experience in three words.

Engaging, inspiring, liberating.

Grace Gardner ACIEEM, Ecological Consultant

What sorts of activities do you typically get involved in?

I deliver classes to primary and junior school age children, typically including ecological survey techniques, from bat surveys to eDNA, using old surplus kits from my employer. These tend to be as part of a school's 'eco week' or similar. I also create resources for teachers to use in classes, career portfolios for older school students, careers days at colleges and talks with parents and teachers about my career path and how I got there.

What do you find most rewarding about the experience?

I really love seeing young people getting excited about ecology and the environment. I'm a big advocate of bottom-up education. If adults can't do it right, we need to get young people doing it from an early age and showing us oldies up. Knowing that a school age student has gone home excited about bats and newts is a really happy thought (maybe I'm just weird).

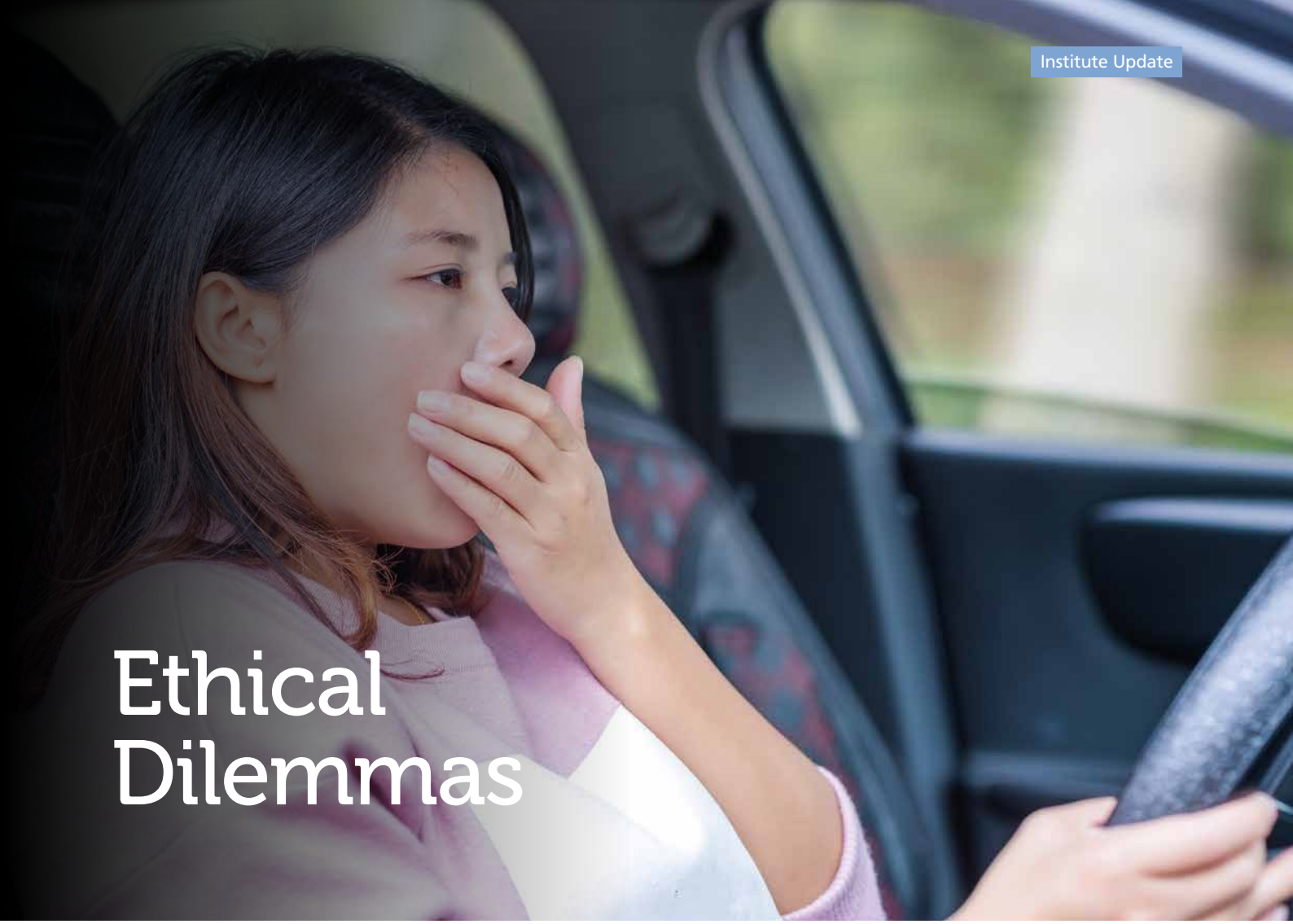
Has anything about the role surprised you?

How much teachers value support especially with topics that they might not be experts in. Having someone come in to teach a lesson on recycling or ponds, for example, is a great breather for them. I have had comments that the teachers have learnt more than the students.

Has being an Ambassador taught you anything about yourself?

The role has been really useful for my own development both in terms of CPD as well as personally. Delivering presentations to young people (who often have many questions) really challenges your presentations skills. It is so diverse, and being able to talk to a wide range of people about something I am passionate about has really helped my ability to communicate with different groups.

Contact Stuart at: StuartParks@cieem.net



Ethical Dilemmas

This is our series of problems and conundrums that can face members during their professional practice. The purpose of the feature is to encourage you to reflect on and explore scenarios that you may face during the course of your work and to consider the appropriate ways to respond to ensure compliance with the *Code of Professional Conduct*.

In the June 2021 issue of *In Practice* we described a dilemma in which you have recently joined an organisation as a senior ecologist. You like the work and get on well with your colleagues, so you feel it has been a good move. You then become aware that you have been shown as the reviewer of a report that you have not had sight of. The report has already been circulated as the final version. You check the report and it is of a high standard so you have no concerns about the quality, but you are concerned that you have wrongly been shown as having reviewed it.

You initially think that it was a mistake but, upon mentioning it to colleagues, you find that it is common practice to show reports as having been reviewed when that is not the case.

You approach your manager, who attempts to make some excuses around a tight turnaround time and a particularly difficult client. He also points out that others in the team have been 'ok with it' when it has happened on occasion in the past.

We asked, what should you do?

Our advice

This is a difficult issue to manage. Starting a new job is both exciting and challenging; however, you are facing an issue that puts you in breach of the CIEEM *Code of Professional Conduct*, with serious ramifications for you, your new company and their clients. The quality assurance process is a key management tool that ensures ecological issues are appropriately addressed. Neglect of this and falsification of the review process is unacceptable and unprofessional, and it creates a legal minefield of personal and company exposure.

Being a signatory to a report makes that individual responsible for its content and outcomes. Without review by an appropriately qualified and competent member of staff, there are real risks that an ecological assessment could miss or misinterpret a range of issues. It increases the risk of substandard or incorrect work, which could expose the company to a malpractice or legal case by their client. A local planning authority (LPA) may also bring a case

against the ecologists responsible if they see poor ecological interpretation, and as the signatory you will be personally implicated and bear the greater responsibility. This would lead to a professional standard hearing and could have serious implications for your career, including possible expulsion from your professional body.

Despite the challenges this issue brings, the very worst thing you could do is ignore this practice, since in doing so you become personally culpable. The initial reaction of your manager exacerbates this problem. Perhaps the best approach is to ask for a further meeting with your manager and point out that, as a new member of staff, you offer the opportunity to bring 'lessons learnt' to your new employer, to help improve their practice. Emphasise that you joined this company because of your intention to undertake high-quality ecological work and management, and state that you need to discuss this issue for the benefit of the company. If met with further resistance, consider the need to approach a more senior member of the management team or a director, in tandem with your project manager.

Your company may also have ISO9001 quality certification, and such practice would also be in breach of this. It remains fundamental to the welfare of the company that the practice stops. No response other than a concession to ensure that signatories are genuine is acceptable, and as such an appropriate review process needs to be in place.

If your meeting does not bring the required response, your only option is to raise a formal grievance with the company. Throughout there remains the option to use the CIEEM Member Assistance Programme (find information in the members' area of the website under Member Benefits) for support including legal advice regarding employment matters and guidance on grievance procedures. This will give you further informed support to persuade your managers.

The next dilemma

So, now for this issue's dilemma.

You are a senior ecologist and have worked for your current consultancy employer for 5 years. They have always been a good organisation to work for but the past couple of years have been very tough financially, a couple of experienced staff have been 'let go' and you are aware that more redundancies are likely unless things turn around.

The director of the company is using a low pricing/high volume strategy, which appears to be working, as the consultancy is now very busy but everyone is feeling the pressure. You are aware that the interns, whom you do not manage or supervise, are working very long hours with night-time protected species surveys at least 4 nights a week. Their initial training is minimal and they are often lone-working and travelling long distances to and from survey sites. Employed staff are asked to do surveys no more than 3 nights a week and have time off in lieu allocated to compensate for the additional hours.

You overhear one of the interns telling the other about a recent dusk and dawn bat survey where she had to sleep in the car overnight as she felt too tired to drive home between surveys. In fact, she had fallen asleep during the dawn survey. She is also getting quite heavily into debt as, although she is doing some bar work at the weekends, the pay isn't enough to cover her living expenses. She doesn't know how much longer she can continue but feels ashamed that she may not be 'tough enough' to make it through.

What do you do?

Policy Activities Update

Amber Connett
Policy and Communications Officer, CIEEM

After a busy summer that saw the return of the Environment Bill in England and elections in Scotland and Wales, we are now gearing up for two major events for the natural environment: the Convention of Biological Diversity (COP15) and the UN Climate Change Conference (COP26). At the time of writing, these are scheduled for October and November 2021 respectively, so CIEEM is currently preparing a series of engagements to ensure these events deliver for biodiversity.

UK and England

We have published a briefing paper on Environmental Net Gain that aims to provide a practical definition of the term and provide the legislative, policy and strategic context within which the principle can be delivered. Further to the briefing paper we have also published Principles for Environmental Net Gain. Find both documents at https://cieem.net/environmental-net-gain/.

At the time of writing we are part way through a series of engagement meetings with Ministers, Shadow Ministers and Select Committee Chairs in Westminster to discuss our concerns around the Environment Bill, the seventh Quinquennial Review of protected species (QQR7), planning reform, and COP15 and COP26.

In the run up to COP15 and COP26, we issued a statement on the importance of these events and our recommendations for how they can interact to address both the climate emergency and biodiversity crisis through the use of nature-based solutions.

We recently teamed up with the Royal Society for Biology and the Institution of Environmental Sciences to deliver a panel event on nature-based solutions and the Conventions on Climate and Biodiversity. You can watch the recording here: https://cieem.net/resource/nature-based-solutions-the-conventions-on-climate-biodiversity-panel-event/.

Following the easing of COVID-19 restrictions, we are now planning winter events for the All-Party Parliamentary Group (APPG) for Nature, including a visit to Kew Gardens and Swanscombe Marshes. Find out more at https://cieem.net/appg-for-nature/.

Scotland

The Scotland Policy Group has been working on an advice note for Local Authorities on Permitted Development Rights for Agricultural Buildings to highlight requirements for the protection of biodiversity, especially in relation to breeding birds and bats.

We have also recently signed up as a host organisation under the Nature Champions initiative launched on 3 June 2021. We are hosting the Blanket Bog habitat and we will support a Member of the Scottish Parliament (MSP) as a Nature Champion.

Wales

We have recently published a position statement, drafted by the Wales Policy Group, on the implementation of proposed new agriculture and land use schemes. This statement focuses on the need for professional, objective and evidence-based advice; well-resourced monitoring and enforcement; and strategic planning of climate measures, such as tree planting, to avoid harm to biodiversity of conservation importance.

We have also written to the Minister for Climate Change, Julie James, and Minister for Rural Affairs and North Wales, and Trefnydd, Lesley Griffiths, to request a meeting to build relationships between CIEEM and Welsh Government, and to set out our position on issues such as agriculture, planning and funding for environmental monitoring.

Ireland

In May, Will Woodrow (CIEEM Vice President Ireland) and Elizabeth O'Reilly (CIEEM Ireland Project Officer) met with the Irish Minister of State for Heritage and Electoral Reform, Malcom Noonan, to discuss some of the challenges currently facing the sector as well as establishing what will hopefully be open and active communication between CIEEM and the department.

The Ireland Policy Group has recently responded to the Mid-term review of the National Peatlands Strategy and is considering how best to support the second iteration of the All-Ireland Pollinator Plan.

We have also been directly invited to participate in a review of Guidance for public authorities on the provision on Articles 6(3) and 6(4) of the Habitats Directive, and in the development of Northern Ireland Environment Agency guidance on Bat Surveys for Wind Turbine Proposals.

Future priorities

As previously mentioned, our priority for the autumn is engaging with both Biodiversity COP15 and Climate COP26 events to ensure they deliver bold positive action for the natural environment. We will also be engaging with reforms to the planning system and Environmental Impact Assessment process in England, as well as ongoing work to ensure a green recovery from COVID-19 across the UK and Ireland.

All of our briefings and consultation responses can be found in our Resource Hub (http:// www.cieem.net/resources-hub) under 'Policy Resources'.

Contact Amber at:
AmberConnett@cieem.net

CIEEM is grateful to the following organisations for investing in our policy engagement activities:

ARCADIS Design & Consultancy for natural and built assets
RSK biocensus EXPERTS IN ECOLOGY
EPR
Stantec

What's in a Name?

Sarah Cox
Membership Operations Manager, CIEEM

Juliet pondered this one – how about you? Have you considered recently what your name means to others. More specifically what your post-nominals mean? You may have achieved qualifications you proudly note after your name on your CV and in your email signature. You may have post-nominals from societies and institutions you are a member of, such as CIEEM. Do these letters provide others with a true reflection of your ability and competence? Are you selling yourself short when you could be proud of your skills and experience, and your profession?

Your membership journey

You are already part of a 6500-person-strong community, all dedicated to raising standards and the profile of professional ecological and environmental management for the benefit of nature and society. But what's next for you and your membership journey? Could it be time to tackle that upgrade application you have been thinking about for a while, or talking to a sponsor or mentor about applying for chartered status or possibly even going for the final step on the ladder and applying for Fellowship of CIEEM?

An easier route

Over the last year we have made further improvements to our membership upgrade application processes to make it even more straightforward for you. We accept upgrade applications all year round and have over 70 volunteer members ready and waiting to review submissions.

We have been busily working on a new online application portal over the summer for you to be able to complete and submit your application online. This is another step forward in our plan to make upgrading as straightforward and accessible as possible. So there really is no reason to be sitting at a grade of membership which doesn't truly reflect your ability and competence.

Should you have a go and not quite make it, don't worry, we've made our reapplication process easier now too. Any competencies you successfully evidence when applying for Associate, Full or Chartered status get stored against your record and you only need to submit evidence to make up the difference in your reapplication.

Your route map and guide

Don't forget we have a suite of resources that we continually update. Listed below are a few of the ones we know others have found to be really valuable:

- **Competency framework document** – whatever grade of membership you are at it is worth spending some time getting to know this document as it provides a framework for you to work through and will help you to identify both areas of strength as well as those in need of some development.
- **Online self-assessment tool** – linked to the document above, this tool enables you to answer a series of yes/no questions to help you identify the areas of the competency framework you are most competent in and flag those where you may want to focus your personal development.
- **Mentoring platform** – launched last year this platform acts like a match-making site, pairing up members looking for professional and personal development with other members who are willing to share their knowledge, skills and experience. If you want support in a particular area to help prepare you to make the move to the next level of membership, then register your requirements on the platform to find someone able to help you.

To complement these tools, we also have a suite of guidance documents and videos in a dedicated 'Upgrade your membership' page in the MyCIEEM area of the website. So please do log in and take a look at what we have available for you.

We are planning a number of webinars during the autumn and winter to provide support to members with upgrade applications and talking more about the tools and resources we have available to help you. Keep an eye out in our weekly eNews for more information about these over the coming weeks.

Here to help

It just leaves me to say that I hope after a busy summer you can take some time out soon to reflect and consider whether you are ready to make the next step on your membership journey with us. Please remember the Membership team are here to support you with any questions you may have so please do drop us a line at membership@cieem.net or give us a call on 01962 868 626 and we will be happy to help you.

CIEEM Welcomes New Fellows

Fellows are role models and ambassadors for CIEEM, inspiring others and often have a strong track record of giving back to the profession. They are highly respected and have reached a demonstrable level of professional excellence within the disciplines of ecology and/or environmental management. CIEEM's Fellows help to shape and set the strategic direction of our Institute and more widely through their professional careers and varied roles. Fellowship matters, both to the individual and the Institute.

We are delighted to welcome another two members to Fellowship:

Katrena Stanhope CEnv FCIEEM

Katrena Stanhope has 20 years of experience relating to biodiversity issues and environmental management. Since 2014 Katrena has been a driving force behind innovative research into the use of ecology detection dogs and was the first to use detection dogs for commercial bat monitoring in the UK. Katrena produced a methodology for bat carcass detection on wind farm projects, and the use of conservation dogs to monitor bat mortality on wind turbine sites has now become common practice in the UK based on her methods.

Between 2016 and 2019 Katrena undertook research into the effectiveness of dogs detecting great crested newts. The data collated has since been used to inform subsequent research by Wessex Water in 2020 and the innovative method has also been included as a mitigation method on the HS2 Organisational Licence for great crested newt.

To raise standards and to promote ecological professionalism, Katrena produced guidance for Atkins ecologists to support their professional development and promotion whilst ensuring a grounding in basic knowledge and experience. Katrena linked this work in with CIEEM's Competency Framework when it was published and produced a logbook for staff to record experience gained towards competency levels which also incorporated an approval process. The system has been rolled out to the Atkins ecological supply chain, supporting individuals and small- and medium-sized companies to adopt the system and improve professional standards and promote consistency across the industry.

Katrena supports the work of the Institute in a variety of roles including as a member of the *In Practice* Editorial Board since its inception in 2011 until September 2021, as part of the Steering Panel for the ECoW Accreditation Pilot Scheme in 2020 and more recently as part of the judging panel for the Action 2030 Award for the CIEEM Awards 2021.

Richard Andrews CEnv FCIEEM

Richard Andrews has over 27 years of experience in ecology, biodiversity and environmental management both in the public and private sector. Richard has been instrumental in challenging and changing how water vole mitigation is conducted in the UK. Richard co-authored the *Water Vole Mitigation Handbook* (2016) and an associated article published in *In Practice* won the CIEEM *In Practice* Award that year (2015). By constructively challenging water vole mitigation practice Richard was partly responsible for a change in Natural England's approach to licensing of displacement through habitat removal.

Prior to this, Richard provided valuable new tools for professional ecologists to use on badger sett classification in an *In Practice* article in December 2013. Then in 2017, Richard became the first professional ecologist in the UK to attain a 'Level 3 Tracker' certification through the international Cybertracker Conservation system and is now working to raise standards in the use of tracks and signs through training and survey with his company's assembled team of UK tracking experts.

Richard has recently authored the latest guidance on Habitat Regulations Assessments for the UK water industry (UKWIR2021) and regularly provides training to other ecology consultancies and practitioners on HRA.

Whilst at the Environment Agency, Richard wrote the original guidance on EIA Environmental Action Plans for the Anglian Region, which later evolved into their national guidance and approach.

Throughout his professional career Richard has always upheld and promoted the highest standards of integrity, independence and quality among his teams and services. Richard spent 14 years leading and mentoring teams which were involved in major infrastructure projects that were award-winning or highly commended.

From the Country Project Officers

Mandy Marsh – Wales Project Officer

S'mae pawb/Hello everyone. As we return to something approaching normal working, I hope you have been able to take advantage of some of the courses we have offered this year. After a lull, our Member Network volunteers have worked hard on an events programme for the summer and autumn. One silver lining of the pandemic has been to make online events available to a greater number of people, something we will continue doing. You will no longer have to wait until an event is held in Wales but can peruse virtual courses all over the UK! Keep an eye on our events pages for the upcoming programme.

Our new membership of Wales Environment Link is bringing many advantages, not least an education into how the Senedd works and how laws are introduced and changed, and an overview of the publication *Future Wales – the National Plan to 2040*. We have written to Ministers Julie James and Lesley Griffiths requesting meetings to explore how CIEEM can best work with the Senedd.

One of the projects CIEEM has been involved with is the Lost Peatlands Project, a joint venture between the County Borough Councils of Neath Port Talbot and Rhondda Cynon Taf. I'm delighted to tell you that the project is now fully funded by the Heritage Lottery Fund and was launched in July.

The next big task on the horizon for me is the Wales annual conference. At the time of writing (late July) we have no firm plans, but that will change shortly with a number of meetings to set us going. If you've any thoughts or suggestions about what you would like to see, please do contact me at the address below.

Contact Mandy at:
MandyMarsh@cieem.net

Annie Robinson – Scotland Project Officer

Hello everyone. We are really looking forward to the Scottish conference on Greening our Grey: Improving the Biodiversity in Urban Landscapes. There are lots of amazing speakers so check out the programme. The conference is online on Tuesday 5 and Thursday 7 October.

We have held five Member Network events this year with over 200 people booked. Although we have really missed seeing you all in person it does mean that the events have been accessible to our members all over Scotland. In the future the Scottish Section hopes to run a mix of online and in-person events. Please let us know ideas for any events you would like to see happen.

As a member of Scottish Environment Link, we are contributing to the Greener Recovery, Planning, Governance and Wildlife groups. It has been great making closer links with many NGOs and directing policy developments. Liaising and networking with other organisations continues apace by the Scottish Section Committee, Scottish Policy Group, our Vice President Caroline McParland and our newest CIEEM Patron Roger Crofts.

The Scottish Policy Group recently compiled a consultation response to SEPA's draft river basin management plan for Scotland. After a quieter spell with the elections, we are expecting a significant number of consultations in the autumn especially around governance and the fourth National Planning Framework (NPF4).

We look forward to seeing you at the conference or at one of the Member Network events.

Contact Annie at:
AnnieRobinson@cieem.net

Elizabeth O'Reilly – Ireland Project Officer

Greetings CIEEM! As the summer season comes to an end, I am excited to look back at the recent activities of the Irish Section. One highlight was our meeting with Malcolm Noonan, Minister of State for Heritage and Electoral Reform, to discuss CIEEM and how we might increase our engagement with his department. We had a very positive meeting, and one we hope to repeat.

Some exciting collaborations have been established. Recently, the Irish Section has contributed to the Engineers Ireland 'Sustainability Grand Tour' and started conversations about how CIEEM and Engineers Ireland can work more closely together in future. We have been in communication with the Royal Institute of the Architects of Ireland (RIAI) and hope to work with them on a project, and our great volunteers have continued work on data sharing with the National Biodiversity Data Centre.

We also saw the first virtual coffee morning organised by the Irish Committee, where we encouraged sole trader ecologists to join us for networking and information sharing. These network building activities are an essential part of the work that I, Will and our volunteers do, to support the Irish membership, and we look forward to building on these moving forward.

But as our members move out of their busy survey season, we plan to have some interesting events lined up for the autumn. Our monthly Lunchtime Chat webinar series will be coming back and maybe an in-person trip before the year is out. Here's hoping and I look forward to seeing you then.

Contact Elizabeth at:
Elizabeth@cieem.net

British Ecological Society

Now launched: Applied Ecology Resources, an open platform from the British Ecological Society

Professor Marc Cadotte
University of Toronto

Whether you work in ecological research, policy or practice, Marc Cadotte explains how the British Ecological Society's new open database makes discovering information and sharing research easier than ever.

In April 2021, following a development period of over 5 years, the British Ecological Society (BES) launched the globally accessible research platform Applied Ecology Resources (AER). It offers a curated and permanently archived database of information sources from all sectors of applied ecology and conservation, including open access journal articles and research summaries.

"The freely accessible and searchable platform aims to benefit the international ecological community's understanding and management of the natural world," explains Professor Marc Cadotte of the University of Toronto, Chair of the AER Advisory Board.

One of AER's largest banks of information is 'grey literature' – factual and research-based material produced outside of traditional commercial and academic communication channels. Making this material much more available helps bridge the gap between ecological research and practice.

"Grey literature is not easily found, vanishes quickly and is often difficult to attribute to the authors," says Marc of previous difficulties in preserving such documents besides research papers. *"It was important for us to develop an archive of grey literature to share best practices and ensure that management planning is informed by a broad array of information sources."*

The amount of grey literature available on AER is constantly growing, and currently makes up about a quarter of the 5000+ archived documents on the platform, which is free for all to access. *"It is critical that grey literature gets into the hands of practitioners, and this wouldn't be the case with a subscription model for AER,"* Marc says. *"We needed to remove roadblocks and ensure that all who need information can find and access it. I hope that searching and synthesizing the available information will become best practice when designing management interventions."*

Marc, and the rest of the Advisory Board, intend AER's value to the wider ecological community to increase over time, developing connections across international networks and representing a new era of information sharing. *"It is our hope that a commitment to open science and ensuring all forms of information are permanently archived, shared and made searchable will proceed to a culture shift in applied ecology and conservation, ensuring greater biodiversity management success globally,"* he says.

"I now search AER whenever I am researching or developing applied plans," adds Marc, who works with a number of non-academic partners. *"I have no doubt that our future projects will include both using information available through AER and uploading our own outcomes and reports as part of our project deliverables."*

At the heart of the AER project, alongside the searchable platform, is the BES's newest open access, peer-reviewed journal *Ecological Solutions & Evidence*. As well as standard research articles and reviews, the journal publishes several different article types including flexible, short 'from practice' articles, data articles and registered reports. The common factor is that they all have direct relevance for the management of biological resources and ecological systems.

The project has also been broadcasting AER Live, a series of free, interactive workshops covering a range of useful topics for applied ecologists and practitioners. The next events are in the autumn.

Accessing AER

Explore the online platform by visiting www.appliedecologyresources.org and following our social media on Twitter (@AER_ESE_BES) and Facebook (@AERandESE).

Adding your reports

Any group that produces evidence-based information on the management of biodiversity and the environment is eligible to become a member of Applied Ecology Resources and showcase their work to the global ecological community. Find out more at www.appliedecologyresources.org.

By Members ForMembers

Volunteers Week: It's Time to Step Up!

Volunteers are the life-blood of CIEEM Member Networks, and the 2021 autumn elections season is fast approaching. We need you to get involved.

It's time! Our incredible Member Network and Special Interest Group Community needs your help. We're looking for CIEEM members at all levels from all backgrounds within the ecology and environmental management sector (and from all corners of Britain and Ireland), to step forward and become an active part in representing their geographic region or specific topic of interest. There are over 170 volunteers who contribute their time to our community of member's groups, and use their experience, knowledge, passion and enthusiasm to provide opportunities for our members and supporters to network, share knowledge and learn more about the science and practice of our amazing profession. Our volunteers have a role to play in promoting professional standards too, feeding into consultations, supporting (or indeed, representing) students and early careers members, and representing the views of CIEEM members at both a local and national level. Sounds good, right?

New volunteers will be welcomed to team CIEEM with a full online induction session, and supported by the Secretariat and existing Member Network and Special Interest Group committee volunteers, to help you find your feet when you begin your role. Whether you can spare a couple of hours a month, or a bit more, there is a role to play for you. All skills gained from your volunteering role will contribute towards you CPD too, and help you to grow a fantastic network of close contacts within the sector, which as we know, can be vital for career progression!

To find out more about the roles available, the elections process, and to get involved as a volunteer, head over to the 'My CIEEM' area of our website, and visit the 'Volunteer Opportunities' page to discover the current and upcoming volunteer vacancies in our Member Network and Special Interest Group committees.

The deadline to apply for Member Network vacancies in 2021 will be **Friday 24 September**, so please submit your nomination forms as soon as possible. Thank you in advance for stepping up for our sector, and the incredible people who want to make a positive difference for nature. Let's do this!

North East England Geographic Section

The White-Clawed Crayfish Strategy

The North East England Member Network held their Annual Members Meeting (AMM) which included a Convenor's report and committee overview, followed by an update from Drew Lyness (CIEEM Volunteer Engagement Officer). Following the AMM, there was a fantastic talk on white-clawed crayfish in the North East. The talk, delivered by Scott Mackenzie from the Environment Agency, and discussed crayfish ecology and key sites for white-clawed crayfish in the North East. It covered their main threats, including the introduction of the non-native North American signal crayfish. This invasive species brought disease to which our indigenous (white-clawed) crayfish has no natural resistance. The talk illustrated recent incidents in the North East and how the Environment Agency has responded, as well as outlined the key aims of the Northumberland Crayfish Strategy which is aiming to promote crayfish conservation and awareness of the species plight in the region.

South East England Geographic Section

The City Greening Challenge

This year's Annual Members Meeting (AMM) of the South East England Members Network was headlined by a fantastic selection of presentations focusing on how we can meet the challenge of greening up our cities, in the context of current challenges (e.g. climate change, biodiversity loss, COVID-19 etc).

Presentations provided attendees with an insight into the urban greening challenge and identified some innovative ideas on delivery of how we can bring nature into our cities. Peter Massini, Director of Future Nature Consulting, focused his talk on urban greening policies and practices. John Little of the Grass Roof Company showcased new brownfield landscapes and the remarkable transformations that can be made to typically unassuming locations in urban areas. In addition, Dr Caroline Nash, a Research Fellow at the University of East London (Sustainability Research Institute department), explained the fascinating concept of ecomimicry, and how this can be and has been enforced in urban green infrastructure design projects. This was a fascinating event, and the results of the city greening projects illustrated here were truly awe-inspiring.

White-clawed crayfish

Ireland Geographic Section

Nature-Based Solutions as an Integrative Systemic Approach

In this brilliant edition of the Ireland Member Network's Lunchtime Chat series, they were joined by Megan Best (MSc Graduate) and Dr Tamara Hochstrasser (Assistant Professor, School of Biology and Environmental Science, University College Dublin) to discuss nature-based solutions (NbS) and some of the challenges for its implementation in Ireland. The aim of this session was to get some real discussion started, ahead of the 2021 CIEEM Ireland Conference in April, themed on NbS.

In this project, our speakers investigated how NbS are conceptualised in Ireland, and what problems practitioners are anticipating or encountering when implementing NbS. They conducted 17 interviews with representatives from a variety of Irish institutions (Teagasc, EPA, UCD, OPW, local and national government, An Taisce), semi-state bodies (Coillte, Bord Na Mona), projects (Kerry Life, Woodlands of Ireland), farmers and landowners. Their results showed that the attitude of Irish stakeholders towards NbS is largely positive. Commonly referenced examples of NbS were: Kerry Life, the Inishowen Rivers Trust and the Dodder improvement works. A number of significant problems for NbS implementation in Ireland were discovered: insurance sector mistrust of NbS; trade-offs between restoring ecosystems and using land for renewable energy projects; and flaws in agri-environmental schemes and the overarching food system. Furthermore, it was remarkable that tree planting as a potential NbS received very little emphasis. It appeared that the potential of NbS to halt biodiversity loss is not systematically incorporated in policy and practice. Multi-stakeholder dialogue across sectors is urgently needed to not only restore degraded ecosystems, but also to renew our relationship with the land and nature that surrounds us. Food for thought going forward.

Career Interview

Interview by Robert Jackson, member of CIEEM's Student & Early Career Focus Group

Name: Chris Smillie BSc (Hons) PGCHE MSc MCSM PhD MCIEEM FHEA

Organisation: SRUC – Scotland's Rural College

Job title: Lecturer/Programme leader

Specialism: Ecology

Years in the sector: 30

Do you remember what first sparked your interest in nature and ecology?

I remember the exact moment. Growing up in an industrial town just outside Glasgow, nature and the natural world wasn't something a kid would normally be introduced to. It was very much a 'grow up and get a job in the factory' kind of place but I remember being taken to Culzean Castle country park where a ranger hosted a tour. I was mesmerised as he identified species, made nettle tea and asked if we knew what the birds were saying, before informing us it was all 'stay away, stay away'. It shows how important role models are as that opened up a whole new world for me. From then on, I read as much as I could on animals and habitats and my interest just grew from there.

What books did you read at that age?

Anything I could get my hands on really. I really loved Willard Price adventure books. Not that they were ecology-based, they were about two lads in the 1950s or something, going around the world on these great wildlife adventures. That really fuelled something in me for the outdoors and adventure. I tried to read them again recently and they really are unreadable as an adult.

What books would you recommend for university students then?

It's definitely not the easiest of reading but I quite like *Ecology: From Individuals to Ecosystems*. It's quite stats-heavy when compared to some others, such as *Essentials of Ecology* but that's what makes it last from year 1 all the way through your degree. Obviously, there are field guides and books on whatever your specialism is to be. They are always going to be extremely useful to you.

What did your academic path look like?

Back when I was first doing my environmental biology degree at the University of Leicester, there wasn't a whole lot of thought into the possible career projections. You get your degree. You have therefore proven your knowledge, so you go into the civil service or something similar. So that's what I did. I worked in finance for a couple of years. When I was working there, I was put in a portacabin overlooking the countryside, watching people out walking their dogs every day and enjoying the outdoors. It was at that point that I thought: *"I need to get out of here... this is not what I want to be doing for the rest of my life."* So, I took on some low-paid contracts with Scottish Wildlife Trust and decided from there that I needed to undertake an MSc and I specialised in Water Environment at Bournemouth University. I always felt it was better to specialise though I'm not sure now if that really is the case. A degree or an MSc in Ecology can be just as good. After my MSc, I took on some more small contracts with Scottish Wildlife Trust and Scottish Water. I had always dismissed the idea of a PhD, as it took 3 years and I felt that was such a long time to be messing around. That being said, I turned 30, looked back at the last few years and could really see nothing that was that unmissable, so I embarked on a doctorate.

What is the best part of being a lecturer?

I'd say learning, I get to keep up to date with the latest advances and literature. In many ways, it's like being a student but I don't have to sit any exams and I get paid for it. It also allows me to tap into other skill sets. I'm training to be a drone pilot at the moment, for instance. I really like the technology available nowadays. When I was on my MSc, we studied what GIS was and spoke about it, but the technology wasn't available for us to use. Now you can use drones to hover down to identify single flowers. One day it will make ecologists obsolete which is a worry but that is a long time off still and I'm sure future ecologists will just keep adapting with the times.

If you could be doing any other job apart from lecturing what would it be?

Well, I was in consultancy for many years so I would probably be doing that or rangering if I wasn't teaching. If it was in another field altogether, I'd say data analysis or something... Oh, actually, can I change my answer to rockstar? Yeah, I'm sticking with rockstar.

Do you hold any protected species licences?

I used to, not so much anymore. The only licence that I've really needed was a bat licence and even then, you can and I have, surveyed bats without a licence. It's only if you are going into the roost that you need the licence. I've purposefully avoided going into roosts as they are normally in peoples' lofts or somewhere equally as unpleasant. I know people who have licences who thought that it would get them into the field they wish to be in and out working in the woods looking at bats in the wild or whatever but they are actually stuck up loft spaces in council estates wondering what went wrong. I would advise caution with these things.

What is your favourite animal?

Shark! Don't need to think about it. Shark. I had a massive fascination with the underwater world and I actually considered studying marine biology when I was younger, although I'm glad I didn't. There are some fantastic jobs in marine biology and I wouldn't like to discourage anyone from that vocation but I discovered it wasn't all diving with octopuses in the Mediterranean every day but in fact, most of the time, you are collecting fish from a boat that has just docked in order to take it back to the lab to test for some disease or whatever. That didn't sound as much fun to me.

Any final advice?

My choices haven't been led by money or success. Everything I've done has been because I enjoyed it or it interested me – studying wildlife in the natural environment, is there anything better?

A bad job is more than just a bad job. It seeps into your whole life and makes you miserable. Make your choices because it's the right choice to keep you interested and make you happy. That's when you will enjoy going to work every day. On a similar note, develop your interest into a skill set. If you are a birder, get an MP3 player and learn to identify all British birds from their calls for example or if you are interested in botany, start trying to identify all plant species. If neither of those are your thing, it may be a bit more difficult to pick up the skills. You can always choose something with less species. There is only one otter or badger species for instance. Try picking up these protected species skills and become really good at them. Getting good at something will make you useful when it comes to getting a job. When you get really good at something you will find that you get a name for yourself and people start hunting you out for positions, you no longer need to be applying for jobs.

Q&A

David Stubbs CEnv FCIEEM, Independent Sustainability Expert at Sustainability Experts Ltd

How did you get into the sector?

Since childhood I wanted to 'do something in the environmental field'. That was about as much a plan as I ever had. At university, where I studied Botany and Zoology, some fellow students and I organised an expedition to Greece in our second year summer vacation. By chance we came across a large population of wild tortoises on which we did a rudimentary study. I was curious to find out more, but to my surprise it seemed nobody had done any ecological studies on Mediterranean tortoises. Two years later I was engaged as a Research Assistant at the University of Kent at Canterbury to do a 3-year NERC-funded study on the population ecology of Hermann's tortoise. The project was based in the south of France and it was through that period I found my professional feet.

When that project finished I landed the role of team leader for the London Wildlife Habitat Survey; a year-long mission to carry out Phase 1 habitat assessment of all the green spaces in Greater London. To our surprise at the time, we found that many of the best remnants of natural habitats existed on golf courses. That discovery led me into a long period working in the golf sector, looking at more environmentally responsible ways to design, construct and manage golf courses. This work took me all over continental Europe and further afield. One of the highlights was organising the first ever green initiative for the Ryder Cup – the biennial Europe vs USA competition – which was taking place in Spain in 1997.

From golf I became interested in the environmental aspects of sport more generally, which led to me being appointed to lead the environmental part of the London bid for the 2012 Olympic and Paralympic Games. Following the host city election, I continued to serve as Head of Sustainability for the Organising Committee all the way through to the delivery of the Games.

What does your current role include?

Since London 2012, I have been working independently as a sustainability specialist in sport and the event sector. Much of the work is on sustainability aspects of corporate strategies, management systems and event operations, which is a long way from my conservation biology roots, but my scientific background in ecology is still immensely valuable to me.

Why did you get involved with CIEEM?

I was one of the Founders of the institute. Simply put, for some years I had felt 'professionally lonely' and sensed a lack of standards amongst those practising in this field. Through networking I came across others who felt likewise. I don't recall the exact chronology, but we managed to secure a meeting with the British Ecological Society, where we met Professor Tony Bradshaw. He instantly understood the issues and saw the opportunity. From that initial encounter and a lot of hard work, our Institute was born.

What advice would you give to those just starting out in the sector?

Do something distinctive that sets you apart and that gets you noticed (in a professional sense of course!). Obviously, it is important to seize opportunities, but the key is to be able to craft an opportunity out of your situation. That requires imagination, skill, guts and determination.

What advice would you give your younger self?

Keep going and believe in yourself.

Can you tell readers something random about yourself?

I once arrested a snake smuggler who was about to leave the Greek island of Milos with 70 live specimens of the endemic Milos viper! It was the first time anyone had been caught doing this and the local police were distinctly apprehensive about a sack of vipers writhing on the floor of their cell. At least they agreed to come and observe the snakes being released back into the wild, as close as we could ascertain to where they had originally been captured.

BOOKS, JOURNALS AND RESOURCES

Compiled by the Academia Special Interest Group

Book OPEN ACCESS

Conservation Research, Policy and Practice

Edited by William J. Sutherland, Peter N.M. Brotherton, Zoe G. Davies, Nancy Ockendon, Nathalie Pettorelli and Juliet A. Vickery

Online ISBN: 9781108638210

Available from https://doi.org/10.1017/9781108638210

This book covers three main areas in conservation research: identifying priorities and collating the evidence, influencing and making decisions, and communication. It is formed of a number of chapters written by experts in their field who provide excellent insights and information in different topics of conservation research, policy and practice. This book is a great educational and practical resource which would be useful to students, professionals or anyone with an interest in this area who would like to learn more.

Guidelines/Free resource OPEN ACCESS

IUCN Guidelines for amphibian re-introductions and other conservation translocations

Edited by Luke J. Linhoff, Pritpal Soorae, Gemma Harding, Maureen A. Donnelly, Jennifer M. Germano, David A. Hunter, Michael McFadden, Joseph R. Mendelson III, Allan P. Pessier, Michael J. Sredl and Mallory E. Eckstut

ISBN: 978-2-8317-2111-8

Available from: https://iucn-ctsg.org/policy-guidelines/taxon-specific-guidelines/

These recently published guidelines provide a useful resource for those working in amphibian conservation. The guidelines take you through best practice for amphibian translocations and explain the detailed steps involved in each aspect of a reintroduction, providing useful examples and links to support and illustrate them.

Paper Review OPEN ACCESS

Quick detection of a rare species: Forensic swabs of survey tubes for hazel dormouse *Muscardinus avellanarius* urine

Priestley, V., Allen, R., Binstead, M., Arnold, R. and Savolainen, V.

Methods in Ecology and Evolution 2021, 12: 818–827

https://doi.org/10.1111/2041-210X.13573

Traditional nest tube surveys for the hazel dormouse are often labour intensive, time consuming and can give false negative results. New survey methods involving environmental DNA (eDNA) collected via dormouse urine in nest tubes were trialled by researchers at Imperial College and Thompson Ecology. The surveys involve placing a clean substrate in nest tubes and then swabbing and extracting eDNA. Results from the trial confirmed presence of dormouse in three out of 50 tubes within 8 days, whereas traditional methods only confirmed presence of dormouse via a nest found on day 63. It is hoped this method will reduce survey and detection time and pave the way forward for the application of eDNA methods in other terrestrial vertebrates.

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Paper Review OPEN ACCESS

Building green infrastructure to enhance urban resilience to climate change and pandemics

Pamukcu-Albers, P., Ugolini, F., La Rosa, D., Grădinaru, S.R., Azevedo, J.C. and Wu, J.

Landscape Ecology 2021, 36: 665–673

https://doi.org/10.1007/s10980-021-01212-y

This editorial is a collaboration between authors from Italy, Portugal, Romania, Turkey and the USA and was motivated by a webinar organized by the IUFRO (International Union of Forest Research Organizations) Landscape Ecology Working Party (https://iufrole-wp.weebly.com/) held on 17 November 2020. This is an excellent, up to date review of the importance of green infrastructure and the evidence for its role in climate resilience, and the delivery of a range of ecosystem services. It introduces emerging evidence, from studies carried out during the pandemic, that demonstrates the importance of nature for health – as well as the more familiar climate resilience of cities. The authors highlight the need to both expand and improve green infrastructure, and the importance of basing decisions on integrative and participatory processes. This will be a useful resource for those requiring easily accessible evidence to strengthen the arguments to promote green infrastructure.

BOOKS, JOURNALS AND RESOURCES

Paper Review OPEN ACCESS

Effectively integrating experiments into conservation practice

Ockendon, N., Amano, T., Cadotte, M., Downey, H., Hancock, M.H., Thornton, A., Tinsley-Marshall, P. and Sutherland, W.J.

Ecological Solutions and Evidence 2021, 2(2)

https://doi.org/10.1002/2688-8319.12069

This paper begins with a timely reminder that, despite the increase in awareness of the importance of evidence-based decision making in conservation planning and policy, many routinely implemented interventions lack a robust evidence base for their effectiveness. The authors expand on this, citing the discrepancy between the teaching of experimental design and data analysis, expectations of academic researchers and the reality for conservation practitioners. Replication, controls and robust statistics are unlikely to be achievable in many conservation projects; however, how much is enough? A process based on ten questions is suggested to identify a conservation management question and designing an experiment to answer it. A worked example, looking at three options for reducing disturbance of ground nesting birds by dogs is given and followed by accounts of accounts of how this approach has been used to generate data and so useful information to be shared with others. The importance of this is stressed, with the need to share failures as well as successes.

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Paper Review OPEN ACCESS

Past, present, and future perspectives of environmental DNA (eDNA) metabarcoding: A systematic review in methods, monitoring, and applications of global eDNA

Ruppert, K.M., Kline, R.J. and Rahman M.S.

Global Ecology and Conservation 2019, 17

https://doi.org/10.1016/j.gecco.2019.e00547

Although this paper was first published in 2019 it may not have come to the notice of busy consultants. It is open access and highlights that eDNA is an interdisciplinary approach combining traditional field-based ecological survey techniques with laboratory based molecular methods and advanced computational tools. It provides a technical background raising concerns about the wider application of this method as well as the benefits, describing how eDNA metabarcoding is being used as a monitoring tool, globally citing examples across all habitats and taxonomic groups, ancient ecosystem reconstruction, plant-pollinator interactions, diet analysis, invasive species detection, pollution responses, and air quality monitoring. Potential future applications are discussed and, despite the proviso that it is likely to be some time before full standardisation is achieved, use is likely to become more widespread and an essential tool in ecological monitoring and global conservation projects.

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Paper Review OPEN ACCESS

Adapting street lighting to limit light pollution's impacts on bats

Julie Pauwelsa, J., Le Viola, I., Basa, Y., Valet, N. and Kerbiriou, C.

Global Ecology and Conservation 2021, 28

https://doi.org/10.1016/j.gecco.2021.e01648

The research described in this paper was carried out in France involving observation of 15 species of bat reacting to streetlights of different heights and of different lamp type and spectral composition. They compared bat activity along linear features up to 200m distant from the source of artificial light at night. The results were analysed according to trait finding a 90% reduction in activity of clutter bats. The introduction provides a comprehensive review of research into this topic, likely to be useful to bat specialists, and identifies knowledge gaps. The research was carried out on 28 sites in a National Park using Song Meter SM2BAT. Concerns regarding the introduction of new, cheaper, energy efficient lighting are discussed and recommendations made for management of artificial light at night (ALAN). It will be no surprise that these were reducing the quantity of light/lighting, increasing light flux directionality and avoiding lighting all together.

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IT'S NICE TO FEEL NEEDED

— and you are —

So much of the great work CIEEM has delivered since 1991 has been produced with the support of volunteer members.

These volunteers govern our strategic direction, input into policy, shape and deliver the CPD programme, assess applications for membership and chartership, judge awards and help to produce industry guidance. They mentor, they encourage, they care. Put simply, CIEEM would not function without them.

So how about you? Have you got some time to give to one of our many rewarding volunteer roles? We currently need some new volunteers for the:

Membership Admissions Committee (MAC)

Training, Education and Careers Development Committee (TECDC)

Professional Standards Committee (PSC)

Membership assessment pool.

If you can volunteer some time to support us, we can provide full training, the opportunity to help shape our work, the chance to network with other volunteers…and lots of thanks – it can even count as your CPD! Whatever part of the sector you are working in, whatever part of the country and whatever grade of membership you hold, we promise to put your time to good use.

For more information about each role and to apply, login to the 'My CIEEM' area of the website

Forthcoming Events

For information on these events and more please see http://cieem.net/training-events.

Conferences
Training Courses
Webinars

13 & 14 September **Water Vole Ecology and Surveys** Online & Cirencester	15 & 17 September **Bats: Assessing the Impact of Development on Bats, Mitigation & Enhancement** Online	23 & 24 September **Phase 1 Habitat Survey** Dunkeld, Scotland	27 September **CIEEM Presidents' Fireside Chat: The Next 30 Years (part of CIEEM's 30th anniversary celebrations)** Online
30 September & 1 October **An Introduction to the NVC** Dunkeld, Scotland	September TBC **Sector Streams webinar ep.8 – The Next Generation (part of CIEEM's 30th anniversary celebrations)** Online	4 & 5 October **Plant Identification and Botanical Keys** Online	4 & 5 October **Water Vole Mitigation** Online
5 October **Barn Owl: Ecology, Surveying and Mitigation** Tamworth	5 & 7 October **CIEEM 2021 Scottish Conference: Greening our Grey: Improving the Biodiversity in Urban Landscapes** Online	6 October **Peregrine Falcon: Ecology, Survey and Mitigation** Edgbaston	11 & 12 October **Preliminary Ecological Appraisal** Online
20 October **Conifer Identification for Ecologists** Shrewsbury	20 & 21 October **Red Squirrel Ecology and Surveys** Dunkeld, Scotland	October TBC **Sector Streams webinar ep.9 – Policy Divergence** Online	8-11 November **Developing Skills in Ecological Impact Assessment (EcIA) (England & Wales)** Online
16 & 17 November **CIEEM 2021 Autumn Conference: Management, Mitigation and Monitoring** Bristol	22 & 23 November **Ecological Report Writing** Online	23-26 November **Intermediate QGIS for Ecologists and Environmental Practitioners** Online	November TBC **Sector Streams webinar ep.10 – Economics and the Environment** Online
8 December **Winter Tree Identification** Shrewsbury	December TBC **Sector Streams webinar ep.11 – COP15 and COP26: What now?** Online		