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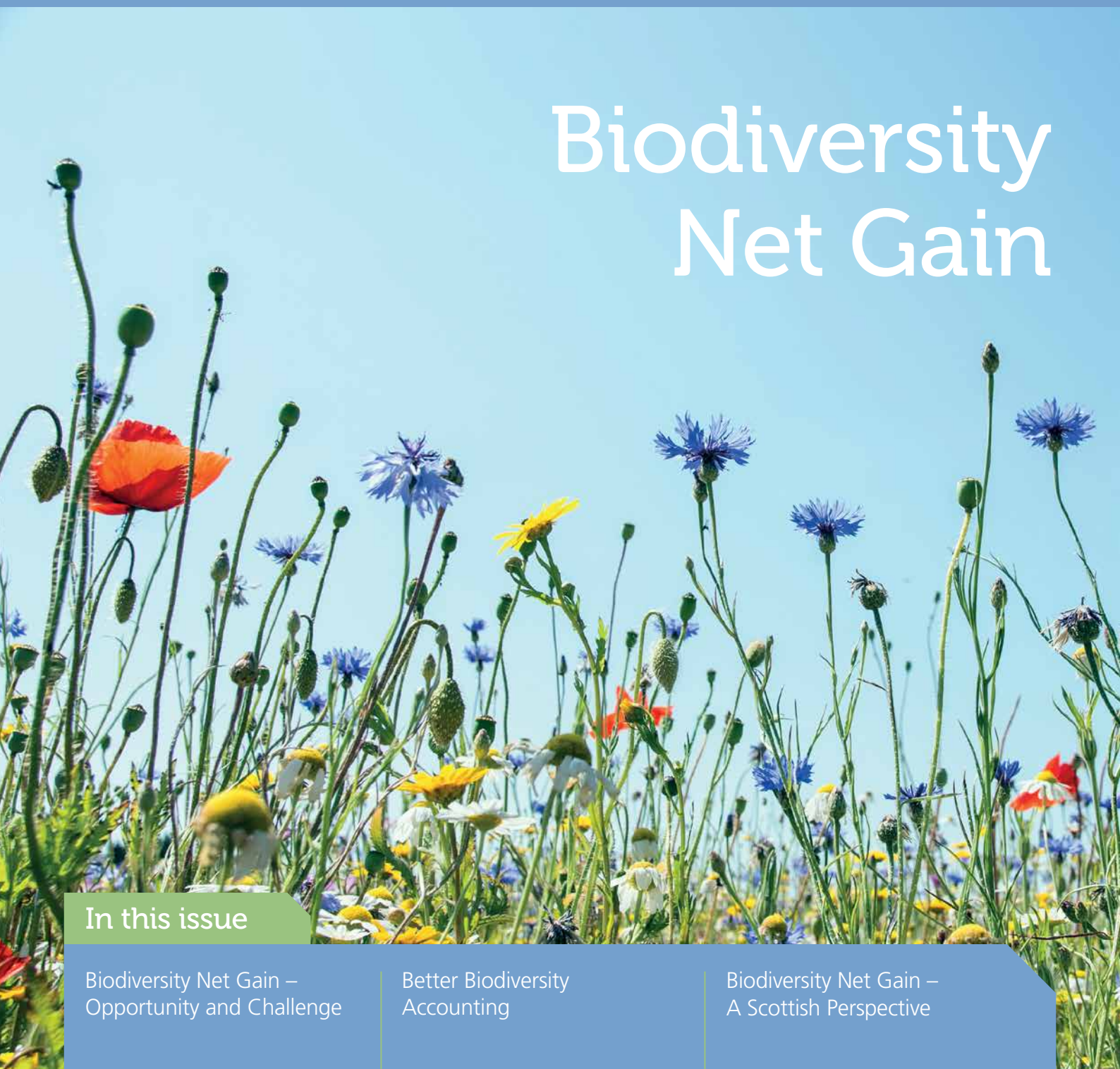
Biodiversity Net Gain



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Welcome

I have evolved as a professional ecologist during a time of profound change. My recollection of early projects (~15 years ago) is that incidental losses of biodiversity from development were very much the norm and seemingly accepted on all sides; in fact, in many cases, such losses may have been significant if there were other 'more important' factors to consider. Some years later we started to target no net loss, a neutral outcome that sat better with the prevailing policy of the time. Now, it seems, all that anyone ever talks about is delivering net gain in biodiversity.

These are exciting times in the progression of net gain thinking and, what is more, this thinking is coming from industry and from our own profession, as well as from government. Earlier this year, new good practice guidance was published on implementing net gain (CIEEM, CIRIA and IEMA) to back up the principles launched at the end of 2016. The Defra metric has been updated and is soon to be re-published. A British Standard on net gain is under development. Perhaps most significantly of all, consideration is being given to mandating Biodiversity Net Gain for development requiring planning permission. Interest in the subject is at an all-time high.

More broadly, the rise of net gain is also occurring in tandem with ever-increasing engagement from the public on issues affecting biodiversity (the 'Attenborough effect'). In addition, the political and systemic opportunities arising from Brexit, with respect to agriculture and the way in which we incentivise land management, could help us to address ongoing biodiversity declines across the wider countryside.

As with all paradigm shifts, there needs to be a prevailing culture of ambitious organisations and passionate people at the helm, to continue to drive the key agendas forward. One such pioneering organisation that has led the way for many years now is the Business and Biodiversity Offset Programme (BBOP) who you will hear from later in this edition (see Treweek & ten Cate).

Understandably, some commentators are far less positive of (in particular) the measurement and accounting of loss versus gain, suggesting that those in favour may be viewing things through rose-tinted glasses. It is certainly the case that there are many potential pitfalls and challenges to be acknowledged and addressed as we move forwards with Biodiversity Net Gain (see Gowing, this edition). The essential need for expertise and capacity within decision-making organisations and the potential for misuse (or even abuse) of metrics by proponents and practitioners are just two of the significant stumbling blocks that are immediately apparent to anyone who has already engaged with this subject.

Delivering genuine gain in biodiversity value as part of any project is undoubtedly a huge ask. Despite our collective knowledge and expertise, we continue to learn new things about how the natural world operates every day. It is therefore perhaps unsurprising that some people will be sceptical about whether it can be done, and scathing of the systems set up to do it. Nevertheless, if the old adage *'if it ain't broke, don't fix it'* rings true, then so must the opposite apply. The evidence suggests that our system of protecting biodiversity is certainly broken, time would appear to be running out, and so I, for one, welcome our transition into this new era of aiming for gain.

It is critical that our profession is fully engaged in the ongoing development of the approach and its effective implementation, so let's get out there and make this happen! I'm tempted to side with Michelangelo here: *'the greatest danger for most of us lies not in setting our aim too high and falling short, but in setting our aim too low and achieving our mark'*.

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In Practice Editorial Board member; Arup

Information

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Front cover: Wildflower meadow, Isle of Wight, England

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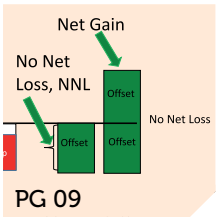

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New advice note published

CIEEM has published a new Advice Note on the longevity of ecological reports. It is important that planning decisions are based on up-to-date ecological reports and survey data. However, it is difficult to set a specific timeframe over which reports or survey data should be considered valid, as this will vary in different circumstances. Where such advice does not already exist, the new note sets out general advice (https://cieem.net/resource/advice-note-on-the-lifespan-of-ecological-reports-and-surveys/).

Low Impact EcIA Reports

For some time now CIEEM and ALGE have been working together to look at proportionate ways of tackling EcIA reporting for sites where the impact is low. Having considered several alternatives, the two organisations have now identified a potential new protocol which will effectively turn a Preliminary Ecological Appraisal report (PEAR) into a low-impact EcIA report. We hope to trial this approach in some of the south-east England local planning authority areas later this year and plan to provide a more detailed account in the September issue of *In Practice*.

Staff changes

There have been a number of changes to the CIEEM Secretariat in recent months.

Amber Connett has started a permanent position as Policy and Communications Officer after completing a 9-month internship.

Michael Hornby has moved on from CIEEM and at the time of writing we were recruiting his replacement in the Membership Team.

Sarah Cox has become the Membership Operations Manager, whilst **Stuart Parks** and **Jason Reeves** have taken on more strategic roles and become Head of Membership and Marketing and Head of Policy and Communications respectively.

The full Secretariat can be found on the website (https://cieem.net/about-cieem/our-team/).

Accredited ECoW Phase Two

Work is about to get under way on the second phase of the project to develop an accreditation scheme for the Ecological Clerk of Works role, thanks to funding from the Construction Industries Training Board (CITB).

Phase Two, which is being undertaken in collaboration with a range of industry stakeholders, involves finalising the competency profiles and standards required, developing the assessment strategy and undertaking a pilot.

Further details are available on the CIEEM website (https://cieem.net/i-am/current-projects/accredited-ecow/).

Low Income Rate Policy

Did you know that as a member of CIEEM, if you are unemployed or on a low income, you could be eligible for reduced delegate rates to attend our events?

If your yearly income is less than £13,433 (or €21,658 in Ireland) please contact the Finance Team (finance@cieem.net) for a Low Income Rate Declaration Form. Simply complete and return the form to the same address.

If you are eligible, you will be entitled to reduced delegate rates at all of our conferences, reduced rates on two training courses each year, and free access to all of our webinars.

New blogs getting fantastic engagement

As you've hopefully noticed, we now have a blog (https://cieem.net/news/?filter_type=5). We hope this will be a platform for members and non-members alike to share their thoughts on relevant subjects and prompt us, the readers, to think a little more deeply on a particular topic and perhaps consider an opposing point of view.

If you have anything you would like to share, or feel moved to respond to something already posted, please get in touch with Mimi Stanwood (mimistanwood@cieem.net).

CIEEM Conferences		
Date	**Title**	**Location**
19 June 2019	Ecological Restoration and Habitat Creation Special Interest Group Conference – Practical Restoration and Creation: Lowland and Upland Grasslands	Chesterfield
4 July 2019	Summer Conference – Health and Wellbeing in the Ecology and Environmental Management Profession	Birmingham
24 September 2019	Scottish Section Conference – Climate Change: Its Impact on Scotland's Wildlife and Landscapes	Stirling
19-20 November 2019	Autumn Conference – Planning for Success: Maximising Biodiversity Net Gain Through the Planning and Permitting Process	Llandudno

For more information on CIEEM conferences please visit: http://events.cieem.net/Events/Event-Listing.aspx

In Practice themes and deadlines

Edition	Theme	Article submission deadline
105 – September 2019	Blue and Green Infrastructure	n/a
106 – December 2019	Future of Land Management	26 August 2019
107 – March 2020	International Approaches	25 November 2019

If you would like to contribute to one of the above editions please contact the Editor (gillkerby@cieem.net). Contributions are welcome from both members and non-members.

Updated National Planning Policy Framework

The UK Government has published the revised National Planning Policy Framework for 2019. The framework was revised in 2018, implementing around 85 reforms. However, following a technical consultation on updates to national planning policy, minor changes have been made to the latest version.

https://www.gov.uk/government/publications/national-planning-policy-framework--2

National Nature Reserves offer £36 million of benefits to society

Natural England have recently published a Natural Capital Accounts report, looking at the benefits provided by their 141 National Nature Reserves. The report shows the most significant benefits provided by the NNRs are wildlife, positive cultural impacts, and carbon sequestration.

http://publications.naturalengland.org.uk/publication/4535403835293696

Public Health England recommend 'net health gain' principle

In their recent report, Public Health England recommends that a 'net health gain' principle should be adopted in any new policy or work programme, to ensure that new developments deliver an overall benefit to people's physical and mental health and reduce air pollution problems.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/784055/Review_of_interventions_to_improve_air_quality.pdf

Scotland's natural capital worth £273 billion

A comprehensive natural capital assessment has been carried out for the first time in Scotland, and has found that in 2015 the asset value of Scottish natural capital was an estimated £273 billion.

https://news.gov.scot/news/scotlands-natural-capital-worth-gbp-273-billion

Welsh Government consulting on environmental principles and governance post-Brexit

The Minister for Environment, Energy and Rural Affairs, Lesley Griffiths AM, has put forward a consultation document on gaps in environmental principles and governance that may open up in Wales as a result of the UK's exit from the EU.

https://gov.wales/environmental-principles-and-governance-wales-post-european-union-exit

Supreme Court rules on Scottish Brexit Bill

The Supreme Court has ruled that the UK Withdrawal from the European Union (Legal Continuity) (Scotland) Bill cannot receive Royal Assent in its current form. The Bill had passed through Scottish Parliament in 2018, however, the European Union Withdrawal Act 2018 received Royal Assent first. The Supreme Court stated the Scottish Bill was not, as a whole outside the legislative competence of the Scottish Parliament, but sections would be as a result of the UK Withdrawal Act.

https://seneddresearch.blog/2019/01/23/supreme-court-rules-on-scottish-brexit-bill/

Review published to help Member States better implement environmental policy

The European Commission has published the second Environmental Implementation Review (EIR) which maps out the situation of environmental policies and rules implementation in each EU country and identifies the causes of implementation gaps.

http://europa.eu/rapid/press-release_IP-19-1934_en.htm

BLIMP – new Bat Low Impact licensing approach

The SNH Licensing team have launched the new bat low impact licensing approach or 'BLIMP', which is a lighter touch licensing approach for development works affecting low numbers of non-breeding soprano and common pipistrelle bats. Applicants will need to hold a current bat survey licence and have a proven track record of experience and practice.

https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/licensing/licensing-news

Welsh environmental projects to receive £1 million through landfill community scheme

The new Landfill Disposals Tax Community Scheme, created by Welsh Government, will provide up to £50,000 each to projects focusing on the environment, wildlife, reuse, biodiversity and waste management.

https://gov.wales/newsroom/environmentandcountryside/2019/190128-environmental-projects-set-to-benefit-from-1m-funding-through-new-landfill-community-scheme/?lang=en

Scottish Badgers publish guidance on badger surveys in Scotland

Surveying for Badgers – Good Practice Guidelines, published by Scottish Badgers, provides a standardised survey methodology for the Eurasian badger in Scotland. The guidelines include the current legal status of badgers in Scotland and how badger data should be managed, interpreted and shared.

https://www.scottishbadgers.org.uk/userfiles/file/planning_guidelines/Surveying-for-Badgers-Good-Practice-Guidelines_V1.pdf

Irish Minister launches Clean Oceans Initiative

The Minister for Agriculture, Food & the Marine, Michael Creed, has announced a new Clean Oceans Initiative which aims to collect, reduce and reuse marine litter and clean up Ireland's marine environment.

https://merrionstreet.ie/en/News-Room/Releases/Creed_launches_%E2%80%9CClean_Oceans_Initiative%E2%80%9D_%E2%80%93_sets_target_for_100_of_Irish_trawlers_to_recover_plastic_waste_from_the_oceans_on_every_fishing_trip.html

Biodiversity Net Gain – Opportunity and Challenge

Keywords: biodiversity metrics, Biodiversity Net Gain, Environment Bill, wildlife conservation

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It is an exciting time to be working on Biodiversity Net Gain. There is activity at every level, from local to across the UK, and much of this is driven by industry and local planning authorities. But it is also a challenging time. Many have raised concerns about the lack of consistency and standardisation in approaches, and have questioned how Biodiversity Net Gain will be secured on the ground in the long-term and not just on paper. It is vital that we keep on the right track, continually seek improvement, and remain focused on the goal – a net gain for biodiversity! Only by being open and honest about the costs, the limitations and opportunities provided by Biodiversity Net Gain, can we ensure that we restore our wildlife and do not simply provide a new way of measuring its loss.

What's the current position with regards to Biodiversity Net Gain?

Over the last two years we have seen Biodiversity Net Gain go from a relatively minor aspect of a small number of ecological assessments to a significant part of many, if not most, large developments. The seed of Biodiversity Net Gain has been growing for a while, but in the last two years the shoots have rapidly broken through the soil and spread their first leaves. Given the current whirlwind of activity, it's timely and important to take stock – what resources and mechanisms do we have in place with regards to Biodiversity Net Gain?

We have a milestone publication of the Good Practice Principles for Biodiversity Net Gain by CIEEM, CIRIA and IEMA (2016). This publication firmly established industry as leading Biodiversity Net Gain by setting out good practice. It also set a clear benchmark on 'what good looks like' so that industry and its stakeholders can evaluate whether developments claiming Biodiversity Net Gain have followed good practice. Now it is up to all of us involved with Biodiversity Net Gain to use these principles.

Accompanying the principles, we have practical guidance that has just been published by CIEEM, CIRIA and IEMA (2019). This gives advice on implementing good practice to design and implement Biodiversity Net Gain, again emphasising both the 'what good looks like' and 'what good does not look like'. It's extraordinary the way that industry is leading Biodiversity Net Gain, but in turn this means it is industry's responsibility to do this right.

As well as these publications, other 'haves' for Biodiversity Net Gain include:

- More and more local planning authorities stipulating Biodiversity Net Gain as part of planning requirements, doing so based on the stronger wording for Biodiversity Net Gain requirements in the revised National Planning Policy Framework (Ministry of Housing, Communities and Local Government 2018).
- Natural England revising the original Defra biodiversity metric taking on board comments and feedback, and developing an Excel-based tool to improve consistency in its application.
- A new British Standard being developed on the process of designing and delivering Biodiversity Net Gain. As with all such Standards, this will further help to improve consistency and standardisation.
- A wealth of international experience to draw from, on what works and – most importantly – what does not work. This experience is widely available through publications, webinars, industry forums, etc., and is there for us to make the most of.
- An exciting schedule of conferences, webinars and training courses, providing opportunities for sharing lessons learnt and advancing practice. This is also engendering cross-sector partnerships and collaboration on Biodiversity Net Gain, especially between developers, planning authorities and conservation organisations.
- Finally, the Treasury announcing that the Government will use the forthcoming Environment Bill to mandate Biodiversity Net Gain for certain development in England, which is an incredible achievement by those working within Government to advance the net gain agenda.

While that's a lot of 'haves', it's equally important to be clear on what we don't have. We don't have all of the answers, especially for the question on how much more biodiversity is net gain. We don't have developments within the UK demonstrating achievements in Biodiversity Net Gain after 25, 30 or 50 years that we can learn from. So, given Biodiversity Net Gain is such as fast-moving and emerging practice – ***what is around the corner for Biodiversity Net Gain and what are the possible implications for ecologists and environmental managers?***

Here are some personal reflections from the authors.

Tom:

The Environment Bill – The Environment Bill may well make Biodiversity Net Gain mandatory but we need to see the details of this before we really understand what this means and which developments it applies to.

A revised Defra metric – This is being developed by Natural England and a number of people have been involved in piloting the new approach (Natural England 2018). As far as we are concerned, it really does look like a significant improvement. There are still issues and gaps in what it covers but it is certainly moving in the right direction and should really help us all assess the biodiversity impacts and opportunities of developments.

Habitat Banks – Mandatory Biodiversity Net Gain provides a clear, consistent and certain requirement for habitat banks, i.e. areas of biodiversity compensation that are in place before the impact. These banks will provide a much cheaper way for the developer to deliver Biodiversity Net Gain because much of the risk to delivery is removed. As a result, they provide a really exciting investment opportunity. Would you like to invest in a habitat bank and gain a return on investment when a developer pays for the compensation it provides? The opportunity will soon be with us!

The Eco-metric – The Eco-metric is a first step towards creating a simple assessment of the benefits that Biodiversity Net Gain provides in terms of ecosystem services. It is not perfected yet but it is a fantastic start and has the potential to open up a whole new way of describing the benefits provided through delivering Biodiversity Net Gain (see https://ecosystemsknowledge.net/ecometric).

Julia:

International good practice principles on the 'people' aspects of Biodiversity Net Gain – We are intimately connected with nature through the way we use, value and depend on nature, so people can easily be affected from losses and gains in biodiversity from a development project. The problem is that these social impacts of Biodiversity Net Gain are rarely accounted for, and when they are, it is often through simple, positive news stories, such as 'enhancing wellbeing', without any real evidence behind them and without accounting for the negative impacts. For example, there can be significant negative effects when people losing biodiversity (and the associated ecosystem services) at a development site are not the same as people benefiting from biodiversity at an offset site.

In 2018, international good practice principles on the 'people' aspects of Biodiversity Net Gain were published (Bull *et al.* 2018). These principles provide a framework to not only address negative social impacts but ensure that people's wellbeing is better as a result of Biodiversity Net Gain. Work is underway to look at how these social principles apply to the UK (watch this space!). Meanwhile, the possible benefits for ecologists and environmental managers from adopting the principles are: being more certain that Biodiversity Net Gain projects are truly sustainable and equitable; ensuring a smoother transition through the consent process by demonstrating that good practice for people has been followed

when designing and implementing Biodiversity Net Gain; and working collaboratively with social specialists, especially on measuring the impacts of Biodiversity Net Gain on people's wellbeing

Rachel:

Strategic planning for Biodiversity Net Gain – Biodiversity Net Gain policies are now appearing in the review documents of most local plans, meaning that in a short space of time, newly adopted local plans will predominantly include a Biodiversity Net Gain policy. This puts those local planning authorities in good stead if, and hopefully when, the forthcoming inclusion of mandatory net gain in development within the Environment Bill progresses to new legislation. Local planning authorities will go through a steep learning curve as they work out how best to embed Biodiversity Net Gain within their planning processes, and there will be very positive collaborations with a wide range of partners and stakeholders as a result.

But the next big step for our local planning authorities, once the implementation and new administration dust settles into the day job of determining planning applications, has to be strategic planning for Biodiversity Net Gain. The biodiversity metric inherently promotes this, with beneficial consideration of strategic biodiversity priorities as an integral part of the calculations. The next new swathe of local plan reviews after Biodiversity Net Gain policies become mainstream, will start to take steps towards a plan-led approach to Biodiversity Net Gain. The next Biodiversity Net Gain policies will be more targeted, setting out within the local plan where and what the biodiversity priorities are, and giving developers options to contribute towards strategic projects.

It would be wonderful to see a reversal of the current trajectory of local planning authority ecologist decline, with a new influx of dedicated staff resource to oversee Biodiversity Net Gain strategically across local planning authority areas. A handful of innovative and leading local planning authorities are already resourcing Biodiversity Net Gain staff to deliver existing local plan area-wide projects, and not too far around the corner is the day that ecological staff in local planning authorities are finally on the increase again.

In summary

All of this makes this issue of *In Practice* incredibly timely. It is imperative that we work together to share our experiences, learn from one another and further develop a shared, robust, and transparent process for delivering Biodiversity Net Gain. The CIEEM, IEMA and CIRIA Biodiversity Net Gain Principles and Guidance start this process. Adding to this, the CIEEM Spring conference on Biodiversity Net Gain was a great opportunity to hear the successes and challenges from people and projects across the UK. Only through everyone getting involved in Biodiversity Net Gain projects will we see this work grow from a seedling into a forest, moorland, wetland or meadow.

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The Business and Biodiversity Offset Programme: Consensus and Controversy

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Keywords: avoidance, Biodiversity Net Gain, mitigation hierarchy, No Net Loss

This article provides an overview of the role of the Business and Biodiversity Offsets Programme (BBOP) in promoting Biodiversity Net Gain (BNG) as an aspirational objective of sustainable development. Between 2004 and 2018, BBOP developed and promoted best practice in achieving No Net Loss and preferably a Net Gain of biodiversity through the thorough application of the mitigation hierarchy. After avoidance, minimisation and restoration, inclusion of an explicit, last step to offset residual impacts was an important early focus, with agreed principles and tools to underpin best practice. This was followed by a standard and then roadmaps for business and government. A number of lessons were learned from BBOP's experiences. It is instructive to consider these as efforts to promote BNG gather momentum in UK policy and business practice.

Introduction

The Business and Biodiversity Offsets Programme (BBOP) provided a forum for an international coalition of about a hundred businesses, conservation groups, communities, governments and financial institutions to collaborate and agree standards and approaches for designing and implementing development with the best possible outcomes for biodiversity as a core objective (Business and Biodiversity Offsets Programme 2018a). BBOP's resources are framed around achieving No Net Loss (NNL) and preferably a Net Gain (BNG) of biodiversity, and underpin BBOP's standard for good practice in the design and implementation of biodiversity offsets (Business and Biodiversity Offsets Programme 2012a, 2018b).

Many companies and governments have integrated BBOP's Principles on Biodiversity Offsets (Business and Biodiversity Offsets Programme 2009) into their own commitments and use its tools and guidance to underpin their efforts towards positive outcomes for biodiversity. BBOP's Secretariat, Executive Committee and members felt able to close the programme once the group had developed, agreed and published a comprehensive suite of tools and these had been widely integrated into government policy, financial institutions' lending conditions and companies' commitments. However, it is important to recognise and understand the very real challenges associated with achieving BNG (Maron *et al*. 2016), so that these can be overcome in policy and practice. To this end, there is much to be gained from reviewing the valuable lessons learned from BBOP's work.

What is Biodiversity Net Gain or BNG?

BNG is achieved if biodiversity increases or is enhanced in comparison with a clearly defined reference scenario. In the context of development planning, BNG means going further than compensating for biodiversity loss where development impacts cannot be avoided or mitigated. The types and amounts of gain are typically determined by comparing future outcomes when planned infrastructure and activities are in place with a baseline future scenario without the planned development.

BBOP took the view that achieving and demonstrating BNG first requires determination of NNL or agreement on what constitutes the break-even point between losses and gains. Without this, it is impossible to determine whether gain is being achieved at all, or what constitutes 'enough' gain. NNL requires a commitment to achieve and demonstrate biodiversity gains that are commensurate with any residual losses caused by a development. Beyond this, some rationale is needed to establish what constitutes sufficient gain to achieve BNG and under what circumstances efforts beyond NNL are appropriate (Business and Biodiversity Offsets Programme 2012b). Ideally this reflects outcomes of systematic conservation planning and a good understanding of allowable trade-offs between the biodiversity lost through permitted developments and the biodiversity gained through mitigation measures, including biodiversity offsets.

BBOP's handbooks, resource papers and roadmaps (Business and Biodiversity Offsets Programme 2018b) offer guidance

to developers and policy-makers on quantifying biodiversity losses and gains as part of a biodiversity offset; identify currencies for loss/gain calculations (Business and Biodiversity Offsets Programme 2012b); select reference (or benchmark) conditions; and identify key sources of risk and uncertainty in assessing biodiversity losses and gains. As a member of BBOP, Defra contributed to these documents and they influenced Defra policy (which draws on the Principles and approach to metrics, for instance; Business and Biodiversity Offsets Programme 2009, 2012b).

Why was BBOP established and what did it achieve?

When BBOP started its work in 2004, development planning was generally ineffective at safeguarding biodiversity despite regular inclusion of biodiversity conservation and restoration measures as conditions in development licenses. This was partly a result of fundamental flaws in the requirements and partly a result of poor monitoring and enforcement. Lack of an offset step in the mitigation hierarchy meant that environmental impact assessments (EIAs) could predict biodiversity losses and recommend measures to minimise them or restore damage, but not to the extent of restoring pre-impact populations of species in optimal situations. Mitigation, if implemented at all, was generally confined within development sites where there were limited opportunities to achieve lasting benefits to biodiversity. In most countries, development planning was resulting in progressive and cumulative negative impacts on biodiversity, even with EIA done well.

By championing BNG, BBOP set out to catalyse a transition away from 'damage limitation' approaches to the management of risks to biodiversity, encouraging more emphasis on tangible positive outcomes. Recognising that residual damages to biodiversity were the norm when developments took place, a particular emphasis was placed on improving avoidance measures and introducing an offset step to the mitigation hierarchy.

The mitigation hierarchy (Figure 1) is a simple framework in theory, but demands a sophisticated approach to handling risk and opportunity in order to place appropriate emphasis on its sequential

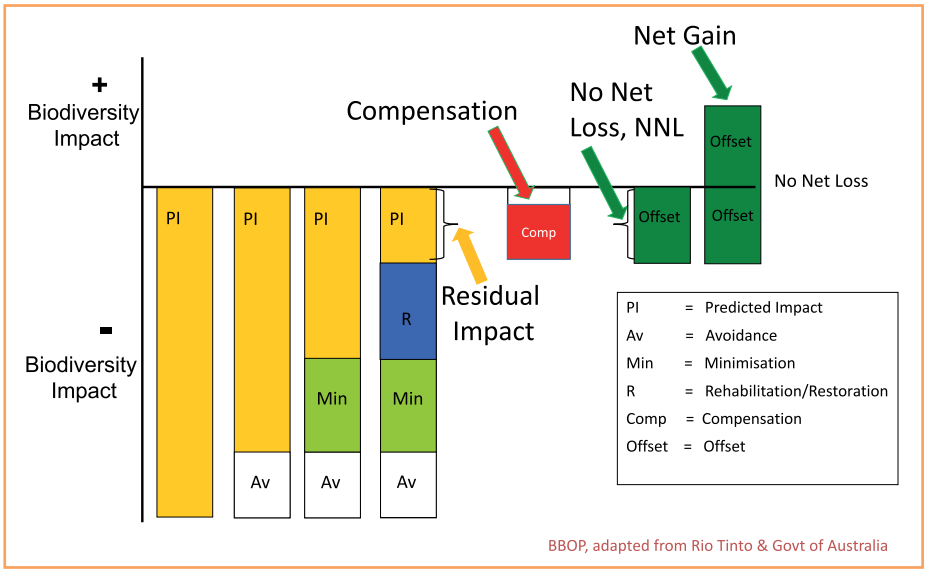


Figure 1. The mitigation hierarchy.

steps. In practice, it can be challenging to determine how much effort and money should be invested in modifying development designs to avoid impacts on ecosystems. Equally, it is challenging to secure long-term, socially and environmentally sustainable economic development objectives once a project has closed or been handed over to a different operator.

When BBOP was established, there was no common understanding of what was meant by a 'biodiversity offset', when offsetting would be appropriate (or not) and how to distinguish between good and bad practice in following the mitigation hierarchy. BBOP defined biodiversity offsets as '*measurable conservation gains that balance unavoidable, residual losses*', (those that cannot be countered by avoiding or minimising impacts from the start or by addressing the damage done through restoration).

Although strengthening measures to avoid impacts on biodiversity should always be the top priority, including a specific offset step in the mitigation hierarchy offers a chance of redress when efforts to avoid or minimise impacts cannot achieve NNL, or when decisions are made to proceed with development despite residual impacts on biodiversity being anticipated.

Offsets are controversial because they can result in qualitative trade-offs (one type or feature of biodiversity being substituted by another); because they may alter access to ecosystem services when biodiversity values are effectively relocated; because gains are often uncertain; and because they are sometimes perceived as a means of legitimising inappropriate development. However, BBOP was able to draw on experience in designing and implementing offsets in several countries with established biodiversity offset policies and practice to develop principles and safeguards for minimising the risk of bad practice. To avoid misuse of offsets, for example by 'jumping' to that final step without appropriate prior efforts to avoid or minimise residual impacts, BBOP worked on a set of consensus-based Principles on Biodiversity Offsets (Business and Biodiversity Offsets Programme 2009). These defined '*limits to what can be offset*' and emphasised the need to achieve '*like-for-like outcomes or better*' when designing and implementing offsets. Principle 4 enshrined No Net Loss or a Net Gain of biodiversity as objectives of offsets ('*a biodiversity offset should be designed and implemented to achieve,* in situ, *measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity*').

The BBOP Principles are now used, cited, adapted and integrated into law, policy, industry guidance and financial loan conditions worldwide, including the UK (see Box 1). They underpin BBOP's Standard on Biodiversity Offsets (Business and

Biodiversity Offsets Programme 2012a), which enables clear and transparent assessment and reporting of progress in the application of the mitigation hierarchy, including design and implementation of biodiversity offsets consistent with the BBOP Principles.

By 2014, thirty-nine countries had existing laws or policies on No Net Loss or a Net Gain of biodiversity, biodiversity offsets or compensation, and twenty-two were developing them (ten Kate and Crowe 2014). Depending on the breadth or precision of the scope of policy considered, this number has now risen to between 74 and 100. In the UK, for example, Defra consulted widely between December 2018 and February 2019 on how best to measure, monitor, standardise and implement its approach to Biodiversity Net Gain to be simpler and clearer for developers (Defra 2019) and, in his Spring Statement, the Chancellor of the Exchequer announced that the government will use the forthcoming Environment Bill to mandate Biodiversity Net Gain for development in England (HM Treasury 2019).

Over 60 companies – including Anglo American, Berkeley Homes, Cemex, Highways England, Kingfisher, Lafarge and Network Rail – have also made public, company-wide commitments related to Biodiversity NNL or NG (BBOP Business Roadmap and Technical Notes, Business and Biodiversity Offsets Programme 2018c). BBOP created and fostered a 'Community of Practice' of over 2000 professionals supporting these developments, sharing and spreading experience and best practice worldwide.

Why was there a strong business-focus?

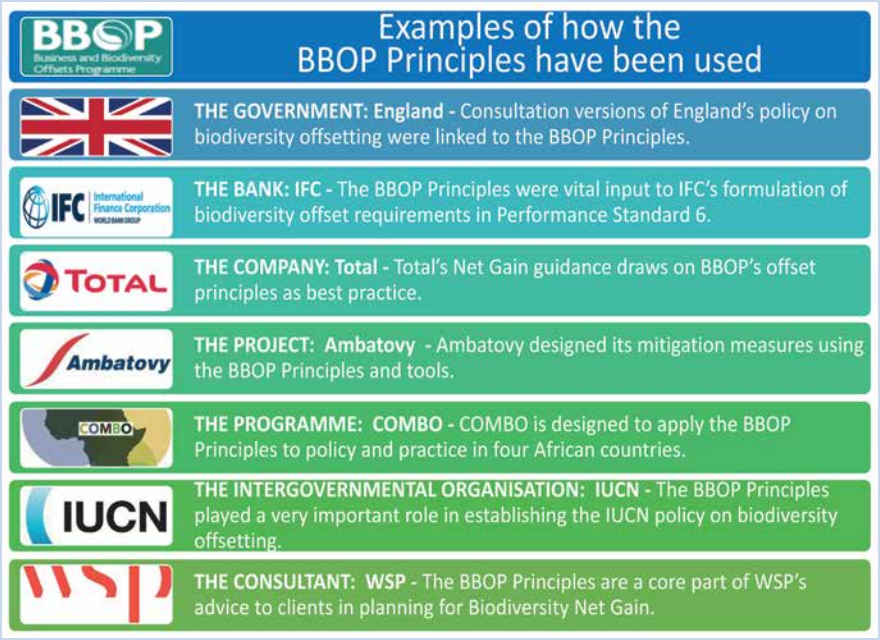
Challenges faced by businesses and their experiences in managing risks to biodiversity were placed deliberately front and centre in BBOP's efforts from the outset.

Recognising the business case for improved biodiversity management (Box 2), corporate entities have often been at the forefront of efforts to improve standards of biodiversity risk management. They may rely on natural capital and sustainable supplies of ecosystem services for viable and sustainable operation, or their licence to operate may depend on their ability to sustain biodiversity or ecosystems that are used (and depended on) by others. Some businesses and developers may have limited flexibility to avoid certain impacts on biodiversity. The fact that minerals can only be mined where they are located is one reason why mining companies have been prominent in initiatives to safeguard biodiversity by applying the mitigation hierarchy and why some were keen to explore the use of offsets.

Box 2. The business case for Biodiversity Net Gain

- Complying with a growing number of laws and policies on mitigation, biodiversity offsets and compensation (now in some 100 countries).
- Access to finance: 94 financial institutions in 37 countries including the UK have adopted the Equator Principles (see https://equator-principles.com), with project finance conditions requiring No Net Loss of biodiversity in natural habitat and Biodiversity Net Gain following development in critical habitat. The Equator Principles provide a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in project finance.
- Competitive advantage from securing smooth and rapid licence to operate, including support from local communities, avoiding costs and delays from conflict.
- Securing supply chains based on natural resources, so that companies can reliably obtain the natural materials they need (food, fabrics, clean water, etc.) from their suppliers without causing unsustainable exploitation.

Box 1. Examples of how the BBOP Principles have been used.



How much is enough?

BNG is clearly a laudable objective, but it is open to challenge if a clear rationale and basis for determining appropriate types, amounts and mechanisms of gain and permanence are lacking. In England, legislation requires public bodies to have regard to conserving biodiversity, and Biodiversity Net Gain is an established part of planning policy. The National Planning Policy Framework (NPPF) has recently been revised to make clear that planning should '*identify and pursue opportunities for securing measurable net gains for biodiversity*'. The Government has recently consulted on Biodiversity Net Gain as a policy objective (including whether

it should become mandatory) and has proposed an adapted use of the habitat-based metric developed by Treweek *et al.* (2010) as a basis for balancing losses and gains. A requirement for mandatory achievement of BNG is one of BBOP's key recommendations, but in the case of the UK, while the government has committed to use the Environment Bill to mandate Biodiversity Net Gain for development in England, the framework for defining how much gain is enough and mechanisms for long-term delivery and review are not yet clearly established.

Conclusions and lessons learned: 'If and only if...'

BBOP made a significant and lasting contribution to development of international best practice related to No Net Loss and Net Gain of biodiversity. This was achieved through international

Box 3. BBOP's 'CALL TO ACTION' in 2018

Help make a real transition to Biodiversity Net Gain

In the 15 years since its founding, BBOP's principles, standards and guidance, and the work of its members, have been instrumental in raising the bar for biodiversity and ecosystem services in the context of residual losses associated with global development. Some 100 governments now have policies and laws that mainstream biodiversity in planning decisions and 94 Equator Principles Association financial institutions have loan conditions requiring No Net Loss of natural habitat and Net Gain in critical habitat. Corporate strategies and procedures that go beyond damage limitation increasingly commit businesses to tangible outcomes for biodiversity.

Strengthening measures to ensure that biodiversity is not lost to begin with is the top priority. Including a specific offset step at the end of the mitigation hierarchy offers a chance of redress when efforts to avoid or minimise impacts cannot achieve No Net Loss.

Through its efforts, BBOP has been at the forefront of a transition to a 'new normal' in which explicit efforts are expected of developers and policy-makers to address residual impacts from development and improve the state of biodiversity and ecosystem services.

Despite these positive changes, biodiversity is in crisis. Results in practice do not match either advances in theory, or government policy and companies' internal and public commitments. Important risks are too often ignored and the approaches taken by some companies and governments are haphazard and inadequate.

CALL TO ACTION: Members of the BBOP Community of Practice* urge action by the international community, governments, companies and civil society.

The world needs to step up efforts to reduce biodiversity loss and improve the standard of mitigation measures, including biodiversity offsets. Only this will achieve a more effective balance between truly needed, sustainable development and vital conservation of the planet's life support system.

THIS IS OUR VISION: Appropriate development in the right place planned to achieve a net gain in biodiversity, and undertaken with integrity to a high standard. *Realising this vision will require a decisive step up from 'business as usual' but brings many advantages: public support, reduced risks and positive social, environmental and economic outcomes. These go beyond biodiversity and can be demonstrated in natural capital assessments.*

We urge a number of actions so that the vision can be achieved, specifically:

GOVERNMENTS

- Produce clear, well-governed, national mitigation regulations that are feasible, properly monitored and enforced, and in line with ambitious biodiversity conservation targets.
- Align conservation and development priorities through timely land-use planning. Provide licences only to companies that adhere to standards of best practice for biodiversity and ecosystem services and apply these standards consistently, raising the bar for all development projects.

COMPANIES

- Include biodiversity and ecosystem services early in the planning of projects and value chains so that impacts can be assessed and there is still room to avoid and minimise them.
- Commit to achieve a net gain of biodiversity in line with the vision, develop a clear roadmap to achieve it and communicate progress and biodiversity outcomes transparently.

FINANCIAL INSTITUTIONS

- Develop, adopt, and then enforce safeguard policies and performance standards in line with the net gain vision.
- Work with investee companies to apply these standards, and introduce greater transparency and disclosure requirements.

MULTILATERAL BANKS
and other donors

- Provide finance for governments to establish effective mitigation systems to achieve the net gain vision, including support for capacity building for both public and private sector entities.

CONSERVATION ORGANISATIONS AND ACADEMIA

- Help establish the biodiversity targets, data, maps and metrics needed to underpin the net gain vision and offer support and independent evaluation to companies and governments.

MEMBERS OF CIVIL SOCIETY

- Hold governments, companies and financial institutions to account, expecting high standards and transparency about the potential and actual achievements of the promises made.

*Note – Membership of the BBOP Advisory Group and Community of Practice does not necessarily imply support for the Call to Action. A list of signatures can be found at https://www.forest-trends.org/bbop/a-call-to-action

agreement between business, finance, government and civil society on key concepts and the principles, standards and methods for delivery, set out in all the BBOP Resources online (BBOP 2018b).

The Programme brought more rigour to the application of the mitigation hierarchy and created tools to help make BNG a realistic proposition in the face of increasing pressures on biodiversity. Practical experience, research and broad debate within society is required to further develop and refine these tools so they continue to play a key role in economic planning and decision-making. However, some important lessons emerged from BBOP's work, as presented in its Call to Action (Box 3). The multi-stakeholder and international nature of the Programme revealed the two biggest lessons that can help those working for BNG: first, that it is a collaborative exercise, and secondly that only high standards will do. High standards in applying the mitigation hierarchy are essential in order to achieve the potential benefits for sustainable development and conservation that lie behind the business case and the policy imperative for BNG. The key conclusions are therefore that:

- Working together, government, companies, investors and civil society should agree on policy and standards of practice and help respond to each other's needs.
- Governments should establish national mitigation systems that are feasible, fair, clear and well governed, with an objective of Biodiversity Net Gain.
- Companies should establish a vision and commitment towards BNG, taking steps to include biodiversity very early in the planning cycle, assess net outcomes with suitable rigour, work in partnership and report outcomes publicly with independently verified results.
- Financial institutions should create and then stand by their safeguard policies and performance standards, report transparently on progress with their successful implementation, and encourage the governments and companies in which they are invested to take the steps recommended to them above.
- Civil society, including conservation and research organisations, should stay informed on developments with Biodiversity Net Gain (as readers of this issue are doing!); offer partnerships to provide biodiversity data, conservation outcomes or monitoring of results; and hold governments, companies and financial institutions to account for keeping their commitments and maintaining high standards.

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Jo Treweek was part of BBOP's technical advisory committee for many years and helped draft the Offset Design Handbook. With her colleague Bill Butcher, Jo designed the "Defra Metric", now in widespread use in the UK as a framework to balance biodiversity losses and gains.

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Kerry ten Kate founded the Business and Biodiversity Offsets Programme (BBOP) and led its work on 'Biodiversity Net Gain' from 2004 to 2019. She is now a trustee of the RSPB, a member of IUCN's Species Survival Commission, and a Conservation Fellow at ZSL.

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Better Biodiversity Accounting

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Keywords: biodiversity accounting, Biodiversity Net Gain, condition assessment, habitat survey

Recently, I was involved in a debate about risks associated with the greater use of biodiversity accounting tools in our industry (Gowing 2019). Building on that debate, this short article makes a number of suggestions for how those risks might be reduced with specific reference to the Defra biodiversity metric and the way it uses habitat information.

In what follows, it is taken as read that accounting tools are a small part of a much wider agenda captured by Biodiversity Net Gain; that accounting for impacts on biodiversity to inform compensation must only be considered after avoidance options have been exhausted; and that irreplaceable habitats should not be 'offset'.

The risks

A recent article in *British Wildlife* (Woodfield 2018) argued that that those undertaking biodiversity accounting calculations could accidentally or wilfully misuse the technique, thereby misrepresenting the biodiversity value of a site. In reducing biodiversity to a simple number (the output of a metric), these misrepresentations may be concealed, giving time-pressured decision makers, who may lack ecological knowledge to critique the metric output, a false impression that good nature conservation outcomes are occurring. Two case studies were described; a lowland meadow site in Buckinghamshire and an unimproved grassland site/nationally significant nightingale population in Kent. Both demonstrate what happens when accounting tools are used inappropriately, resulting in potentially deleterious consequences for important biodiversity. It was concluded that the Defra metric (Defra 2012) (and potentially other similar tools) are subject to numerous flaws and should never be a substitute for adequate survey information or expert judgement. Accounting tools should never provide a definitive position on a biodiversity issue.

Fixing the flaws

The risks associated with greater use of the Defra metric in our industry are certainly material. It is apparent that by altering distinctiveness and conditions scores (two of the key input variables for the Defra metric), widely different offset requirements can be generated. Metric use, and the outputs given, are strongly influenced by the technical knowledge of those undertaking biodiversity calculations.

However, the risks should be considered in view of the fact that the current system for managing wildlife in the planning system doesn't seem to be working. Despite a lot of positive change in the past decade, assessment and mitigation resources are still disproportionately spent on a small number of protected species. Strategic coordination is often lacking, resulting in a disparate series of uncoordinated compensation efforts. Compliance monitoring is rarely undertaken and is not enforced. An urgent change is required.

Placing sole reliance on 'expert judgement' does not remove the risk of misrepresenting the nature conservation value of a site or of miscalculating what is an appropriate amount of compensation (Reed 2019). This risk already exists, irrespective of whether accounting tools are used. Consider who are the experts, what pressures they are under and what conscious or sub-conscious biases they bring to the table.

In England, it is proposed to mandate Biodiversity Net Gain for development in the planning system (Defra 2019). It is probable that the Defra biodiversity metric (as updated) will be the accounting tool used to measure attainment or otherwise of this target (Natural England 2018).

Growth of accounting tools may be inevitable so we are left with the challenge of how we improve metrics. This is a large and technical subject area of which much as been written (see Business and Biodiversity Offsets Programme 2012, Treweek and ten Kate, this issue). A large amount of work to set general standards and principles for Biodiversity Net Gain

in the UK has also been progressed (for example CIRIA, CIEEM, IEMA 2018). What follows are some perspectives on how the use of habitat information may improve application of the Defra biodiversity metric.

Competence in Habitat Survey and Biodiversity Accounting

Obtaining a protected species survey licence seems to be a basic rite of passage for those advancing their knowledge of the survey and assessment of animal species. As a minimum they should also meet CIEEM's Competencies for Species Survey as well as other task-specific competencies.

The same weight is not placed on habitat survey and botanical competence, at least in a formal way. However, independently validated, competence certification schemes do exist for plant identification such the Field Identification Skills Certificate (FISC) awarded by the Botanical Society for Britain and Ireland (see https://bsbi.org/field-skills).

Defra guidance recommends a slightly awkward and incomplete translation of the Integrated Habitat System to classify how 'distinctive' habitats are (http://ihs.somerc.co.uk). The revised Defra metric is likely to use the new UK Habitat Classification (UK Habs; Butcher *et al.* 2018) but most ecologists still use the Phase 1 habitat classification (http://jncc.defra.gov.uk/page-4258). Those using the Defra metric need to be competent at classifying and translating between the three different systems to guarantee a reasonable outcome.

Given that the Defra metric relies on habitat type and condition as a proxy for biodiversity, surely minimum compulsory survey standards should be set for those undertaking baseline survey work? For example, a minimum of FISC Level 3 qualified for sites involving non-priority habitats, and a minimum of FISC Level 4 qualified (or higher) for sites containing priority habitat or botanical designated sites. Whilst FISC is a measure of plant identification skill, it does not indicate competency in habitat classification. A comparable standard for habitat survey is something that is required.

Beyond this, perhaps we need to think about competence certification for those undertaking biodiversity accounting assessments. If it's all too easy to swing the outcome of such tools in the favour of loss/gain, through errors in habitat classification or data input, those undertaking such assessments should be trained and subject to appropriate certification. CIEEM could be the awarding body for such a competency but, as a minimum, certification must be independent and not ordained by our colleagues, which would lack credibility and undermine faith in the system.

Audit

In the drive to please clients and to demonstrate innovative approaches to Biodiversity Net Gain in front of our peers, it is especially important to always be self-critical of instances where biodiversity accounting approaches have not delivered the foretold improvements in biodiversity. It is only through honestly cataloguing the evidence that improvements will be made. The pages of *In Practice* tend to be rose-tinted rather than neutral or negative. Biodiversity accounting is a relatively new technique and it is understandable that it will need a great deal of refinement and improvement. We should report this and learn from those instances by presenting before/after botanical survey data in recognised publications. Going further, perhaps there is another role for CIEEM here in convening an audit committee, given that local authorities lack the necessary resources to critically evaluate assessment.

Better condition assessment

The Defra biodiversity metric uses a condition assessment method developed for the Farm Environment Plan (FEP) (Natural England 2010). It is a sub-optimal method for several reasons including that some of the criteria bear little relation to ecological indicators (for example storage of machinery in a woodland) and the FEP method is unlikely to be able to detect statistically significant change in vegetation communities. In addition, there is a great deal of evidence that different habitat surveyors classify the same habitats differently (Cherrill 2014). Presumably the same variability is true of condition assessment. Hopefully the promised updates to the condition assessment method for use with the revised Defra metric will fix these defects (Natural England 2018) but should condition assessment techniques go further? There are relatively simple steps that may be adopted to ensure habitat survey design is better able to detect ecological change (Fuller *et al*. 2016). However, this will require ecologists to be better trained in standardised sampling and statistical testing. Effective offsets depend on securing an uplift in habitat condition, therefore this must be a desirable standard to aim for.

Democratising the process

If we fear the misapplication of biodiversity accounting tools by those using them 'behind closed doors', then surely we should democratise the process by mandating that the outputs of calculations are always published. Further still, planning authorities could establish, for a relatively modest investment in survey work, the baseline metric value of land allocated for development in their local plans. This information could be made available for public and professional scrutiny. Compensation expectations would be known in advance of any development and the feasibility of those compensation plans (or otherwise) would be contestable. The costs involved in survey could be recouped through the planning process.

Time to target condition and creation difficulty

The Defra metric uses multipliers to adjust the habitat compensation requirement based on how long it takes for new habitats to reach their target condition and how difficult they are to create. Use of these multipliers radically affects the offset requirement. For example, a shorter time-to-target estimate results in a reduced offset requirement. The evidence to substantiate these estimates seems to be absent from Defra guidance. There is no apparent consideration of how soil type, hydrology and available management skill, among other factors, affect time to target and difficulty of creation. Further academic research is required on this subject area but it could start with a meta-analysis of the published habitat creation literature. This may result in revision of the list of habitats that we consider irreplaceable (at least in practical terms).

New natural habitat types

The Defra biodiversity metric replicates one of the most enduring hallmarks of British

nature conservation: that habitats have a 'set point' condition and must be returned to that condition through appropriate management to be in favourable condition. Perhaps it is time to question whether this is a valid philosophy in a world where the climate is changing and new 'natural' communities are emerging which incorporate a greater proportion of exotic species (Thomas 2017). Does this philosophy hold true where non-intervention and wilding – without a predefined 'set point' – are favoured conservation objectives (see https://www.rewildingbritain.org.uk/, Tree 2018) The Defra metric must be able to adapt to situations where we accept that people and communities should justly be allowed to dictate the nature in their environment, rather than expert ecologists. The list of habitat and distinctiveness bands used by the Defra metric (and its successors) should be kept under regular review. New high distinctiveness categories in habitat classifications should be allowed for.

Conclusion

Biodiversity Net Gain is about much more than accounting metrics, but metrics have captured the attention of businesses and decision makers and are soon to be encouraged by Government policy. They are here to stay and we need to work to that agenda. The risk of metric mis-use is real and may be inadvertent or even deliberate. A system of checks and balances is needed to counter this.

This system of checks and balances must address six key issues.

- Standards in botanical and habitat survey competence must be improved.
- A system of audit for those undertaking assessments must be devised and instigated.
- There should be greater use of quantitative methods to validate the condition improvements forecast by metrics.
- The outputs and workings behind biodiversity calculations must be made publicly available.
- There should be increased research into the 'time to target' and 'difficulty of creation' estimates to ensure that they are realistic.
- Finally, society's aspirations for nature conservation are evolving and nature itself is changing in response to a changing climate. Successful biodiversity accounting must be able to recognise and accord appropriate value to new assemblages of species and habitats, including those with no pre-defined final condition state.

There is an old cliché about models (of which metrics are a type) which is – 'rubbish in, rubbish out'. The output from models can only ever be as good as the quality of the data that is input. We need to manage the risks associated with greater use of biodiversity accounting tools. To do that, we need to take a long hard look at how habitat information is collected and analysed, and work hard to regulate and improve standards.

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One Policy, Many Metrics: Comparing Different Metrics Because the Maths Matters

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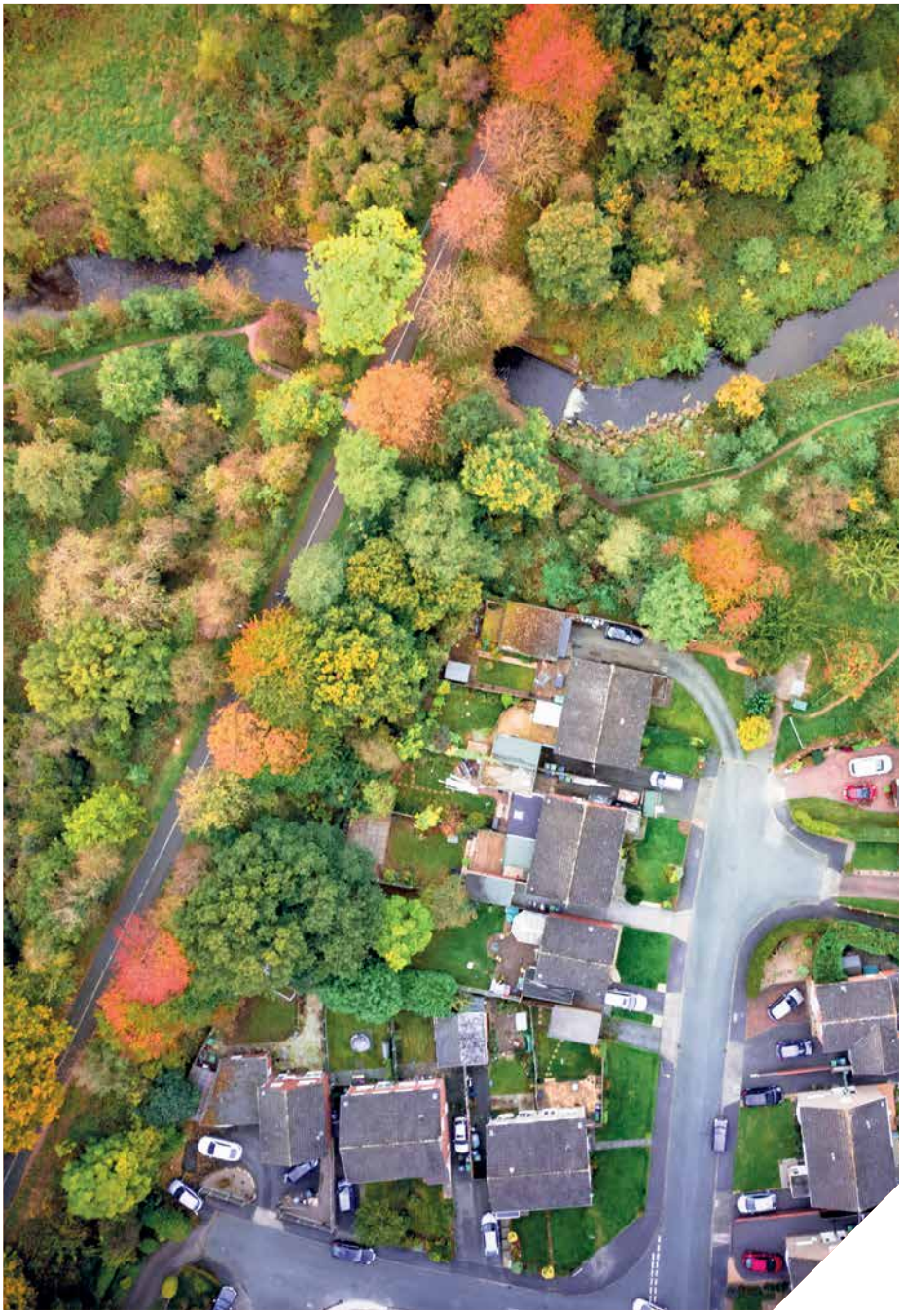
Keywords: biodiversity accounting, biodiversity metrics, biodiversity offsetting, development, habitat distinctiveness

Net gain policies and the use of biodiversity metrics are on the rise. Most of us ecologists chose to be ecologists because we are drawn to cuddly critters outdoors rather than the fastidious and fiddly world of spreadsheets, so it's easy to forget that the seemingly simple maths at the heart of metric tools can have real world outcomes. Several metrics have been developed to meet the specific needs and situations of public bodies, local authorities and developers in England. Here we compare some of these metrics to illustrate how subtle differences in the metrics can influence the biodiversity balance sheet. This article does not attempt to judge whether any particular approach is 'best' of those currently in use; it simply signals that there can be substantive differences in units and the requirements placed on developers depending on which metric is used.



Net gain and metrics

Since the introduction of biodiversity offsetting to the UK, there has been increasing recognition that Biodiversity

Net Gain is a policy approach that could contribute to creating ecological benefits from development (Ministry of Housing, Communities and Local Government 2018, HM Government 2018).

Achieving genuine net gain relies on an objective method for measuring some proxy for biodiversity in a transparent and replicable way. Biodiversity metrics are simple conceptual tools for doing just this. They attempt to represent the complexity of nature using tangible values through a calculation based on factual survey data. When supported by underlying good practice in respect of habitat equivalence and additionality (CIRIA, CIEEM, IEMA 2016), the calculation of losses and gains can then be used by non-specialists to inform better decision making.

In the UK, the biodiversity metrics used to-date are habitat rather than species orientated. Defra's Biodiversity Offsetting Metric 2012 (Defra 2012) is perhaps the best known and most widely used. Its introduction set the precedent for similar metrics used by HS2, Network Rail's Biodiversity Calculator (NRBC), the Warwickshire, Coventry and Solihull Biodiversity Impact Assessment Tool (WCSBIA), and the forthcoming update to the Defra biodiversity metric that Natural England will be publishing in the near future (Defra 2018).

These metrics are broadly similar in the method of calculation, multiplying values of habitat distinctiveness, condition and area to produce a figure of pre-construction biodiversity value. Post-construction biodiversity value is calculated in the same way, i.e. multiplying values for habitat distinctiveness, target condition and area, with negative multipliers for time to reach target condition, delivery risk and spatial relevance.

Despite their similarity, each metric takes a subtly different approach. Ultimately this reflects the context in which they were intended to be used. Both Defra methods are designed to be used across the breadth of England and in a range of infrastructure projects. Other metrics have been developed with a greater degree of relevance to their situation. Network Rail's Biodiversity Calculator was designed specifically for rail projects, most of which occur almost entirely within the rail estate. HS2's metric was developed specifically for the scheme and the circumstances unique to such a large-scale, linear infrastructure project. In contrast, the WCSBIA metric was designed with local conservation priorities in mind and use at County scale.

Despite the increasing application of a Biodiversity Net Gain approach to development, the UK metrics have rarely, if ever, been openly compared. The nuances of each metric mean that the net balance of biodiversity has the potential to vary quite significantly depending on which is used. This is an important issue because a net gain approach must be transparent in order for stakeholders to have faith in the process and so that genuine benefits to biodiversity can be attained.

An exercise was carried out to compare four biodiversity metrics currently used in the UK:

1. Defra's Biodiversity Offsetting Metric 2012
2. HS2 Phase 1 Biodiversity Offsetting Metric (HS2 2015)
3. Network Rail's Biodiversity Calculator (Version 5.10)
4. The Warwickshire, Coventry and Solihull Biodiversity Impact Assessment (WCSBIA) Tool (Version 19.0).

In comparing these metrics, we aim to highlight the similarities and differences in how net gain is calculated in three areas: off-site habitat creation, distinctiveness and condition values, and trading-down corrections. The comparison is not exhaustive and there are several facets of these metrics which add to the variation in Units but are not discussed. In identifying these points, we hope to emphasise the importance of the sums with the aim of making the Biodiversity Net Gain process more transparent.

Comparing the metrics

For each metric, there are two distinct types of inputs: user-specified values and metric-specified values. User-specified values are those where there is more than one value option to choose from and this is defined by the person using the tool. An example is choosing whether a semi-natural woodland is of Good, Moderate or Poor condition. The person inputting the values reviews the survey data and chooses the appropriate option.

Metric-specified values are fixed within the metric tool itself or by metric rules and cannot be changed or edited by the user. The spreadsheet tools for the NRBC and WCSBIA, for example, have automatic formulae, drop-down boxes and restricted cells that cannot be overwritten or changed by the user. These values are entirely metric-specified and vary between the two. A metric-specified value common to all metrics would be lowland beech-yew woodland, which is automatically defined as high value.

Calculating offsets

Maths is at the heart of the metric-based net gain approach and to understand the metric outputs we need to understand the equations. The order of the calculation matters because subtleties within them can cause quite different outcomes. At its most basic we can say:

Biodiversity Net Change = After Works Units – Baseline Units

When we expand this to include the multipliers, all the metrics are consistent in their approach to calculating on-site units, but approaches differ for offsets (i.e. off-site habitat compensation). Two schools of thought begin to emerge from the metrics we looked at: whether to deduct baseline Units before negative multipliers have been applied, or after (Box 1).

The Defra 2012 metric guidance is somewhat vague on this and it is easy to see how it has been interpreted differently in different metrics. The worked example in the Defra 2012 guidance does at least show their line of thought: baseline Units are subtracted before negative multipliers are applied (Equation 1, Box 1). This is the approach taken in the NRBC and some of biodiversity offsetting pilot study areas. The alternative approach (Equation 2, Box 1) has been taken up in other metrics used by HS2, WCSBIA, The Environment Bank and provisionally used in Defra 2.0 (Natural England 2018).

The difference this makes is best illustrated through the worked example in Box 1. Using Equation 1 to calculate the value of offsets, the habitat creation scheme would be predicted to result in a 66% net increase in Biodiversity Units. An equivalent increase in Units using Equation 2 would require a commitment to achieving a 'Good' target condition (3) and an increased area of

Box 1. Calculating off-site offsets

Equation 1

Biodiversity Net Change=

$$\frac{((\text{After Works Distinctiveness} \times \text{Condition} \times \text{Area}) - \text{Baseline Biodiversity Units})}{(\text{Delivery Risk} \times \text{Time to Condition} \times \text{Spatial Risk})}$$

Equation 2

Biodiversity Net Change=

$$\left(\frac{\text{After Works Distinctiveness} \times \text{Condition} \times \text{Area}}{\text{Delivery Risk} \times \text{Time to Condition} \times \text{Spatial Risk}}\right) - \text{Baseline Biodiversity Units}$$

For example, an off-site habitat compensation scheme will create one hectare of unimproved grassland (High distinctiveness, 6) with a Moderate target condition (2). This will replace one hectare of poor semi-improved grassland (Low distinctiveness, 2) in Moderate condition (2). The new unimproved grassland is of Medium delivery risk (1.5), will take 20 years to reach its target condition (2) and is spatially well connected to the habitat it is replacing (1).

The pre-construction value of the poor semi-improved grassland habitat is calculated as:

$$2 \times 2 \times 1 = 4 \text{ Biodiversity Units}$$

In Equation 1, the net change is a positive increase of 2.66 Units, calculated as:

$$\frac{((6 \times 2 \times 1) - 4)}{(1.5 \times 2 \times 1)} = 2.66 \text{ Biodiversity Units}$$

Using Equation 2, there is a net balance of 0 Units. There is no net loss in Units, but no net gain either, calculated as:

$$\left(\frac{6 \times 2 \times 1}{1.5 \times 2 \times 1}\right) - 4 = 0 \text{ Biodiversity Units}$$

0.35 ha, i.e. a third extra land or habitat needs to be acquired or managed.

Defra's net gain public consultation suggests that Biodiversity Net Gain may be identified as an increase of at least 10% above the baseline value (Defra 2018), which in this example would mean a positive increase of 0.4 Units. Using an Equation 1 metric, this could be reached with 0.5 ha of the created unimproved grassland in Moderate condition. Using an Equation 2 metric hitting the same net gain target needs a minimum 0.75 ha of Good condition habitat, again a third extra in both area and condition for the same result.

Distinctiveness and condition

A less subtle difference between the metrics is that both user- and metric-specified values differ between them. The WCSBIA, for example, uses five distinctiveness scores (2, 3, 4, 5, 6) compared to three in the Defra 2012 and NRBC (2, 4, 6) and four in HS2 and (anticipated) Defra 2.0 (2, 4, 6, 8) (Natural England 2018). High distinctiveness habitats are rarely encountered on most developments and throw up an entirely different set of issues to those discussed here. However, three common habitats do warrant some discussion because of their prevalence and lack of other legislative protection. Dense scrub is valued Medium-low (3) in the WCSBIA and Medium (4) in the other metrics, amounting to a 25% difference in the Biodiversity Units available for this habitat depending on which metric is used. Similarly, tall ruderal vegetation is valued as Low distinctiveness (2) in the NRBC, HS2 and Defra metrics and Medium-low (3) in the WCSBIA, a 25% difference in the Unit outcome of this habitat. Poor semi-improved grassland was considered to be of Medium (4) distinctiveness by HS2, but valued Medium-low (3) in the WCSBIA and Low (2) in the NRBC, again resulting in a 25-50% difference in the Unit score that this habitat will contribute to the biodiversity balance sheet.

Applying condition values can also exacerbate the differences between metrics. The Defra 2012 metric used the Farm Environment Plan (FEP) Manual (Natural England 2010) as the basis for its condition assessment. However, the consensus now is that it is not particularly suitable for this purpose, with many habitats typically encountered on development sites either not included or covered inadequately, particularly for Low distinctiveness habitats.

A creative method for getting over this issue was devised for use with the NRBC. This bespoke method uses a default condition assessment derived from common themes in the FEP (e.g. presence of non-native invasives) (Network Rail 2017). Other metrics have removed the variable condition weighting of habitats altogether. The HS2 metric gives all Low distinctiveness habitats an automatic Poor condition, '*recognising that condition has a negligible effect on the overall value of those habitats*' (HS2 2015). The WCSBIA takes a similar stance, using metric-specified condition multipliers for some Low distinctiveness habitats. In these three metrics, again we begin to see differences emerging in how the Biodiversity Unit score might vary between them. A patch of arable land would have a standard Poor condition (1) using the WCSBIA or HS2 metrics and up to Good condition (3) using the NRBC, a difference of up to 66% depending on the flexibility of the metric. Similar variation will also occur in the post-construction calculation with the time to reach target condition multiplier. An interesting point drawn from HS2's metric is that creating habitat of High distinctiveness was capped at a Moderate (2) condition, limiting the overall value of much of their compensatory habitat. By contrast, other metrics do not enforce

a condition cap in the same way. It is understood that a new bespoke condition assessment is under development for use with Defra 2.0 which may use five condition values (1, 1.5, 2, 2.5, 3) (Natural England 2018) and this may level the playing field with a consistent protocol for describing habitat condition.

Trading down

One of the key net gain principles is of equivalency in habitat compensation. High distinctiveness habitats cannot be offset with the creation of habitats of lower value. The loss of one hectare of unimproved grassland, for example, should not be replaced with larger areas of habitats of lower distinctiveness such as semi-improved grassland or dense scrub (i.e. trading down). However, this then raises the question of what to do when a project does result in trading down. A facet unique to the WCSBIA tool is that it includes an automatic 'trading-down correction', which the others do not. The WCSBIA calculates the net change in Biodiversity Units and then deducts the number of Units that are not accounted for through equivalency. While all other metrics should apply a similar correction, it is not automatically deducted so without skilled interpretation the metric tools can appear to allow trading down to occur without penalty. This can make the WCSBIA appear to be far less favourable than other metrics where equivalency can be poorly accounted for.

Conclusion

It is difficult to disentangle the extent that these differences contribute to the overall variation that we see between the metrics. There are, of course, many other idiosyncrasies not discussed here that add to the variation. The specifics of the site and situation where a metric is used will no doubt contribute to any disparity. What is clear is that the individual metric rules that account for distinctiveness and habitat condition, together with trading down and differences in the calculation itself, will all contribute to the overall Unit variance between metrics.

In a comparison like this, subtle differences like those outlined above may seem innocuous at first glance. However, we need to recognise that Biodiversity Net Gain strategies do affect real-life projects. A third extra habitat may equate to a third extra cost, which on large developments can be substantial. In the Defra 2.0 metric consultation, an indicative tariff rate of £9,000 – £15,000/Unit was estimated (Defra 2018b). With this figure in mind, we can see that calculating Biodiversity Units inaccurately, or using an unsuitable metric, can lead to substantial differences in the cost of offsets, with the total sum scalable to the size of the project. Using an inappropriate metric could be bad news for project balance sheets if excessive costs result from over-compensation, but even worse news for biodiversity if it results in failure to deliver genuine net gain. Such large differences in Units don't only translate to cash but also to the biodiversity outcomes that we, as an industry, are trying to promote through Biodiversity Net Gain policies.

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Biodiversity Net Gain Must Lead to Proper Biodiversity Restoration at Scale

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The Environment Bank Ltd

Keywords: biodiversity, net gain, offsetting, restoration economy

After detailed consultation, the Government has announced that Biodiversity Net Gain is to be made a mandatory requirement of the planning system. It is essential that we use the opportunity to restore biodiversity and not to 'prettify' development.

I introduced the concept of compensation via biodiversity offsetting and mitigation banking into the UK in 2007 because I was concerned at the way biodiversity was treated within the planning and development sector. The ecological consultancy profession has spent decades working for developers to secure permissions but the evidence for the success of mitigation designs is poor. Mitigation schemes where small pockets of 'nature' are kept within the red line boundary of the development have been used to justify 'no significant effect of the development'. I know, because I also had to design these schemes and then defend them at public inquiry!

Proper and effective net gain can only be achieved if much of the gain is delivered outside of the development boundary – on newly created and managed sites set up specifically to restore the UK's biodiversity.

Planning authorities currently have the ability to require developments to deliver Biodiversity Net Gain through the revised National Planning Policy Framework (NPPF). Yet few authorities are using that facility to discharge their legal duties for biodiversity. Now that Biodiversity Net Gain is to be mandated, all planning authorities will require Biodiversity Net Gain to be delivered from all relevant development and the first step is to ensure that they either have relevant policy in their Local Plans or use supplementary planning documents (see examples at http://www.environmentbank.com/files/eb-planning-toolkit-england-march2017.pdf).

In addition to the NPPF, net gain requirements also feature in the Government's 25-year Environment Plan (HM Government 2018). Compliance with the Plan will depend upon a robust mechanism for delivery across the country and it will be essential that planning authorities apply the rules consistently as and when they are introduced. Some developers are requesting that net gain should be for natural capital in its entirety rather than just biodiversity, believing that they can 'trade' natural capital gains through such features as SUDS, balancing ponds, hedge and tree planting (for carbon sequestration) at the expense of biodiversity, giving an overall net gain in natural capital but where, as ever, biodiversity loses out. This cannot be allowed to happen. Some developers are also including gardens within housing developments as features that, they argue, raise the biodiversity value of the land from the intensive farmland on which the houses are built. Whilst I agree these areas might be better in some respects than industrially farmed land, I do not believe one can integrate wider-countryside biodiversity conservation within a housing estate.

I am sure some will not agree with me on this point but, clearly, the system would be improved if we had: a) proper and appropriate assessment of the value of genuine biodiversity gain within the development scheme, so that developers receive pragmatic advice but where our duty to biodiversity overrides our duty to the developer client, and b) much greater capacity and consideration on the part of planning authorities to require good quality Biodiversity Net Gain. If developers truly understood the economic value to their business and to biodiversity of off-site provision, they would not be persuaded that within-site delivery actually works for biodiversity at any meaningful scale. It simply does not.

Some of my most recent work comparing on-site versus off-site costs has revealed that only a very small amount of the required Biodiversity Net Gain can be delivered on-site without impacting on the development's viability and creating huge costs. The use of development land for Biodiversity Net Gain at the average development land values, and the reduction in net developable area that results, suggests that a 100 ha housing scheme, delivering 20% of the Biodiversity Net Gain requirement (at 10% gain rate), would cost the project £150 million in land value and lost revenue. By contrast it would cost just under £4 million to deliver the entire Biodiversity Net Gain requirement for the housing scheme off-site via habitat banking.

Manifesto for effective biodiversity conservation

1. **Mandatory Net Gain**. Making Biodiversity Net Gain a mandatory requirement of the planning and development system in England, as announced by the Chancellor in his Spring Statement (March 2019), and as originally recommended by the Ecosystem Markets Taskforce in 2013 (Ecosystem Markets Taskforce 2013), will facilitate a transformational change in

how development addresses biodiversity impacts. Not only will a mandatory system provide consistency, clarity, and a level playing field for developers, it will encourage investors to generate a market in offset site provision. The role of the local authority ecologist will gain prominence as Biodiversity Net Gain becomes a key factor in whether planning permission is granted.

2. **Use the Defra metric**. Each development to be required by the planning authority to have its impact measured in biodiversity units, assessed using the Defra biodiversity impact accounting metric which takes account of off-site provision through the deployment of appropriate spatial strategy maps (http://publications.naturalengland.org.uk/publication/6020204538888192). Locally based offset sites will provide greater gains for communities than a nationally focussed scheme.
3. **Balancing on-site and off-site provision of Biodiversity Net Gain** to be weighted towards off-site provision. Allow for some retention and mitigation within the development red line boundary using the mitigation hierarchy in a practical – not theoretical – way but only where this makes a proper contribution to biodiversity conservation. Given the constraints of delivering effective biodiversity restoration within the development site boundary, an 80:20 ratio of biodiversity gain between off-site (offsets) and on-site provision would have merit. Arguably, the 20% on-site provision should exclude landscaping, tree planting, SUDS, etc., which are features incorporated to make a development look more attractive to prospective purchasers or users rather than to protect biodiversity. Off-site provision would be beneficial to the developer in maximising net developable area and reducing ongoing, long-term management liability for biodiversity on-site, which currently developers very rarely achieve.
4. **Governance**. Regular auditing of on-site Biodiversity Net Gain required by the planning authority (or an environmental governance body) from the start of development work and continuing for at least 25 years once completed/occupied, to ensure that within-site net gain is delivered and maintained. This should be underpinned by an insurance policy paid for by the developer to rectify deterioration or failure to deliver according to the management plan for the habitats retained within the development site. The developer would also enter a delivery contract with the planning authority or other independent body to cover the cost liability for 25 years or more. Failure to deliver and/or to rectify failure should be subject to a significant 'fine', the proceeds from which would be used to restore and manage the site.
5. **Inspection.** All planning authorities to be inspected regularly by an environmental governance body who would visit a random proportion each year to assess how their schedule of developments are achieving Biodiversity Net Gain both within-site and off-site. Any planning authorities found to be failing would be put into 'special measures' in order to generate improvements in their monitoring and enforcement of biodiversity policy. The key point is that on-site net gain and off-site provision should be subject to the same requirements and conditions.
6. **Off-site provision** of Biodiversity Net Gain to be achieved either through bespoke offset sites established with local farmers, landowners and conservation bodies as the delivery agents, or through the purchase of 'conservation credits' from larger, spatially cohesive habitat banks. As with bespoke sites, the establishment of habitat banks on farmland would be facilitated by brokers with appropriate expertise, where conservation credits generated from the banks are sold to developers and the delivery agents paid in return for meeting the objectives of biodiversity management plans. Habitat banks are a cost-effective way for all sizes of development to deliver Biodiversity Net Gain.
7. **An environmental governance body** should provide:
    a. an inspection function on planning authorities to assess how they are delivering their biodiversity duty
    b. an inspection function on developments to ensure on-site net gain is being delivered and to levy fines on those that are found to be failing, in the absence of planning authority-led enforcement
    c. an accreditation facility whereby brokers can receive accreditation that guarantees they operate on the basis of established standards incorporated into their business model
    d. accreditation of bespoke offset sites and habitat banks based on delivery standards.

Environmental governance could be a role for the Environment Agency or Natural England, or the proposed new environmental watchdog – the Office for Environmental Protection.

With the above infrastructure, Biodiversity Net Gain from development would generate the degree of funding necessary to have a transformational impact on how biodiversity is viewed within the planning system and how biodiversity is restored at scale in the wider countryside.

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North Stoneham Park illustrative layout. Image credit Highwood Group.

Practical Considerations for Achieving Biodiversity Net Gain at the Site Level

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Keywords: Biodiversity Net Gain, collaborative working, development, health and wellbeing, open space, sustainable drainage

Achieving Biodiversity Net Gain on development sites, alongside wider, often competing policy and legislative requirements, can be challenging. This article discusses the potential opportunities for integrating biodiversity enhancements with wider outcomes and provides examples of developments where multifunctional landscapes have been established.

Introduction

There is an increasing focus on achieving Biodiversity Net Gain (BNG) as a consequence of development, illustrated by the Chancellor's announcement in his Spring Statement that he intends to mandate it. Whilst this promises to present a wealth of opportunities for wildlife and nature, it also comes with a number of challenges. Not least among these will be the need to convince some less engaged developers of its merits and deliverability in the short term, until mandatory Net Gain is adopted. This is particularly true on smaller sites and where other concessions on developable area are already required to meet wider planning requirements. Flood storage capacity, public open space, community infrastructure and parking are just some examples, each of which come with their own space and resource requirements, potentially making overall site viability a concern. The commitment to achieve BNG therefore puts a renewed emphasis on the need for ecologists to work together with wider disciplines to create efficient and multifunctional spaces that complement the built environment and deliver across a range of policy agendas.

This article discusses some common demands for space within a development site, how they present an opportunity for BNG, the potential conflicts, and a list of key considerations for each.

Sustainable drainage

Sustainable Drainage Systems (SuDS) are a method of managing surface water run-off from development sites to minimise flood risk and water pollution. The SuDS Manual (Woods-Ballard *et al*. 2015) outlines how successful schemes can provide diverse benefits including the provision of clean water, making developments attractive

to people, climate change resilience and space for wildlife.

In purely quantitative terms, the potential biodiversity gains from SuDS are high because drainage systems often require large areas of open, green space. SuDS will return a high number of biodiversity units per hectare from Defra's biodiversity metric (Natural England 2018) because wetland habitats typically score well for distinctiveness, difficulty of creation and time to target condition (assuming appropriate design and management). Baker *et al.* (2019) make it clear that BNG assessment must be qualitative as well as quantitative, highlighting aspects such as ecological connectivity and local ecological networks. By their nature, SuDS often contribute to connectivity, for example where larger features such as ponds and basins are located to the edge of a site to enable outfall to local watercourses, and linear features such as swales within green infrastructure support connectivity through developments (Box 1).

Box 1. SuDS and open space – North Stoneham Park, Eastleigh, Hampshire

North Stoneham Park is a mixed-use development including c.1,300 homes occupying land that was previously a mix of grazing land and sports pitches. The design prioritised landscape and biodiversity gains, with the masterplanning stage assessed under BREEAM Communities (https://www.breeam.com/discover/technical-standards/communities/). Central to the development is a large swathe of open space which runs north to south through the site, acting as an extension to Avenue Park to the north – a Site of Importance for Nature Conservation (SINC). A drainage network had to be incorporated into the area to cross the open space. Rather than use pipes, drainage was designed as a network of swales to create a wetland habitat rather than further neutral grassland. Several large, dry storage basins were created in open areas, enabling permanently wet ponds to form where space was limited. Permeable paving was used in places (where natural features were impractical) to provide an additional source-control measure to treat water before it entered these features, improving water quality. Further local biodiversity gains came from an extension to the nearby Lakeside Country Park that aimed to restore an area of wet grassland and remove invasive species.

Example of SuDS basin with permanently wet central channel to maximise biodiversity gain. Photo credit Steve Akehurst.

However, the principal purpose of SuDS is to manage flood risk and water quality, which may lessen the value of these schemes for biodiversity. For example, a dry basin may be needed for storage of floodwater even though a pond would provide greater biodiversity gains. Drainage features will also suffer from lower water quality than those designed specifically for biodiversity. When using a metric, it is unlikely that a high target condition can be achieved unless there are sufficient intervening water treatment stages. Some useful guidance on designing SuDS for biodiversity is provided by Woods-Ballard *et al*. (2015) and Graham *et al*. (2012). For example:

- Use more natural treatments such as rain gardens and filter strips (vegetated depressions which trap sediment and pollutants) rather than engineered solutions such as permeable paving
- Make sure there are sufficient wastewater treatment stages to maintain high water quality within SuDS features, particularly ponds and basins
- Locate features near development boundaries to contribute to the local ecological network where appropriate
- Include permanently wet features, not just dry basins
- Develop and implement a suitable long-term management and monitoring regime.

Public open space

The provision of public open space is a common requirement for development, typically covered by local planning policy, which can occupy a significant part of a site. The area required varies between local authorities. For example, New Forest District Council require a minimum of 3.5 ha of open space per 1,000 population (New Forest District Council 2018) whereas Tendring District Council in Essex require at least 10% of the gross site area to be provided as public open space (Tendring District Council 2008). This represents another opportunity to provide biodiversity gains.

The objective of BNG is to leave biodiversity in a better state post-development than before. Rather than leave a sterile development with off-site gains, higher-value habitats contributing to local objectives should be incorporated into the design of open space. This might include the creation of community orchards or replacing amenity road verges with species-rich grassland. There is the potential for the intended use of public open space to conflict with biodiversity objectives. For example, public recreation may disturb sensitive species and cause habitat degradation and erosion along informal paths. There is also the need to consider public safety (e.g. avoiding trip hazards, removing unsafe trees). Design can help with this, for example areas of longer grassland or scrub can be used to deter access from features of high wildlife value which may be less tolerant of disturbance. It may also be appropriate to use surfaced paths in places to direct access. Like SuDS therefore, these areas are unlikely to achieve a high target condition and this risk should be accounted for when planning for Biodiversity Net Gain or mitigated through a robust management

and monitoring plan, preferably secured by legal agreement (e.g. a Section 106 agreement) and delivered by an independent body (such as the Land Trust, thelandtrust.org.uk). The difficulty of managing higher distinctiveness habitats should also be considered. Habitats with complex requirements (such as heathland) may be too costly, or it may be too complicated to reliably achieve the target condition (even with a management plan). On the other hand, higher-distinctiveness habitats may present a cost saving in management. For example, a native species-rich hedgerow cut on a 3-year rotation will be cheaper to manage than a formal hedge requiring several cuts a year.

Even without achieving high condition, open space of medium distinctiveness (for example) will be more valuable than low distinctiveness areas (such as amenity grassland) and may also provide other qualitative benefits such as climate change resilience, mental health and wellbeing, and promoting physical activity (Lester and Maudsley 2006, Faculty of Public Health 2010). Walking routes can provide connectivity through a site, and larger areas of habitat creation can support ecological networks in some circumstances. Individually these gains may be small but taken cumulatively across a site they could provide a significant contribution to achieving an overall net gain. For example, North Stoneham Park (Box 1) includes a total of 15.9 ha of open space. Across this area (assuming low target condition and all other scores and risk factors are the same) an increase from low to medium distinctiveness results in a gain of 26.6 biodiversity units. If medium condition is achieved this increases to a gain of 79.8 units. Thus, although public open space may not be as ecologically valuable as areas of dedicated habitat creation, these areas can still provide an opportunity for biodiversity gains.

Key considerations to maximise biodiversity gains from open space include:

- Target habitats of higher distinctiveness (which meet local objectives) for creation and design at an early stage, and set a target condition which can be reliably achieved (Box 2)
- Design open space to provide connectivity to other natural areas and contribute to local ecological networks
- Engage with adopting bodies such as local planning and highways authorities who may be reluctant to agree to non-standard landscape design
- Develop and implement suitable long-term management and monitoring regimes, preferably through legal agreement (e.g. Section 106 or Unilateral Undertaking)
- Consider habitats or designs which reduce the need for management.

Surfaced path and boardwalk to manage public access through wet woodland and reduce trampling of adjacent habitat. Photo credit Kevin Wood.

Box 2. Public open space – Northbrook Road, Swanage, Dorset

Formerly sheep pasture, this 2.4 ha site was allocated for 90 dwellings. Despite the relatively low biodiversity value of the site pre-development, there was limited scope to deliver BNG. However, a planning requirement for Suitable Alternative Natural Greenspace to mitigate potential recreational impacts on the Dorset Heathlands SPA was delivered on a further 6 ha of grazing land to the north of the site and included within the red line development boundary. This provided an opportunity to maximise biodiversity value through the creation of species-rich meadow, wet grassland and scrub. Large areas of high-value habitat were needed to offset the impacts of recreation and so the layout was designed to direct the public to lower-value areas. Hedgerow reinforcement and new planting will further improve the local ecological network, which is characterised by grazed fields subdivided by gappy hedges.

Species mitigation

Current metrics for Biodiversity Net Gain focus solely on habitats. The provision of mitigation or compensation for protected species will, however, represent more familiar ground for many practitioners. For species such as great crested newts *Triturus cristatus* or hazel dormice *Muscardinus avellanarius,* developments are required to maintain favourable conservation status of the species (both as a material planning consideration and a requirement of European Protected Species Licencing). In addition to direct protection, this is often interpreted as achieving No Net Loss of supporting habitat, either by providing new areas or enhancing sub-optimal habitat.

In principle, this approach aligns well with Biodiversity Net Gain through creating new, high-value habitats and improving the condition/distinctiveness of existing ones. It also represents efficient use of land as required by the National Planning Policy Framework (Ministry of Housing, Communities and Local Government 2019). Where large-scale habitat compensation is required, there is an opportunity to provide links between areas which may previously have been isolated. Achieving net gain in these cases is likely to be easier, although this is not always intuitive (Box 3).

However, there is a potential conflict between species mitigation and net gain, where a species requires specialised habitats of low intrinsic biodiversity value. Careful consideration of species' habitat requirements and local biodiversity objectives is therefore vital as it is feasible that the best outcome for target species does not offer the greatest biodiversity gain.

Box 3. Protected species mitigation – Havant Borough Council, Hampshire

The Draft Havant Borough Local Plan 2016-36 (Havant Borough Council 2018) includes two areas of land which incorporate dedicated winter bird refuges, each occupying 30 – 50% of the site. These are required to avoid adverse effects on the integrity of Chichester and Langstone Harbours SPA and its population of dark-bellied brent geese *Branta branta bernicla*. The optimal refuge habitat for dark-bellied brent geese is a fairly species-poor grassland that does not inherently score highly in biodiversity matrices. However, this habitat still represents a significant biodiversity gain over the existing arable land and in view of the areas involved, achieves an overall net gain for development. The mitigation is funded through developer commuted sums and implemented by the local authority and partner organisations such as the RSPB and Wildlife Trust.

Key considerations to maximise Biodiversity Net Gain from species mitigation include:

- Identification of likely species mitigation requirements early in the planning process and design of net gain objectives to accommodate these
- Maximising biodiversity gains from creation and enhancement whilst taking account of species' habitat requirements (Box 4)
- Making sure long-term management plans take into account measures to protect sensitive species (ideally though management by an independent conservation body)

Public open space located in the area between developments with formal paths to guide access around high-value wetland habitat. Photo credit Kevin Wood.

Box 4. Protected species mitigation – Fair Oak Lodge, Eastleigh, Hampshire

Fair Oak Lodge is a single dwelling set in generous grounds to the south of Fair Oak in Eastleigh, west of Quobleigh Wood in Hampshire. Its baseline value stems from its large, unmanaged rear garden and two adjacent great crested newt (GCN) breeding ponds. A strategic survey for Eastleigh Borough Council found these ponds (along with others located in Quobleigh Wood) supported one of only four metapopulations of GCN in the north of the Borough. Compensation for the loss of habitat following development includes habitat enhancement along the southern and eastern boundaries of the site to maintain connectivity with the woodland and management to improve the condition of a further breeding pond within the woodland. A SuDS system (required to prevent pollution of off-site watercourses) was designed to include swales, filter drains and a large detention basin, which represent gains over the previous species-poor grassland. As part of the development, most of Quobleigh Wood (approximately 6.8 ha) will be transferred to the local authority along with a woodland management plan and commuted sum to pay for long-term management (to be undertaken by the local authority). Although the woodland is currently accessible, this is primarily via boardwalks with the wet conditions within the wood preventing significant disturbance by the public. Improvements to structural diversity and removal of invasive species from the woodland represent a significant quantitative biodiversity gain; however, the qualitative gains are also important. It secures the long-term protection of the GCN metapopulation (which are not common within the borough) and an area of high value habitat which forms an important link to publicly owned open space to the south and west.

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Conclusion

With Biodiversity Net Gain to become mandatory, many developments will most probably be required to create more wildlife habitat. However, this does not necessarily mean that some developments will simply become unviable. There are other land use requirements for development such as drainage and open space which, with appropriate design, can contribute to biodiversity value and synergistically help to achieve Biodiversity Net Gain. The primary functions of these areas must be taken into account, however, which may limit the target condition which can be achieved. It is also important to remember that the best outcome for protected species may not achieve the highest net gain overall. It is therefore vital that Biodiversity Net Gain is considered as early as possible in the planning process, and that ecologists work closely with other disciplines to achieve the best all-round outcome.

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Residential Development and Biodiversity – Uneasy Bedfellows or an Opportunity to Benefit Both People and Nature?

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Keywords: biodiversity, habitats, housing, nature for people, net gain

Photo credit Redrow.

Following recent government drivers and the announcement that Biodiversity Net Gain will become mandatory for new development, there has been a great deal of discussion about how it would work in practice. However, the implications for individual developers are often overlooked. This article reports an initiative by a major house builder to create a company-wide biodiversity strategy that has net gain at its heart but goes further to benefit people as well as nature.

Introduction

Redrow Homes is one of the UK's largest housebuilders with a network of 15 operational divisions across England and Wales. Since mid-2017, they have been working with SCN Lavalin's Atkins business examining how a Biodiversity Net Gain approach could be included in their national biodiversity strategy. The background work included a retrospective application of the Defra biodiversity metric to a sample of Redrow's development sites. This article shares the findings of this study and explores how Biodiversity Net Gain can be used as a positive platform to shape future residential developments for the better.

A retrospective look

The Defra metric was applied retrospectively to three development sites. The assessment was based on habitat surveys required as part of the original planning application. At two of the sites, Caddington Woods in Luton and Saxon Brook in Exeter, there was a Biodiversity Net Gain after development whereas at the third, Woodford Garden Village (Phase 1) in Cheshire, there was a biodiversity net loss after development. It is important to note that this study was undertaken retrospectively and that none of the developments were designed with Biodiversity Net Gain in mind.

Developments with a Biodiversity Net Gain

Caddington – 325 new homes

The development site was a 10.48-hectare car park surrounded by semi-natural broadleaved woodland, plantation woodland, dense scrub, semi-improved grassland and two ponds. The woodland had good connectivity to a nearby ancient woodland (Badgerdell Wood) to the south east of the site. The Defra metric gave a value of 31.44 biodiversity units pre-development.

The majority of the habitat lost to development was hard standing (existing car park). Other habitat types lost were scrub and semi-improved grassland (also of low value), which contributed to a biodiversity loss of just 3.76 units. The majority of the woodland area was retained and will be managed to enhance its biodiversity value through improving its condition. The two ponds on site were also retained and improved as well as new ponds being created. Newly created habitats included species-rich grassland, semi-improved neutral grassland, ornamental shrub and native shrub planting. Taken together with enhancements to the woodland, there was an on-site gain of 23.79 units giving an overall Biodiversity Net Gain of 20.03 units. This was largely due to the retention and management of the established woodland.

Saxon Brook – 350 new homes

The development site was 17.67 hectares in area, mostly comprising improved grassland. The Defra metric gave a value of 36.26 biodiversity units, all of which was lost as a consequence of development. Although the majority of the mature trees on site were retained and 700 new trees were planted post-development, individual trees are not included within the metric calculation.

A variety of new habitats were created including species-rich wildflower meadows, native woodland and orchard trees, new ponds with emergent and marginal

New ponds and planting maturing at Saxon Brook, near Exeter. Photo credit Redrow.

vegetation, and marshy grassland, all of which contributed to the post-development value of 41.74 units. Overall, this represented a Biodiversity Net Gain of 5.48 units. In addition, a stream on site was retained and extended and new hedgerows were planted, both providing a net gain in linear features.

Woodford Garden Village Phase 1 – a biodiversity loss

This former private airfield and aircraft factory site covers an area of approximately 200 hectares and is a phased development. For the purposes of this study, the calculation was only undertaken on the Phase 1 works, which covers an area of 10.89 hectares and comprises residential housing (approx. 145 houses), gardens, public open space and access roads.

The site comprises areas of hardstanding and existing buildings, as well as some scrub, semi-improved grassland and a small area of woodland plantation at the northern and eastern edge of the site. The Defra metric returned a value of 5.94 biodiversity units, all of which will be lost during development.

The creation of ponds, species-rich grassland and ornamental shrub planting contribute to the on-site gain of 1.36 units, leaving a net biodiversity loss of -4.58 units. This is largely due to the limited area of the high and medium distinctiveness habitats being created, such as species-rich grassland; they are not large enough to compensate for the loss of medium distinctiveness woodland. This is unlikely to have been picked up as part of the usual EcIA planning process because the mitigation hierarchy was followed, and sufficient habitat creation and enhancements were provided in relation to the whole development to satisfy normal planning requirements. The net loss of biodiversity was only highlighted due to the Defra metric being applied retrospectively and on only one phase of the development.

If the woodland plantation area (0.47 hectares) along the northern and eastern edges of the site had been retained and managed to improve its condition from moderate to good, then an overall net gain would have been achievable for this phase. Importantly, 2 km of new hedgerow has been created and over 400 trees planted as part of Phase 1, which enhance the development but these additional trees are not included in the net gain calculation.

Lessons learnt

For planning purposes, Woodford Garden Village was treated as one large site rather than separate impact assessments being carried out for each phase. Therefore, the biodiversity net loss for Phase 1 should be reviewed in the context of the wider ecological assessment and the total value for the entire site pre- and post-development.

This development was not designed to 'achieve a Biodiversity Net Gain' but nevertheless it does highlight the need for biodiversity to be considered at the earliest opportunity when designing the masterplan.

Going forward, the Defra metric will be calculated for Phase 2 (and future phases) of Woodford Garden Village development to establish if an overall Biodiversity Net Gain can be achieved for the whole development, and the findings of this review will inform the company-wide biodiversity strategy.

A developer's view

As a result of this work, Redrow were able to explore the potential impacts of Biodiversity Net Gain for the business, including purchase of land, the design of developments and supporting processes. Redrow already assess ecological impacts very early on in the purchase and design process, seeking to incorporate high quality habitats into our designs. Achieving net gain will require us to strengthen this approach and focus more on enhancement of habitats, as well as considering how we will compensate for habitats that are lost.

Our planned approach is to use Ecological Constraints and Opportunities Plans to complement the biodiversity 'scores' from the Defra metric and to help make the process more visually meaningful to the design teams. These Plans will show how the scores relate to the habitats on the ground using a traffic light system to help guide initial planning of the development. The colour coding will help teams to easily see where habitats need to be retained and enhanced, and which habitats are more suitable for development.

In addition, work to train teams is already underway, and new specifications are being drawn up for ecological and landscape consultants as well as management companies. Critical to the success of a company-wide Biodiversity Net Gain strategy will be to ensure that design and checking processes are robust so that gains are translated effectively from paper onto the ground.

Beyond Net Gain

A key question for us as a developer was to establish how achieving Biodiversity Net Gain could also contribute to our aim

of creating thriving communities. Clearly, the mandating of Biodiversity Net Gain for new developments has the potential to improve the quality of the environment for any new community. Research shows that high quality, biodiverse green spaces have a positive impact on the health and wellbeing of people accessing them. Our aim is to seek net gains on-site by designing developments in a way that benefits both nature and people, enabling residents to connect with nature in their daily lives. However, careful planning and design will be essential to protect and enhance biodiversity on-site and, in some circumstances, biodiversity offsetting may be a more appropriate option.

New developments can provide important habitats for a range of species and should seek to contribute to existing ecological networks, as well as creating habitats and planting that are locally appropriate. The new Defra metric 2.0 recognises the importance of place and connectivity, although it is deliberately – and rightly – a simple and practical tool. However, we are pursuing a broader approach that incorporates and builds on the metric to ensure that biodiversity gains are appropriate to the location and its surroundings.

To help us achieve this, we have partnered with The Wildlife Trusts to develop a group-wide strategy that is robust and will really deliver for both nature and people. Such partnerships can provide local knowledge and ecological expertise, advising on how to provide high quality, appropriate habitat with good connectivity to existing sites, and may even be able to offer offset sites. They can also promote engagement with the local community and ensure effective long-term management.

Housing development, Biodiversity Net Gain and the future

The government has now committed to mandating Biodiversity Net Gain on all new developments which will help us, and other developers, improve the biodiversity value of landscapes surrounding new communities. It will mean placing a greater focus on biodiversity from initial land purchase through planning, design implementation, management and monitoring – from project inception through to completion and beyond. We believe that our approach of creating a company-wide strategy for biodiversity that is integrated into all aspects of the business will be a successful model to help us achieve nature-rich developments where people want to live. Working in partnership to draw on crucial expertise, as well as providing staff training and sharing information across teams and external consultants, will help the housing industry play an important role in protecting and enhancing biodiversity for the future, and allow us to create great places to live.

Natural spaces and people in residential development. Photo credit Redrow.

Redrow has established a Biodiversity Working Group consisting of representatives from across Redrow's teams as well as The Wildlife Trusts and the Bumblebee Conservation Trust, with whom we also have a long-standing partnership. The Working Group has been reviewing current biodiversity practices in the business and has drafted a new 'Nature for People' strategy which has three main themes: Gains for Nature, Rewilding Lives and A Flourishing Legacy. This draft strategy is now receiving input and feedback from all 15 Redrow divisional planning and technical teams and will also be reviewed by the Wildlife Trusts before its release in summer 2019.

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Biodiversity Net Gain – A Scottish Perspective

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Figure 1. Spittal substation development, Caithness. Photo credit SSEN.

In Scotland, the adoption of the principles of Biodiversity Net Gain to address the loss of biodiversity has been less widespread than in the rest of the UK. Awareness and experience of Biodiversity Net Gain is generally low amongst regulatory bodies, practitioners and developers. This presents an opportunity for industry to take the lead in Biodiversity Net Gain implementation. However, during trials of the Defra metric by Scottish Hydro Electric Transmission, limitations have become apparent when assessing biodiversity value. For example, default condition scores are inaccurate for some widespread habitats such as conifer plantations or peatland; habitats of 'irreplaceable value' are common; the water environment is not accounted for; and constraints imposed by policy such as the Scottish Woodland Removal policy can be a hindrance to achieving net gain. Also, the restoration of some habitats, such as peatland, score poorly due to the length of time it could take.

This article suggests how these issues might be overcome through a commitment by developers and regulators to achieving Biodiversity Net Gain in Scotland as well as engagement with stakeholders to develop an accepted metric and toolkit.

Biodiversity Net Gain in Scotland

The Biodiversity Net Gain (BNG) approach to mitigate potential impacts from development is not as well developed in Scotland as in the rest of the UK. Generally, there is relatively little awareness amongst most stakeholders about what the approach entails, how it can be achieved and the benefits that can follow. There is no current regulatory or policy requirement for developments specifically to achieve BNG, although the need to enhance biodiversity during development is recognised. As such, efforts to address loss of biodiversity using the BNG approach are at present purely voluntary. Consultation and information sharing amongst practitioners, statutory bodies and conservation bodies is urgently needed to bring consistency and a wider acceptance of BNG in Scotland.

A small number of regulated businesses across Scotland have begun to explore the use of BNG assessments (Box 1). As well as the need to carry out development responsibly, there is a requirement for public and regulated bodies in Scotland to conserve biodiversity whilst undertaking operations (as detailed within the Nature Conservation (Scotland) Act 2004) and to fulfil the reporting requirements of the Wildlife and Natural Environment (Scotland) Act 2011 (WANE Act).

Scottish and Southern Energy Networks (SSEN) is comprised of two businesses: Scottish Hydro Electric Transmission plc (SHE Transmission) and Scottish Hydro Electric Power Distribution (SHEPD). SHE Transmission is the Transmission licence holder in the north of Scotland and owns, maintains and operates 5000 km of overhead line and underground cable above 132 kV as well as numerous substations. Due to the increase in renewable energy generation capacity in the north of Scotland, primarily due to wind generation (off-shore and on-shore), there has been a significant increase in the grid infrastructure required to export the power to centres of need. In providing this infrastructure, SSEN acknowledge our responsibility to protect the natural environment and to add value so that BNG is achieved (see Box 1).

Box 1. Scottish and Southern Electricity Networks' Sustainability Plan

SSEN have committed to delivering Biodiversity Net Gain for all projects by 2025 as one of six main goals in their Sustainability Plan:

'To positively contribute to the UN and Scottish Government biodiversity strategies, we aim to achieve an overall 'No Net Loss' on new infrastructure projects gaining consent in 2020 onwards and achieving Net Gain on projects gaining consent in 2025 onwards. This will involve developing Biodiversity 'Net Gain' assessment guidelines and a terrestrial tool to calculate biodiversity units pre- and post-development for all new capital development projects over the coming year. These procedures will be incorporated into environmental impact assessments and construction contracts during 2019 to achieve our target from 2020 onwards.'

Using the Defra metric in Scotland – the SHE Transmission experience

To encourage wider acceptance of biodiversity accounting and a greater commitment to Biodiversity Net Gain, SHE Transmission trialled the 2012 Defra metric on five substation sites across the Highlands to assess its applicability to the Scottish landscape (Defra 2012). Subsequently, we have committed to working towards No Net Loss (NNL) on our development sites by 2020 and BNG by 2025. The phased approach has been adopted because Scotland-specific tools and systems are not yet available, either internally or in Scotland in general. Further, we need to learn how to deliver BNG for projects which don't always easily lend themselves to this approach, such as overhead power lines where we don't own the land on which assets are located (Box 2). In addition, our current investment period does not include funds for delivery of BNG.

It is important to adopt a consistent approach that is accepted by stakeholders throughout Scotland. SHE Transmission is engaging with key stakeholders and working with interested parties on a toolkit that better suits the habitats and species that occur in Scotland so that BNG can be achieved across a broad suite of habitats.

An initial pilot project was carried out in 2017 using the 2012 Defra metric (Defra 2012). Four large high voltage substation development sites were assessed at Spittal near Thurso in Caithness; Tomatin, Highlands; Stornoway, Western Isles; and Fort Augustus, Highlands. The first site, Spittal (Figure 1), was a new HVDC/AC substation development where works had

Box 2. Balancing woodland loss and biodiversity – the special case of overhead lines

There can be challenges in achieving Biodiversity Net Gain for sites where there is a presumption in policy against the net loss of woodland cover (this is most often an issue in relation to commercial conifer plantations). On sites where the land is purchased, this can be mitigated against, but a problem remains for substation developments where we do not own the land on which the overhead lines or cables operate. Achieving BNG will require careful management and monitoring of the land, forestry and woodland that may directly affect our infrastructure. A balance will need to be struck between the desire for sustainable forestry management, maintaining affordable, safe and reliable electricity supplies for our customers and achieving BNG. We will also need to review operational wayleave vegetation management activities of overhead lines to identify opportunities for reduced activity and biodiversity enhancement.

Box 3. Spittal converter and substation Biodiversity Net Gain improvements

The Spittal substation site was located in an area of semi-improved grassland with a single strip of non-native conifers. Generally, it was of low biodiversity and ecological value. The consented landscape plan focused primarily on providing screening. Key changes were implemented to achieve a Biodiversity Net Gain, rather than a net loss, whilst still maintaining screening:

- Increased areas of wildflower meadow to replace areas of semi-improved grassland (Figures 2 and 3)
- Altered tree planting to include a greater proportion of native broadleaf trees rather than conifers
- Increased areas of trees and inclusion of scrub to provide a mosaic of habitats
- Areas of hedgerow planting
- Increased areas of wetland planting around SUDs ponds
- Wetland creation and watercourse enhancements.

already started. The aim, therefore, was to use the assessment to refine the consented landscape scheme. The assessment revealed that the development would result in a 23% net loss of biodiversity. SHE Transmission, Balfour Beatty (Principal Contractor) and WSP (BNG Consultants and Environmental Clerk of Works on site) discussed modifications to the landscape plan to maximise biodiversity outputs. This was then re-assessed using the Defra metric, which showed that the site could achieve a 34% net gain in biodiversity if fully implemented and assuming habitats were given appropriate time to mature (see Box 3).

This trial demonstrated the possibilities for achieving Biodiversity Net Gain from a substation development; the revised plan was implemented in 2018/19 and monitoring is ongoing. However, several important issues were identified that might limit the use of the Defra 2012 metric in a Scottish context:

- Default condition scores (e.g. for conifer plantations or peat habitats) did not reflect accurately the condition on the ground. The toolkit does not allow sufficient differentiation, for example between relatively old and diverse Scots pine plantations and densely stocked commercial plantations, or between high quality and degraded peatland habitats.
- Habitats of 'irreplaceable value' are common in the north of Scotland presenting major challenges for developers. For example, peatland habitats of various quality are common across Scotland. There is a concern that if net gain is simply not possible where peatland habitats are present, regardless of significance of the impact, it will be a major disincentive for developers to work towards BNG. Therefore, in some circumstances it should be permitted to offset losses of certain types of peatland habitat or to undertake peatland restoration.
- Constraints imposed by policy can hinder achieving BNG. For example, the Scottish Woodland Removal policy requires compensatory planting for any woodland removed in association with development (Box 3). Where development takes place in commercial woodland this can mean that areas have to be returned to monoculture forestry rather than being used to provide other more diverse habitats.
- The 2012 Defra metric does not consider the water environment (i.e. running water, bogs, etc.), which is very prevalent in Scotland. This issue is being addressed in the revised metric.
- Habitats that intrinsically take a long time to recover or to create, score poorly in the metric, which may dissuade efforts to enhance or restore peatland habitats.

The SHE Transmission project portfolio encompasses a wide range of scales from relatively minor works within existing substations to major new developments. At some sites, it was not possible to achieve a net gain within the development boundary due to constraints including site area, landownership, operational requirements such as maintenance of

Figure 2. Area of ground prepared for wildflower meadow at Spittal substation in Caithness. Photo credit SSEN.

Figure 3. Wildflower meadow one year after seeding at Spittal substation in Caithness. Photo credit SSEN.

clearances to powerlines, and farm subsidy issues. Although achieving BNG at the site level would always be the preferred option, we have suggested that assessing net gain over our suite of projects could be a way forward. This would also account for those smaller scale developments where habitat enhancement is not possible. For larger developments, one key implication of implementing BNG is that more land will be required for habitat mitigation within the development boundary if compensating at a distance is to be avoided where possible.

Developing Scotland-specific guidance and a toolkit

Following these initial experiences of applying the Defra metric to assess biodiversity impacts, and then modifying development plans and implementation to achieve BNG, SHE Transmission is developing a toolkit and guidance that better reflects the habitats and species across our sites, and more generally in Scotland. The toolkit will be based on existing tools and we hope it will be widely adopted by developers in Scotland. It will encourage consistency in our approach and will detail how and when BNG assessments should be carried out at all stages of a project's lifecycle from optioneering (site selection) through to the development of the final landscape plans. As always, the underlying principle will be to apply the mitigation hierarchy to avoid impacts by careful consideration of biodiversity during project development in consultation with key stakeholders.

Given that the BNG approach in Scotland is in its infancy, together with the potential change from Phase 1 habitat classification to the UK Habitat Classification (UK Habs; Butcher *et al.* 2018), it will be essential to make sure that all users of the toolkit apply the assessment in a consistent manner to maintain rigour. The reporting of BNG must be scientifically robust and transparent so that stakeholders understand how the assessment was carried out and what the conclusions mean.

The toolkit is not an attempt to 're-invent the wheel' but seeks to address the issues with the Defra metric that are specific to developments in Scotland. Key to this is a robust and transparent scoring mechanism for the peatland habitats which are found commonly in our area but are often in poor condition. Consideration of how other major habitat types, such as coniferous woodland, are treated is another issue. We are currently assessing the new Defra metric and are providing comment to Natural England on what we see as the benefits and limitations. It is crucial that the correct habitat classification at the appropriate UK Habs level is assigned during the BNG assessment because it has a significant impact on the distinctiveness score. In addition, SHE Transmission are setting up meetings with the statutory agencies and other stakeholders to promote the good practice that will be essential to achieving acceptable and justifiable assessments.

Benefits of the BNG approach to business

Biodiversity loss due to development is unsustainable. The BNG approach seeks to redress the balance and protect the environment for future generations in a coordinated, consistent and transparent manner. Despite the challenges inherent in achieving BNG, it can be a useful tool for business (see Box 4). Positive aspects include:

- Clear justification for appropriate site location and a large enough footprint to enable BNG
- Efficiencies in planning applications as biodiversity impacts are addressed objectively
- Resolving local objections to development proposals
- Fewer development delays by addressing biodiversity impacts early in the process.

Promoting BNG shows industry leadership through a clear dedication to Corporate Environmental Responsibility and sustainable development. Reputational benefits should follow with potential for good PR through industry awards for innovation in biodiversity improvements and joint working with local community projects and NGOs

Box 4. Biodiversity Net Gain is good for business – SHE Transmission's experience

- *Resolving local objections*: At Tomatin Substation there were local concerns over removal of conifer plantation and the loss of habitat to make way for the substation. By using the Defra metric to calculate biodiversity values and then modifying the landscape design to achieve BNG, SHE Transmission could show that after development the substation site would achieve a 47% net gain in biodiversity, rather than the loss that was perceived by the local community. This uplift was achieved by replacing planned tree planting with areas of more diverse heath/grassland habitats combined with dense scrub away from the areas of blanket bog at risk of drying out.
- *Easing planning application issues*: In response to the Fort Augustus Substation application, Forestry Commission Scotland were concerned that the area of woodland replanting was insufficient to account for the overall woodland loss during the construction and operational phase. The biodiversity assessment demonstrated No Net Loss in woodland cover and assuaged the concerns about adequate area.
- *Positive recognition in the media*: By focusing on the need to achieve BNG after development, opportunities to enhance habitats are explored in depth and new initiatives can have positive PR value. For example, enhancement of grassland habitats can be used to demonstrate positive steps to meet the Scottish Government's Biodiversity and Pollinator Strategies (Scottish Government 2013, 2017).

Acknowledgements

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Scottish biodiversity in safe hands

Clearly valuable in its own right, biodiversity is also crucial to the maintenance of the natural systems on which we all depend. Business must take full responsibility for the impacts of their development activities on biodiversity. By using a metric approach to assess changes in biodiversity value (losses or gains) brought about by development or changes in land management, impacts can be assessed objectively and the mitigation hierarchy applied to ensure that Biodiversity Net Gain is achieved in both the long and short term. In Scotland, the Defra metric needs to be adapted to take account of those habitats that are widespread and specific to the country.

Specifically, we need to adapt the current Defra tool to address the issues of the peatland and coniferous habitats that are common in Scotland and account for those habitats of local importance. Further engagement with regulators including the Scottish Government, Scottish Natural Heritage and the Scottish Environmental Protection Agency is needed to agree a universally accepted BNG methodology. By working in partnership with statutory agencies, business and environmental bodies, we can develop a modified metric that could be used country-wide in future. All stakeholders need to be encouraged to share lessons learned and to promote the adoption of BNG. Wider engagement with the other disciplines, such as engineers and landscape architects, is also needed to ensure that biodiversity gain is designed into the development process from the very beginning.

By showing leadership, sharing good practice and committing to action, businesses and developers can play their part in protecting our unique natural heritage whilst also achieving Biodiversity Net Gain.

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Vikki Patton MSc is a Principal Biodiversity Consultant and is focussed on the delivery of Biodiversity Net Gain from large-scale infrastructure projects. With twelve years' experience in biodiversity conservation, Vikki is passionate about working with stakeholders to minimise environmental impacts and identify opportunities for sustainable biodiversity enhancement. Vikki is focussed on supporting clients and statutory bodies to implement Biodiversity Net Gain within the Scottish development industry.

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CIEEM Featured Training

Survey, Ecology and Identification

Otter Survey Impacts and Mitigation

Dunblane, 6 June

This course will provide cover topics including otter legislation, licensing, ecology, survey, as well as impacts to otter and mitigation and compensation options when impacts to otters are anticipated.

Grass and Sedge Identification – Neutral and Calcareous Grasslands

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Cumbria, 19 June

This course provides an introduction to the theory and practice of the National Vegetation Classification (NVC) system; a standardised method for identifying and describing many UK plant communities.

Wildflower Identification – Neutral and Calcareous Grassland

Salisbury, 24 June

This training day will familiarise participants with wild flowers commonly encountered in the countryside, as well as the more specialist species associated with species-rich calcareous grassland. No keys will be used, but we will aim to get a handle on the main families of flowering plants in the UK, to help identification skills. The workshop will be carried out in stunning hill-forts surrounding Salisbury, and provide the opportunity to discuss some of the conservation management issues of these habitats, and how wildflowers can be used as indicator species of the habitats they live in.

Hazel Dormouse: Handling and Survey Methods

Canterbury, 29 June

This one day course provides a basic introduction to dormouse ecology, with more detailed information on survey and handling techniques. The training includes practical sessions on dormouse handling and nibbled nut identification.

Working with Crayfish: Survey Methods, Ecology, Mitigation, Licensing and Invasive Species

Settle, 3-5 July

This popular course, now in its 19th year, provides a field-based introduction to a range of fieldwork with crayfish, in the marvellous setting of the Yorkshire Dales.

Technologies

Flying high – Drones for Ecology and Land Management

Richmond Park, 11-12 June

The course will consider the uses and potential uses of drones for ecological and land management work in the UK. The main focus of the event will be the use of drones to produce high resolution orthomosaic images to produce accurate habitat maps. However, other uses, including tree and roof inspection for bats, will also be covered and, where practicable, demonstrated.

Mitigation and Management

Wetland Habitat Identification, Evaluation and Management

Swansea, 8 July

This one-day course uses Crymlyn Bog NNR, a wetland site of international importance, as the field site to explore some of the key issues in wetland identification, assessment and conservation. Field and classroom sessions are planned to build understanding of the structural and ecological types of wetland, the collection and interpretation of vegetation data as well as some of the factors affecting wetland quality and how these may be managed.

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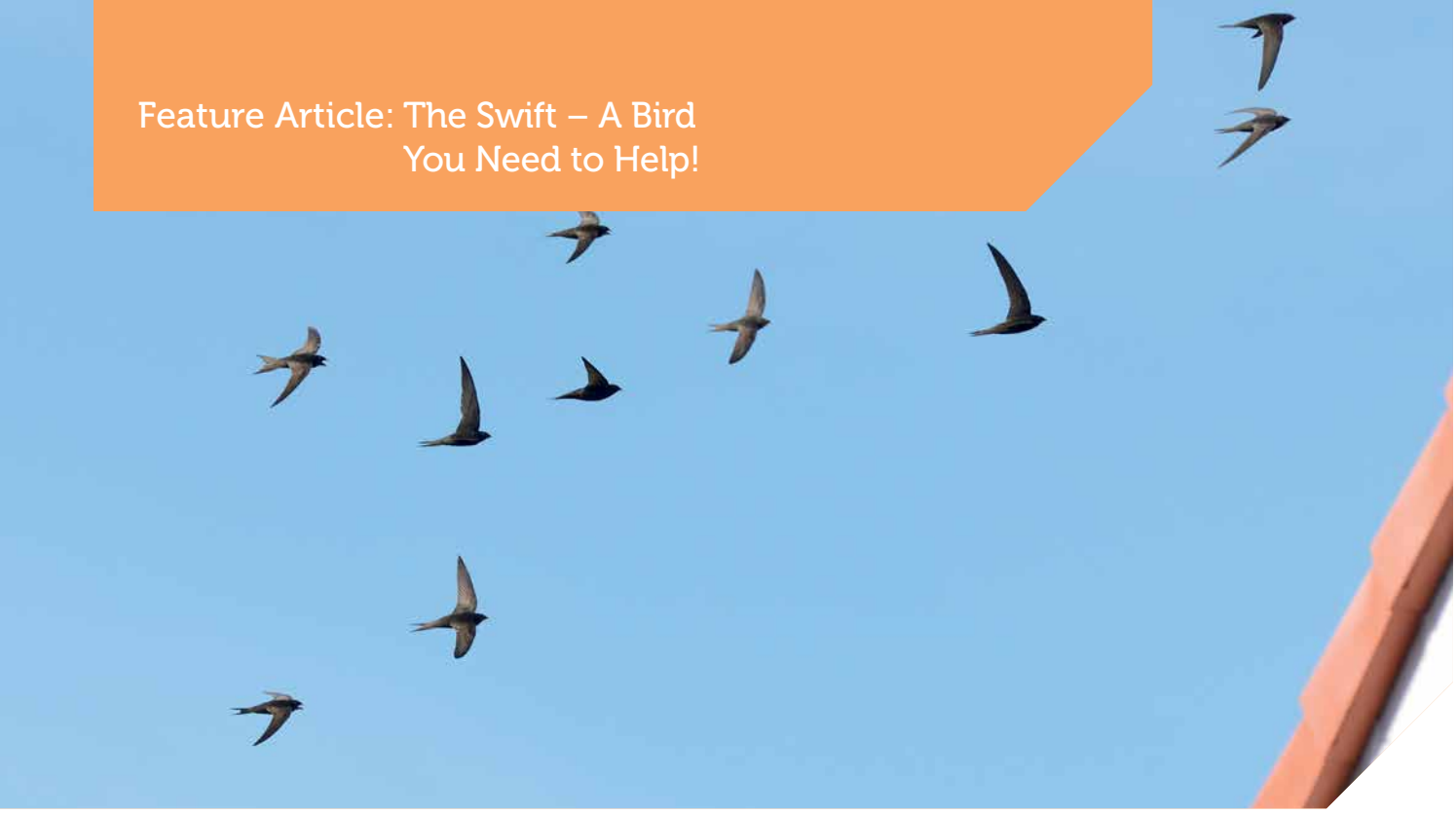

Figure 1. Swifts are a familiar sight above the rooftops of our villages, towns and cities. Photo credit RSPB-Images.

The Swift – A Bird You Need to Help!

John Day MCIEEM, Edward Mayer, Dick Newell

Keywords: biodiversity, conservation, developments, nestbrick, swift, urban

The Government's ambitious house building programme needs to be carried out in a way that protects and benefits all those species impacted by development. One bird directly in the line of fire is the swift *Apus apus*, with a reduction in suitable nest sites resulting in declining numbers across the country. This article reviews the worrying conservation status of the swift, the growing public interest and the urgent action needed to prevent further losses by providing suitable nest sites in new developments.

Introduction

The swift is a summer visitor, arriving back in the UK to nest in the eaves of houses, commercial buildings, churches and older buildings. They return to the same nest every year, establishing colonies that can last for centuries. They eat flying insects including aphids, gnats, mosquitoes, flea beetles, moths, hoverflies and flying ants as well as spiders floating in the air, and they spend most of their life on the wing. (Figure 1)

Despite a rapid 53% decline between 1995 and 2016 (Breeding Bird Survey – BBS, Harris *et al*. 2018), the swift is only amber-listed as a Bird of Conservation Concern (BoCC) (Eaton *et al*. 2015). This decline is greater than the '50% in 25 years' threshold required for a species to be placed on the BoCC red list. Therefore, the swift may well move from the amber to red list at the next BoCC revision in 2021. In addition, according to International Union for Conservation of Nature (IUCN) criteria the swift is classified as endangered in the UK (Stanbury *et al*. 2017).

The causes of decline may include a lack of insect food, but nest site loss is a particular problem and is an issue we can start to address. Swifts rely on nest sites in buildings but unfortunately many traditional sites disappear each year through renovation, insulation and demolition, while new buildings exclude them from the spaces they normally use.

Public perceptions

A recent MSc study investigated householder attitudes toward nest and roost bricks in houses. It questioned 142 people of whom 75% thought integral swift bricks were a good thing (Roberts 2017). Overall, 85% of respondents said their decision to buy a house is unlikely to be negatively influenced by the presence of an integral swift brick while the remaining 15% thought it might even increase their likelihood of buying a property. When asked, 73% of people would recommend a house with an integral swift brick to a friend; the remainder didn't know, and nobody said they wouldn't. The study found there were no discernible differences in the perceptions of people of different wealth (using the number of bedrooms as a proxy), age, gender or whether there were children in the house. Studies like this will help to allay concerns of developers that nesting birds compromise the saleability of houses.

Figure 2. An example of a Manthorpe brick. Photo credit John Day.

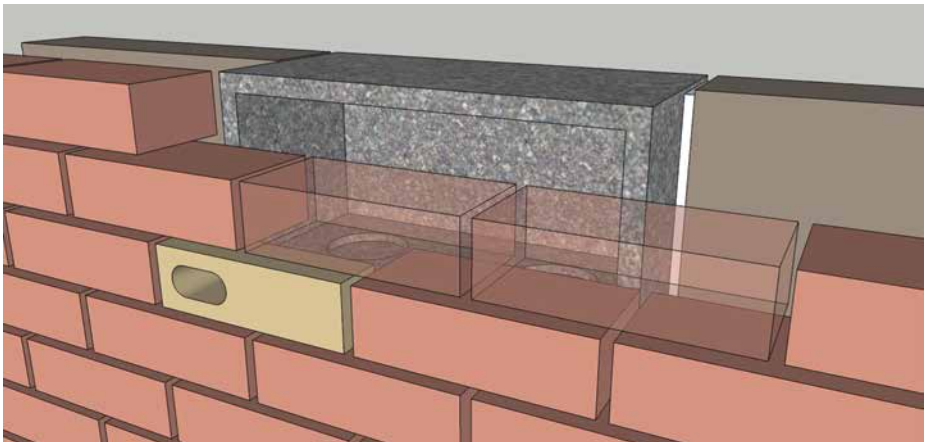

Figure 3. Cross section of Cambridge Brick system. Photo credit Dick Newell.

Nest provision

Great advances have been made in the UK over the last decade in our understanding of swift nest requirements, both for the protection of existing nests and provision of new nests. Options are now available for most situations, either 'off-the-shelf' or bespoke. Provision of artificial nest sites has secured or created many local swift colonies both in the UK and in Europe.

Swift boxes can be mounted externally or fitted internally, either flush with an external wall or inside a roof space. Externally mounted nest boxes can more easily be fitted to existing buildings but it can also be cost effective to retrofit integral swift bricks. These are more secure and eliminate future maintenance requirements. Details and case studies of these techniques appear on the *Action for Swifts* and the *Swift Conservation* websites (see Further Resources below).

For new houses, be it one, several hundred units or a small two-storey extension, internal swift bricks are the preferred option. They leave a neat, tidy finish, last the lifetime of the building and require no maintenance (Figure 2). An integral swift brick is a self-contained unit and prevents access to anywhere else in the roof space.

It has been around 30 years since the ornithologist Chris Mead worked with Schwegler to design integral swift bricks. Since then many companies have joined the market. An impartial booklet, Facts about Swift Bricks (Newell 2019a), listing many brands and suppliers can be downloaded from the *Action for Swifts* website (tinyurl.com/swiftbricks). Unit costs range from £25 to £160 or more. It is preferable to choose a product compatible with UK brick sizes; many imported products are not. There are cement-based products, for example the CJ Cambridge System and Schwegler, as well as products made of lighter materials including plastic, for example from Manthorpe and Birdbrickhouses (see Newell 2019b or visit https://www.nhbs.com/equipment) (Figures 2, 3).

Other species are known to use swift bricks, including starlings *Sturnus vulgaris*, house sparrows *Passer domesticus*, great tits *Parus major* and blue tits *Cyanistes caeruleus*. Whilst numbers of starlings and house sparrows are also declining and will benefit from artificial nest sites, there is the potential for conflict with homeowners because starlings often leave droppings. Starlings can also displace swifts from a nest site, but they can be excluded by ensuring nest entrance holes are no larger than 65 x 28 mm. It is best to consider providing external starling boxes on trees adjacent to open areas of grassland where they can easily find their insect food.

House sparrows and tits will happily use swift bricks (Figure 4) as well as sparrow bricks or external sparrow terraces, which swifts cannot use. Sparrows and tits will not generally exclude swifts from a nest

Figure 4. House sparrows also use swift nest bricks and can attract swifts to nest. Photo credit John Day.

site, and their presence in a swift brick may even attract prospecting swifts to use that nest site in future years. Therefore, other species can be accommodated by providing more swift bricks in a building without this being detrimental to swifts. However, provision of suitable cover in the form of hedges and large shrubs in the vicinity of the nest boxes is of equal importance to house sparrows.

How many swift bricks? And where?

As swifts and sparrows nest in groups, nest bricks should be clustered in suitable areas of the development, two to four bricks per dwelling, resulting in an equal number overall of nest sites and residential units (Gunnel *et al*. 2013). On larger commercial buildings, one swift brick per 6 m^2 of wall, mounted near the roof, in clusters of three or more, is recommended (Figure 5a,b).

Swift boxes can be placed on any aspect of an existing building, ideally under shade-casting eaves. However, nest boxes exposed to the sun need to be constructed of thick enough material and possibly painted white to prevent overheating. Avoid locating nest boxes and bricks above doors and windows. There is no upper limit for the height of a swift nest but nest boxes installed 5 m or more from the ground should lead to higher occupancy rates. Ensure a clear flyway of at least 5 m in front of the nest box avoiding obstructions such as trees, including any trees planted in new landscaping that may cause obstruction when mature (Newell 2019b) (Figure 5a,b).

Swifts are long-lived birds and may take several years to find a new nest site. Playing recordings of swift calls can encourage swifts to investigate a site and accelerate the process. Advice on this well-proven technique is available from actionforswifts@gmail.com or mail@swift-conservation.org.

Mapping for swifts

There are several local or county-level recording systems for swifts. Currently, two systems operate across the whole of the UK: the RSPB Swift Survey and the Swift Mapper phone app. Data from these systems can be used by local authority planners, architects, ecologists and developers to identify swift hotspots. This should enable adequate mitigation to be incorporated into development projects to protect breeding swifts and to provide swift nest sites as part of building works.

The RSPB Swift Survey was created to collect data on nesting swifts from the public. It allows users to enter or search for records of swift nest sites or parties of 'screaming' swifts in flight and provides details about the nest sites. It also allows the absence of swifts to be recorded from previously occupied sites.

The Swift Mapper phone app, launched in the autumn of 2018, is available for both

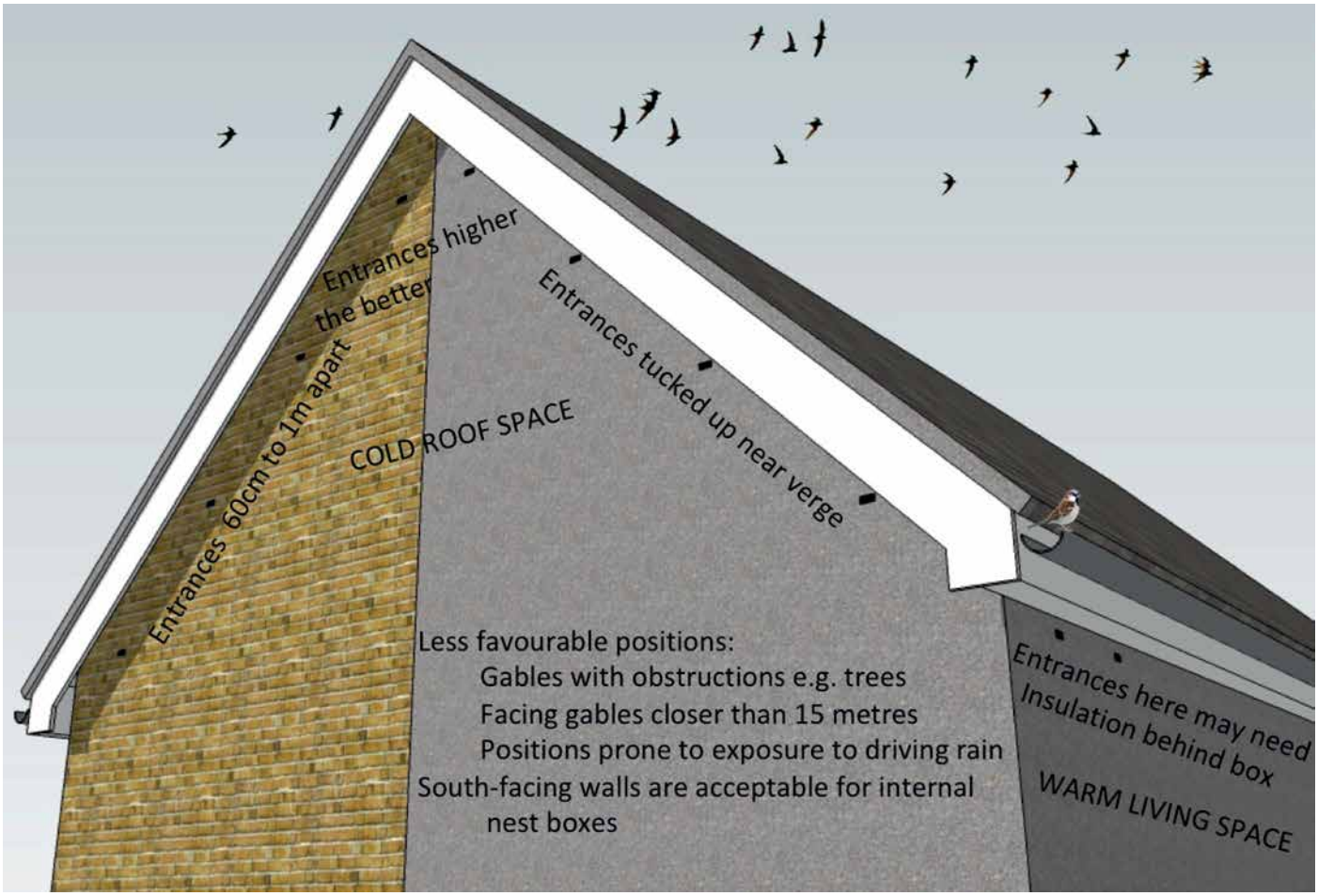

Figure 5a. Recommended positions of internal nest boxes for swifts and house sparrows. Other possibilities include holes in soffits and fascias. Photo credit Dick Newell.

Figure 5b. Recommended positions of internal nest boxes for swifts and house sparrows. Photo credit Dick Newell.

Apple and Android phones. It has the same objectives as the RSPB survey but with the added flexibility of recording sightings in the field. Records from the app may be exported into other systems such as the RSPB Swift Survey.

In some areas, RSPB data are transferred to local biodiversity records centres for ease of local access. The value of these datasets increases over time, for example the RSPB Swift Survey now contains tens of thousands of records. Gaps in coverage still exist, of course, and lack of records from any individual area does not mean swifts are absent. The imperative is to provide new nests to compensate for the gradual loss of established sites, help maintain and expand existing colonies and start new colonies elsewhere. (See also Further Resources below.)

Planning policy and the role of ecologists

Under Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006, public bodies have a duty to protect and enhance all biodiversity. This is supported by the National Planning Policy Framework (NPPF) 2018 in paragraph 175d: *When determining planning applications, local planning authorities should apply the following principles:..... opportunities to incorporate biodiversity improvements in and around developments should be encouraged*.

Many local authorities now include swift nest site provision in Local Plans and Supplementary Planning Guidance documents. One of the first to do so was Exeter City Council (Exeter City Council 2010) and other authorities around the country have followed suit, for example the Local Plans for the London Boroughs of Hackney and Islington require swift bricks to be used in many new developments.

Unfortunately, lack of resource in Planning Authorities means delivery can be 'hit and miss'. Officers do not have time to make checks and may not know the details of correct installation. Where measures come proposed as part of a planning application, a local authority may not have the knowledge to determine if those proposals are correct. There is therefore an extremely important role for ecologists to play here, ensuring they specify the right provision and that it is executed correctly on site by monitoring progress. Where swift bricks are not installed, we need to work with council officers in charge of planning conditions to ensure bricklayers return and fit them.

Recommendations

Biodiversity continues to decline in the UK and swifts are just one species suffering as a consequence. The UK Government's ambitious target to build 300,000 homes per year presents an opportunity for effective mitigation and compensation for the continual loss of existing swift nest sites. We propose the following key recommendations for all planning applications.

- Incorporate nest boxes into development projects. Nest boxes suitable for multiple species such as swift nest boxes will help more species. Although birds of any kind are good for people's health and wellbeing, budgets should be targeted at species that need help.
- Use data from the mapping tools together with ecological survey work to assess likely impacts on swifts; implement effective mitigation by installing enough swift boxes in the correct location and position.

- Wherever possible, incorporate swift bricks in new or restored buildings to increase the overall availability of nest sites for swifts and other species. Birds such as house sparrows can use swift bricks but swifts cannot use house sparrow nest bricks.
- Integral swift bricks are the preferred option on new housing developments (fitted in clusters of 2 to 4 on gables and near the roofline where swifts would naturally look for a potential nest site); on larger commercial buildings include one swift brick per 6 m^2 of wall, mounted near the roofline, in clusters of 3 or more, with approximately 1 m between entrance holes.
- Try to ensure swift bricks have a minimum of 5 m clearance beneath and in front, and avoid locating them above doors and windows.
- 'Tool-box' training and on-site supervision is essential to ensure swift bricks are fitted correctly and in the right places.
- If in doubt, ask for advice: the Swift Local Network (SLN) group, Swift Conservation, Action for Swifts or the RSPB are always available and happy to provide help. Check their respective websites and contact them for one-to-one advice on a project.

Further Resources

Distribution data:

RSPB Swift Survey is available at https://swiftsurvey.org/rspb/home/index

Swift Survey Data is used to provide GIS layers for administrative areas (email: dataunit@rspb.org.uk)

Advice and case studies:

http://www.rspb.org.uk/helpSwifts
http://swift-conservation.org
http://actionforSwifts.blogspot.com
Swift Local Network Groups near you – link from http://actionforswifts.blogspot.com

Training:

Swift-related training (on-site and CPE style) for ecologists, architects and planners is offered by Swift Conservation (mail@swift-conservation.org) and RSPB (Conservation-advice@rspb.org.uk)

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About the Authors

John Day is the RSPB's Urban Adviser. His work covers many aspects of the built environment, promoting the design and landscaping of climate-resilient towns and cities to green space managers and developers, and encouraging the provision of wildlife beneficial features.

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Dick Newell is an engineer who, since retirement, has focussed on solutions to the problem of a declining swift population. He was given a BTO Marsh Award for "Innovative Ornithology" in 2016. Several swift nest box designs on the market incorporate ideas resulting from bespoke projects by Action for Swifts.

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Edward Mayer runs Swift Conservation, a free online advice service for those wanting to help swifts. He gives talks on the conservation of swifts and enhancing urban biodiversity. His background in property and museum management gives him great credibility within the building profession.

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Meet the Author – Jo Treweek

What do you do?

I am a Director of eCountability, a small ecological consulting company. We design and implement baseline surveys, impact assessments, and mitigation strategies towards no net loss/net gain outcomes for biodiversity and ecosystem services. We also design tools and software solutions for managing and interpreting ecological data and carry out due diligence audits for financial institutions. A lot of our work is overseas in the extractives sector.

What or who first inspired you to make a career in ecology and environmental management?

My degree was in agricultural and forest sciences and I started working life as a shepherd, but it was the ecological basis for production that really interested me. Visiting New Zealand and Australia to learn more about sheep farming, I was struck by the degree of ecological transformation that had occurred there, in such a brief period of time. I decided to change tack and work on strengthening the ecological basis for land use planning. Poetry by John Clare and Kathleen Raine also inspired me to become an advocate for nature.

What have been the most important steps along the way?

My PhD investigated the grazing ecology of sheep and ways to integrate viable production with conservation management of grasslands (a precursor of agri-environment schemes). I was then lucky enough to be offered a dream job at the Institute of Terrestrial Ecology, Monks Wood, to research use of ecological data in policy and decision-making. Shocked to discover how little ecology made it into environmental assessment at the time, I wrote a book on Ecological Impact Assessment (and may have 'coined' the term). Subsequently, as Global EIA Team leader for a Canadian consulting company, I had opportunities to learn about infrastructure development and engineering as well as mitigation banking and biodiversity offsets. This experience was invaluable when I set up my own business.

Are there any 'must-have' qualifications or experience?

Masters and PhDs are a good grounding for consultancy, as they require self-guided learning and the ability to communicate. Statistics and GIS are invaluable tools and good EIA practitioners benefit from knowledge of social sciences and economics. Having an investigative mind is probably the most important.

Do you have any advice for someone setting out on a career in ecology and environmental management?

I gained a huge amount from membership of the British Ecological Society and the International Association for Impact Assessment: both gave me networking opportunities and the chance to learn the state of the art from leading researchers and practitioners. I developed lifelong colleagues and friends through these organisations and later CIEEM and BBOP. I think it helps to have some sort of specialism to set you apart from others.

What's the best thing about your job?

Having the opportunity to change perceptions and improve outcomes for biodiversity and the people who value or depend on it. I also really enjoy working with local partners in different countries who are committed to safeguarding biodiversity and have the creativity and insight to develop novel and workable solutions that clients are willing and able to implement.

What's the downside?

It is depressing to witness the ongoing attrition of ecosystems, but worse to find the same issues and barriers coming up in every Project: insufficient time or inappropriate season for good surveys, engineering designs fixed before biodiversity impacts are considered, inability to access land or funds for delivering mitigation and 'paper promises' that aren't delivered in practice. Biodiversity, ecosystems and the people who value and depend on them still do not have an equal place at the table.

What's next for you?

Running some professional development workshops on biodiversity in impact assessment in Macedonia and then auditing an LPG project in the Russian Arctic.

What is your top tip for success?

Motivation to catalyse change is a really powerful thing, together with an ability to communicate complex information in a strong and straightforward manner. Be outcome-oriented and be prepared to have an opinion, but back it up with solid evidence as you may have to defend your position in court.

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Improving Working Conditions for Early Career Ecologists

Peter Lawrence MCIEEM
Associate Director of Ecology,
Land Use Consultants (LUC)

Craig Llewellyn ACIEEM
Senior Ecologist, AECOM

Introduction

Most of those seeking to become ecological consultants do so in large part due to their passion for and commitment to the natural world. Ecological consultancy provides an attractive employment option with opportunities for regular fieldwork across the UK and Ireland, varied project work, good opportunities for career progression and the chance to work in a range of companies, from multi-national engineering firms, SMEs, as sole traders and sub-consultants, to consultancy arms within charities. The majority of consultancies implement fair and progressive working practices, with excellent examples of companies leading the way to improve conditions for employees and sub-contractors, helping the growth of young ecologists and the profession as a whole.

However, through personal experience, discussions with other ecologists, and recruitment activities, the authors have regularly encountered instances of unfair and/or unsafe working practices for early career ecologists, and there is concern that such practices continue to persist today. Examples include ecologists being expected to work long and unsocial hours without sufficient breaks or the ability to recoup overtime, travel time and/or expenses; or even cases of early career ecologists 'volunteering' to gain experience, without any or adequate remuneration despite undertaking tasks which are subsequently charged to the client, improving profits for the consultancy. More recently there has been an increase in the use of so-called 'zero hours contracts', driven in part by large infrastructure projects (with graduates increasingly expected to set-up as sole traders to resource projects rather than being directly employed by the consultancy). Although this employment model suits some ecologists subject to the contract terms if used inappropriately can offer very little for the worker and profession, presenting limited opportunities for professional development and career progression, and reducing the availability of full time contracts for those seeking to enter the profession (whilst potentially providing high profitability for employers as a result of decreased employer costs).

Some of these issues arise as an unavoidable result of the nature of the work, especially seasonal surveys with unsocial working hours; but it is possible for working practices to accommodate this, and many companies do so successfully. The relatively high occurrence of unfair working practices in ecological consultancy appears to be compounded by:

- high levels of competition for employment at an early career stage;
- financial pressures experienced by small consultancies;
- the need for young career ecologists to gain on the job experience to improve employment prospects;
- pressure of clients to drive down costs; and
- perception of low value of ecological consultancy within other professions and developers.

Overall this presents a competitive advantage to those willing to implement or turn a blind eye to unfair working practices.

This article aims to help early career ecologists working within consultancy, but is also a call to all of us to aim higher: to improve working practices across the industry, and challenge bad practice where we encounter it, with leadership from professional organisations including CIEEM being key to achieving this. This will help young ecologists and our profession flourish, and deliver stronger nature conservation outcomes.

What should you expect from your employer?

There should be:

- **A clear definition of your role and what is involved** which should follow CIEEM's *Guidelines on Providing Quality Work Experience in Ecology and Environmental Management* (see Box 1), in particular making clear payment terms, length of position (seasonal or full-time), the amount of training to be offered (including *in lieu* of payment), and level of responsibility.
- **Clear lines of communication** between you and your employer to help you understand and deliver your role, and find your feet as you enter a new career. This may be through formal line management and mentoring, possibly with the support of a HR department depending on the nature of the company.
- **Fair remuneration for work undertaken, as clearly identified in the role description** (again see Box 1). It is unacceptable for early career ecologists to be delivering project tasks (e.g. providing survey support or completing data analysis) without

appropriate remuneration (whether through pay or provision of high-quality training with structured learning outcomes). The competitive advantage this provides to the employer does the profession harm by undermining the value of ecological support whilst hindering professional development.

- **Payment or payment *in lieu*** truly reflecting the hours worked (including travel to/from site), allowing for the payment of overtime or TOIL (time off *in lieu*) provision, and the payment of all expenses (including travel, accommodation, PPE and equipment).
- **Compliance with legal requirements and best practice guidance** regarding your working hours, such as those produced by the Bat Conservation Trust relating to recommended safe working limits for dusk and dawn bat surveys (Collins 2016). Regular rest breaks are important, particularly given the unsocial hours, varying work patterns and travel requirements for ecologists, so that over-working and fatigue are avoided.
- **Sufficient time and resources for the task**, ensuring work can be completed to a high standard, delivered against client requirements and nature conservation objectives whilst ensuring safe working practices.
- **A safe working environment (both in and out of the office)**, which is compliant with relevant UK and/or Republic of Ireland legislation. Where site visits are carried out, appropriate risk assessment procedures must be planned for, developed, communicated and followed, including contingency plans to deal with accidents and emergencies.

Box 1. Definition of Employment Terms

From CIEEM's *Guidelines on Providing Quality Work Experience in Ecology and Environmental Management:*

- **Work experience** – a period of paid or unpaid supervised work with a host organisation to better understand the role or roles available and learn/practice relevant skills.
- **Work placement** – a period of work experience undertaken as part of a degree or other programme of study, typically between 2 and 10 weeks in duration and taken as a block or one day a week.
- **Sandwich placement** – usually a six-month or one-year work placement taken as part of a programme of study, usually taken between the last two years of study for an undergraduate degree.
- **Work shadowing** – observing/working with an employee of an organisation to learn what their job entails. Typically this would be for 1-2 weeks, or on an ad hoc basis for specific activities.
- **Volunteers/Volunteering** – spending time, without pay (except for travel and other out-of-pocket expenses), helping an organisation or individual with activities to benefit the environment or individuals/groups other than, or in addition to, close family members. The volunteering must be optional, with no obligation to offer the volunteer work or for them to carry it out. It may be over a defined period or open-ended. Host organisations still have legal responsibilities in relation to volunteers.
- **Apprenticeship** – a nationally-recognised scheme that provides a combination of 'on-the-job' learning and training over a longer period (1-3 years) in order to learn a trade. Apprentices receive a wage. Usually apprentices will not have followed a relevant programme of study post-19.
- **Traineeship** – a period of paid or unpaid work experience involving formal training in a specific role over a set time period. Trainees are expected to be trained up to a specified level of knowledge and skill and this may include day release to follow a relevant programme of study.
- **Internships** – a period of paid or unpaid work experience where the individual has the opportunity to apply their learning and skills in a focused role following a relevant programme of study. Internships are typically 3-12 months in duration. An internship may be used to cover seasonal work but should have structured learning support in place.
- **Worker** – an individual who works for an employer under contract and who is entitled to some employment rights, such as holiday pay, entitlement to the National Minimum Wage and protection under anti-discrimination legislation. This term usually includes employees, agency workers and short-term casual workers. The contract may be a formal written contract or a verbal agreement.
- **Employee** – an individual who works under an employment contract. Employees generally have additional employment rights such as Statutory Sick Pay, maternity, paternity and parental leave and statutory redundancy pay.
- **Zero hours contracts** – a form of employment contract designed to enable employers to manage fluctuations in available work and therefore workforce requirements. Individuals subject to these contracts will always have worker rights (see above) and may also be considered an employee of the organisation, with the additional rights which that affords.

How does CIEEM currently encourage fair working practices?

CIEEM provides a range of guidance regarding professional standards, much of which is of potential value to early career ecologists, key items are summarised in Box 2.

What else can be done to help early career ecologists?

It is the responsibility of all of us working in ecological consultancy to drive forward improvements in working practices and professional standards. Poor treatment of early career ecologists undermines the value of our industry and creates a negative feedback loop, with clients continuing to expect unrealistically low quotes. Clients should also therefore bear some responsibility; ensuring contractors implement fair working practices and questioning unusually low costs.

Poor treatment hinders the professional development of ecologists, and therefore undermines the strength of our industry. Very importantly, when biodiversity is declining significantly and facing unprecedented pressure, it can hamper the delivery of nature conservation objectives if ecologists are allocated to a project without enough time, guidance or training provided for them to undertake work to a high standard. Addressing these issues should be our primary aim as professional ecologists.

But to help deliver improvements in working practices, we feel that there is more that consultant ecologists, employers and CIEEM can do. Examples may include:

- The CIEEM *Code of Professional Conduct* for individuals (not just the Registered Practices) should directly require compliance with the *Good Working Practices* guidance.
- All members should be aware of the *Good Working Practices* guidance and the guidance documents produced by CIEEM (Box 2). These documents need to be better publicised and should be made available more widely, for example by being accessible to non-members on the CIEEM website. Making these available to those considering becoming ecologists, and those who are not yet CIEEM members, would help improve the profession.

Box 2. Professional Standards Guidance

The below list includes a range of documents currently available from CIEEM which outline the standards expected, and guidelines provided, which help to encourage fair employment practices:

- **CIEEM Code of Professional Conduct**
  - As well as other items of relevance including those relating to the upholding the reputation of the profession, Item 6 of the Code states that as a member of CIEEM:
  - *I shall ensure those working for me are appropriately qualified, trained, competent and supervised and supported*
- Furthermore, the **Supplementary Notes** include the following items:
  - *the requirement to demonstrate a duty of care to others when carrying out professional activities, for instance by complying with relevant health and safety standards;*
  - *Members, as employers, managers or supervisors, have a responsibility to encourage and support those working for them to maintain and enhance their professional competence. As a minimum Members must take all reasonable measures to ensure that those working for them or supervised by them are competent for the tasks that they are undertaking and undertake those tasks safely and to the standard required.*
- **CIEEMs Guidelines on Providing Quality Work Experience in Ecology and Environmental Management**
  - This guidance should help early career ecologists understand the various roles available, and how to determine whether the provision of training and opportunities provided by internships or work experience for example, are appropriate or adequate.
- **CIEEM's guidance on Good Working Practices**
  - This very useful guidance document sets out what employers should provide, and employees expect, in terms of good working practice, including legal responsibilities and best practice.
- **CIEEMs Registered Practices initiative**
  - Although this initiative is very new and its impact cannot yet be determined, this aims to identify practices as champions of high professional standards, including requirements to comply with the Registered Practices *Code of Practice* and the *Good Working Practices* guidance.

- We should celebrate best practice, and the recognise employer contributions to improving standards in the sector. The Registered Practices scheme will help, and employees can do their part by encouraging employers to become registered. A regular section in *In Practice* could be used to champion best practice.
- CIEEM could offer an advice service for early career ecologists, helping them to determine whether employer expectations are acceptable or may be challenged.
- CIEEMs *Code of Professional Conduct* includes clauses which requires adequate support to be provided for the employees of members. However, the CIEEM disciplinary process should be reviewed to determine whether this is able to deal with employment issues. For example, anonymous complaints are not currently accommodated by CIEEM given legal implications, and this may deter early career ecologists from raising complaints (given the risk of retribution by employers). It may be that CIEEM's guidance can point employees to other legal advice services in these cases, such as the ACAS helpline.
- Specific training could be provided (e.g. by adding to CIEEM's existing webinar programme) to share best practice and help employers implement change that will raise standards and to help early career ecologists and other employees understand what 'best' should look like.

- Production of a basic 'checklist' for employers and employees, to ensure that the working environment is compliant with best practice and professional standards. This may be provided as an addition to the *Guidance on Good Working Practices*.
- Continued outreach to other professional bodies such as the Landscape Institute, CIRIA, IEMA and other partner/client organisations, would publicise the value of the ecological industry and encourage good working practices. This could help compare standards between professions and look at where improvements can be made across the board.

On the whole ecological consultancies are great places to work, providing real and diverse opportunities to deliver benefits for wildlife and people. The majority of companies successfully support and help early career ecologists develop, addressing the challenges posed by ecological survey work. However, poor practice does exist and needs to be challenged and improved.

Our profession and biodiversity will benefit as a result!

Reference

Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition).* The Bat Conservation Trust Ltd., London.

Legal Advice

As part of your membership benefits, CIEEM can direct you towards further advice.

About the Authors

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Craig Llewellyn BSc (Hons) ACIEEM is Craig is currently a Senior Ecologist at AECOM, and leads Ecological Impact Assessment (EcIA) for large projects for a broad range of protected species and habitats, and holds several protected species licences. He is the Convenor for the South East CIEEM Committee, and has an interest in policy engagement, and an active interest in collaboration with other environmental disciplines.

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Registered Practices are live

Sally Hayns CEcol MCIEEM
Chief Executive Officer, CIEEM

CIEEM's new Registered Practices scheme went 'live' on the 1 June. Over 50 organisations are now able to proudly display the new Registered Practices logo as evidence of their commitment to high practice standards and their role as ambassadors for the profession.

We are delighted with the positive response to the scheme, but we are also aware of a number of concerns and misconceptions so we have put together some FAQs which we hope will answer questions.

How will the Registered Practices scheme help to raise standards?

The Registered Practices scheme recognises those organisations that have a commitment to high practice standards and are prepared to make that commitment public. It also requires all or a significant majority of relevant staff to be members or member applicants of CIEEM and therefore bound by the *Code of Professional Conduct*.

One regular problem with the previous Professional Directory was that companies would get work through the Directory even if they only had one CIEEM member on the staff. However, if a client had cause to make a complaint to CIEEM, believing that by using the Professional Directory they had a means to do so, they often found subsequently that the employee concerned was not a member of the Institute and we could do nothing to help them.

Registered Practices are also committed to supporting and developing their staff and treating them fairly. In a profession where long and unsocial hours are often the norm and where there is much concern about health and well being of staff, especially more junior staff, those organisations that recognise the importance of looking after their most valuable resource deserve to be recognised, and those that do not need to be encouraged to do so.

How will being a Registered Practice help my business?

Becoming a Registered Practice will demonstrate your commitment to high professional standards, commitment to supporting and developing your staff and your recognition of your obligations to your profession. If you are actively seeking clients, your inclusion on the Registered Practice Directory will be an important marketing tool to help your business grow. We will be very proactively promoting the Directory to your potential clients (see below).

Are sole traders eligible to be a Registered Practice?

Yes sole traders are eligible as long as they can prove they are 'trading' e.g. by having a tax reference number. You do not have to be a limited company.

Why has the Professional Directory been removed?

The Professional Directory has, for some time now, been a pretty static resource that did not work well with newer software platforms and interfaces. Its features were limited and were not the easiest user experience. It was not sustainable to invest more money into it and it was no longer a good resource to promote to an external audience.

Whilst we have previously been able to offer an entry onto the Professional Directory for free, this was effectively being subsidised by all members, regardless of which sector they work in. We could not justify this when investing new monies into an improved commercial Directory and its promotion (see right).

We have replaced the individual Directory with a new Members Directory which automatically lists all members. You can select, via the Members' Area to show your contact details should you wish to do so.

I am a sub-contractor only so how will companies looking for sub-contractors find me?

We are planning to offer sub-contractors entry onto a free sub-contractors directory to be located in a different area of the website and will signpost ecologists and environmental managers to it. The new sub-contractors directory should be live later this month.

How will the Registered Practices Directory be promoted?

We have already contacted local planning authorities in the UK and Ireland to tell them about the new Directory, both directly and via items in e-bulletins such as through the Planning Advisory Service. The Association of Local Government Ecologists (ALGE) has also helped us to spread the message via the membership. We have also notified key contacts in the statutory nature conservation bodies. There will be regular reminders to these key groups.

Over the next few months, funded by income from the scheme, we will have articles, advertorials and advertisements in relevant industry publications such as The Planner, Housebuilder Magazine, Professional Housebuilder and Property Developer as well as looking at how we can use events such as Futurebuild to spread the message. This is part of an ongoing commitment to actively promote the Registered Practices Directory.

We hope that this article answers some of your questions but if not, do please drop us a line at registeredpractices@cieem.net.

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- Use our Registered Practice logo on your business stationery, website and marketing.
- Display a Registered Practice Certificate at your business premises.
- Enjoy a 20% discount on advertising in the CIEEM In Practice magazine or on our website.
- For larger businesses or organisations, receive bespoke support for groups of your staff to apply for Chartered Ecologist or Chartered Environmentalist status.

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www.cieem.net/i-am/registered-practices

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INTERNATIONAL FOCUS

Inaugural African Linear Infrastructure and Ecology Conference

Corin Simmonds CEcol MCIEEM
Associate Director for International Projects Group, RSK

The Inaugural African Conference on Linear Infrastructure and Ecology (ACLIE) was held in the Kruger National Park, South Africa from 10 to 15 March 2019. Delegates came from all over Europe, Australia, the Americas and Africa from non-governmental organisations, academic institutions, consultancy and the private sector to share ideas and experiences on how to manage detrimental impacts arising from linear infrastructure on ecology.

The conference was hosted by Endangered Wildlife Trust (EWT) and Eskom (South Africa's state energy supplier). The conference was a unique forum to discuss the common threats shared by these projects and most importantly examples of the effective mitigation that has been used in different countries worldwide to reduce impacts on the environment.

The Eskom/EWT Strategic Partnership provided examples of the work that they are undertaking and how this unique relationship is directly reducing wildlife interactions with electrical infrastructure and preventing disruption to power supplies. There were a number of presentations on road ecology by EWT such as managing vehicle collisions with wildlife and improving driver safety; the effectiveness of building wildlife bridges for various species; and looking at behavioural responses of wildlife to approaching trains. Many attendees and presenters were associated with the Infra Eco Network Europe (IENE) which is a network of experts working with various aspects of transportation, infrastructure and ecology. IENE aim to share knowledge and best practice whilst promoting a safe and ecologically sustainable European transport infrastructure. Representatives of the committee for ecology and transportation who are responsible for the International Conference on Ecology and Transportation (ICOET) were also present. More information on IENE can be found at www.iene.info and on ICOET at https://icoet.net.

The importance of the conference being held in Africa was highlighted with talks alluding to the threat posed by current and future development across Africa and then opportunities to encourage early inclusion of effective mitigation to minimise and reduce impacts to biodiversity and the environment. The next decade will see significant developments in Africa, many of which will be focussed on development corridors comprising power lines, roads, pipelines and railways.

It is hoped that ACLIE will become a regular event on the global calendar providing an opportunity to further our understanding and work towards the common goal of minimising threat to wildlife from linear infrastructure projects.

ACLIE delegates

Wendy Collinson-Jonker, EWT Wildlife and Transport Programme Manager, elaborated, *"We were extremely proud to be able to showcase our projects to the rest of the world at ACLIE, as well as share potential solutions for the proposed linear infrastructure developments across the African continent. The challenge will be implementing many of these solutions, but the input and support from experts who attended ACLIE may well assist us in ensuring development that is more resilient and ultimately benefits the economy but conserves the environment."*

Kishaylin Chetty, Senior Environmental Advisor at the Eskom Biodiversity Centre of Excellence, added, *"The ACLIE 2019 conference brought industry and wildlife impacts to a discussion forum where all parties can work towards shared objectives, expanding knowledge, and understanding how to ultimately minimise the threat to wildlife. This is an incredibly exciting opportunity."*

ACLIE 2019 was organised with the assistance of africaMASSIVE, and was supported by Eskom Holdings SOC Ltd, Road Ecology Center – UC Davies, TRAC N4, EcoKare International, SANPARKS, Balmoral Engineering, Painted Wolf Wines, and Arcus Foundation. More information can be found at https://www.eiseverywhere.com/ehome/321729/694063/.

If you would like to contribute to this page please contact Corin at: csimmonds@rsk.co.uk

UK CSCS Cards – An Update

Sally Hayns CEcol MCIEEM
Chief Executive Officer, CIEEM

Health and safety on construction sites is of paramount importance. They are often high-risk areas with lots of activity, often involving heavy plant or other dangerous machinery, and it is important that all those on site are aware of the risks and how to keep themselves and others safe. The CSCS card system aims to do just that.

Members who work on land-based construction sites in the UK and Ireland will be familiar with the need to obtain a CSCS card. In the UK the land-based CSCS card scheme is administered by the British Association of Landscape Industries (BALI) and offers a variety of different colour-coded cards dependent on the cardholder's role on the construction site. These cards need to be renewed periodically.

Some history

For many years feedback from numerous CIEEM members has focused on the perceived disproportionate requirements and costs of the scheme in relation to the roles and responsibilities on sites (applicants are required to have passed a mandatory CITB health and safety touch screen test, to attend a Register of Land-based Operatives (ROLO) health, safety and environmental awareness course and pass the associated mandatory test). The nub of the problem has been that, whilst CIEEM's competency-based membership grades mean that members are entitled to apply for the white/yellow Academically Qualified Person/Professionally Qualified Person (AQP/PQP) card, this card is more suited to those in a construction management role on site, a role that most CIEEM members would not have. Additionally, the ROLO course has often not been found to be useful in many cases, being composed primarily of information either not relevant to the CIEEM member role and/or inaccurate environmental information.

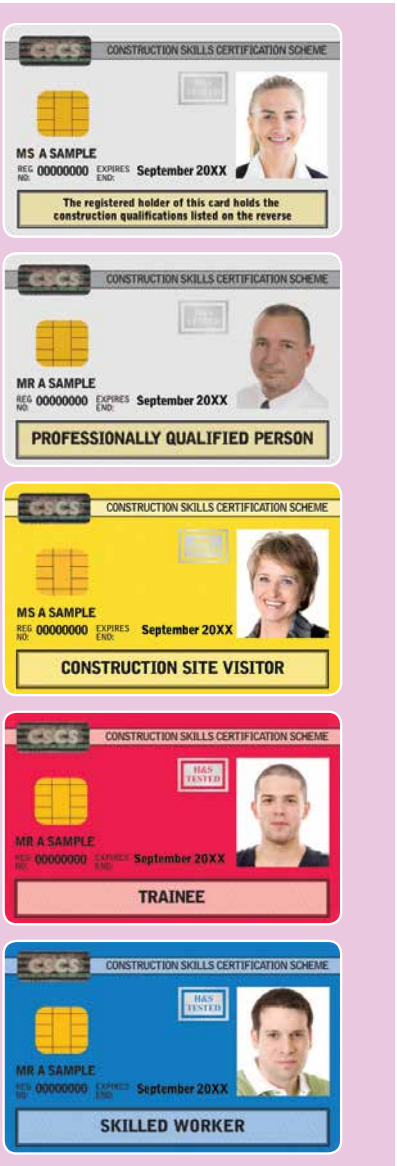
Many members have sought to get round the problem by obtaining a yellow Visitors card, which only requires the CITB test, but this is not appropriate if you are actively undertaking work on the site.

CIEEM has repeatedly tried to raise awareness of the frustrations of members with both CSCS and BALI in order to meaningfully engage in what a more appropriate approach for our discipline might look like, but without success. CIEEM has also volunteered time and expertise to update the content of the ROLO course to at least have some relevance to members and to ensure that members of other professions were getting accurate environmental information, but these changes do not appear to have been incorporated by most ROLO trainers. We have now been advised that further changes to the scheme are being introduced.

Changes to the CSCS card scheme

BALI has announced that, in addition to the CITB touch screen test, BALI is developing a mandatory 3-5 day ROLO health and safety course and test for holders of white/yellow AQP/PQP cards (for which only our Full members and Fellows are able to apply) which will be introduced in 2020.

Dependent on your role on site, all members can apply for the red Trainee SmartCard (valid for three years and renewable once only) which requires the CITB touch screen test and the one-day ROLO course and test. However, after six years you will have to apply for either the AQP/PQP card or the Blue Skilled Worker (Ecologist) SmartCard. The Blue Skilled Worker (Ecologist) SmartCard is valid for five years and requires you to have the necessary Protected Species licences for the relevant statutory agency, to have done the CITB touch screen test and to have also done the ROLO health and safety course and test.



The Yellow Visitors SmartCard is still available currently (until 28 February 2020) but will be withdrawn on 31 August 2020.

Further information can be found at: https://www.bali.org.uk/lisscscs/apply/ecology-and-environmental-management/

We must emphasise that it is up to individual members and their employers to decide what is the most relevant card for their role. Health and safety should not be compromised for the sake of a saving in time and money.

CIEEM Medal 2019

Awarded to Professor Desmond B.A. Thompson FCIEEM FRSE

The CIEEM Medal is the Chartered Institute's highest accolade and is awarded annually in recognition of an outstanding single or life-long contribution to the field of ecology and environmental management.

The Medal is open to both CIEEM members and non-members. Recipients of the Medal must have made an outstanding and/or life-long contribution, in relation to ecology and environmental management, in at least one of the following areas:

- intellectual insight, research and writing;
- technical innovation;
- advancing professional practice;
- development of organisations and capacity-building;
- influencing corporate and/or political policy and understanding; and/or
- extending public understanding and influencing attitudes.

Des Thompson is a highly influential ecologist who has made an outstanding and life-long contribution to biodiversity conservation and upland ecology at both national and international levels.

A strong proponent of the importance of basing conservation practice on sound scientific principles, he has published over 200 papers, articles and books, especially in relation to upland and bird ecology in which he has earned international recognition and respect. Indeed, he has been involved in almost every aspect of upland conservation throughout the British Isles over the past 30 years including as founder chairman of the Scottish Raptor Monitoring Scheme. His books, many of them published collaboratively, include *Ecological Change in the Uplands* (1988); *Heaths and Moorland – cultural landscapes* (1995); *Birds of Prey in a Changing Environment* (2003); *An Illustrated Guide to British Upland Vegetation* (2004); *The Nature of the Cairngorms: Diversity in a changing environment* (2006) and *Scotland's Birds of Prey* (2010).

Des not only administers but has also strongly influenced nature conservation policy, initially for the UK through the Nature Conservancy Council (NCC) and the Joint Nature Conservation Committee (JNCC), and in recent years for Scotland as Principal Adviser on Science and Biodiversity for Scottish Natural Heritage (SNH). He regularly provides advice to Ministers and civil servants in the Scottish Government which undoubtedly influences the political approach taken to conservation issues. At an international level he was, in 2014, elected Chairman of the Technical Advisory Group advising the United Nations Convention of Migratory Species work programme on the Conservation of Migratory Birds of Prey in Africa and Eurasia.

His work demonstrates both breadth and depth in his ecological expertise and contribution to our field. His primary research interests are in upland and arctic-alpine ecosystems, health, conservation and dynamics and on the value of nature. He is an associate editor for the *Journal of Applied Ecology* and has extensively presented at conferences in the UK and internationally. In 2015 he was elected a Fellow of the prestigious Royal Society of Edinburgh. He also gives generously of his time as a Fellow of CIEEM, writing articles for *In Practice* and chairing, with gentle authority and wisdom, numerous disciplinary boards. He is also a very active Chair of the Field Studies Council, a charity dedicated to providing outdoor environmental education.

An excellent communicator, a brilliant scientific administrator and an influential advocate for our profession, Professor Des Thompson is an undoubtedly worthy recipient of the CIEEM Medal.

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Policy Activities Update

Amber Connett GradCIEEM
Policy and Communications Officer, CIEEM

In recent months, the focus of our policy work has been on the forthcoming Environment Bill and engaging with decision-makers to ensure the Bill provides the best outcomes for the environment.

Our Environment Bill briefing has been been finalised and we have recently met with a number of MPs to discuss the wider Bill which is expected in summer 2019. Our briefing can be viewed at: https://cieem.net/resource/cieem-environment-bill-briefing/.

Over the last few months, we have been working on setting up a new All-Party Parliamentary Group (APPG) for Nature. The group will provide a forum for parliamentarians and policy-makers to engage with nature and issues relating to its management and enhancement. CIEEM will provide the secretariat services for the group, and we will organise an engaging programme of site visits and events to showcase the importance of nature for its enjoyment and human wellbeing, as well as a necessary support system for the economy and society. We are currently organising the group's launch and first meeting which will take place this summer.

On 12 March, Jason Reeves (CIEEM Head of Policy and Communications) gave a presentation on Green Brexit to the Westminster Energy, Environment & Transport (WEET) Forum seminar on 'Natural capital in England: progress on industry guidance, government policy and one year on since the 25 Year Environment Plan'.

CIEEM President, Max Wade CEcol CEnv FCIEEM, has given evidence to the Science and Technology Committee as part of their inquiry into Japanese knotweed and the built environment. Max outlined how recent research by AECOM and the University of Leeds provides sound evidence that Japanese knotweed is no more damaging to buildings than other problem plants. He also gave evidence on the experience of professionals working in that area. The evidence session can be viewed at https://parliamentlive.tv/Commons.

Jason Reeves (far right) at WEET Forum. Photo credit Chris Gerrard.

In March 2019, Kathy Dale (CIEEM Scotland Vice President), Caroline McParland (CIEEM Scotland Vice President-Elect), Annie Robinson (CIEEM Scotland Project Officer) and Jason met with representatives from Scottish Government to discuss environmental governance, Scotland's forthcoming environment strategy and Biodiversity Net Gain. Jason also met with Scottish Environment Link to discuss environmental governance.

In April, Caroline, Annie and Jason met with Mairi Gougeon MSP (Minister for Rural Affairs and Natural Environment) to discuss issues including how CIEEM can better engage with Scottish Government.

Jason Reeves, Mairi Gougeon, Annie Robinson and Caroline McParland

Annie has also started a dialogue with Gillian Martin MSP, chair of the Environment, Climate Change and Land Reform Committee in Scottish Government.

At the time of writing, Penny Lewns (Wales Vice President) and Diana Clark (Wales Project Officer) are intending to attend a meeting in the Welsh Assembly in May on nature and agriculture.

In Ireland, we are working on several initiatives to engage with stakeholders and other organisations. This work is being led by our Ireland Project Officer, Liz O'Reilly, with support from Ireland Vice President Will Woodrow.

We have recently responded to the following consultations:

- Biodiversity – Public Goods Scheme Inquiry (Climate Change, Environment and Rural Affairs Committee; Wales)

- Implementation of Section 7(1) of the Heritage Act 2018 (National Parks & Wildlife Service)
- Skellig Michael Management Plan – Public Consultation (Department of Culture, Heritage and the Gaeltacht; ROI)
- Biodiversity Net Gain (Defra)
- Scrutiny of the draft Environment Bill (Environment, Food and Rural Affairs Committee and Environmental Audit Committee; joint Environmental Policy Forum response)
- Housing Sector Plans (Scottish Environment Protection Agency)
- Heritage Ireland 2030– a new national heritage plan (Department of Culture, Heritage and the Gaeltacht)
- Climate Change Adaptation Programme 2019-2024 (Scottish Government)
- Scoping a new forestry plan for North West area forests and woodland (Department of Agriculture, Environment and Rural Affairs; NI)
- Environmental Principles and Governance for Scotland (Scottish Government)

Our Strategic Policy Panel met in March to discuss a variety of issues, including natural capital and green finance, the Agriculture Bill, future farm payment mechanisms and farm environment advisors, targets for the Environment Bill, and measuring the impact of policy engagement. Our four Country Policy Groups also met to continue work on country-specific projects and horizon-scanning activities.

The Ireland Policy Group has now published its briefing outlining business preparations that our members may need to make for Brexit, which can be viewed at our Resource Hub (https://cieem.net/i-am/resources-hub/).

At the time of writing, our other policy groups are continuing their work on country-specific projects:

- The Scotland Policy Group is continuing work on its Biodiversity Net Gain briefing, having sought input from the wider membership and relevant sectors.
- The England Policy Group is finalising two briefing papers: Natural Capital for Decision Makers and Natural Capital Briefing for Ecologists and Environmental Managers.
- The Wales Policy Group is pulling together a draft briefing on Green Infrastructure.

In the coming months we will continue to engage with relevant bodies and parliamentarians on the forthcoming Environment Bill, launching the APPG for Nature and increasing our policy engagement in the devolved countries.

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
biocensus Experts in Ecology
BSG ecology
EPR
pba peterbrett

Complaints Update

Breaches of the *Code of Professional Conduct*

At a hearing held on 28 February 2019 Mrs Olivia Collingwood ACIEEM was found to be in breach of Clause 4 of the *Code of Professional Conduct*, having failed to take sufficient action regarding the quality assurance of ecological reports and the evidence base for the conclusions and recommendations within them. Mrs Collingwood has been reprimanded with advice.

At a hearing on 28 February 2019, Mr Howard Williams CEnv MCIEEM was found to be in breach of clauses 4 and 5 of the *Code of Professional Conduct* having a) failed to meet the required good practice standard in bat survey and reporting and b) demonstrated a lapse of judgement in not managing a conflict of interest appropriately. Mr Williams has been given a reprimand with advice.

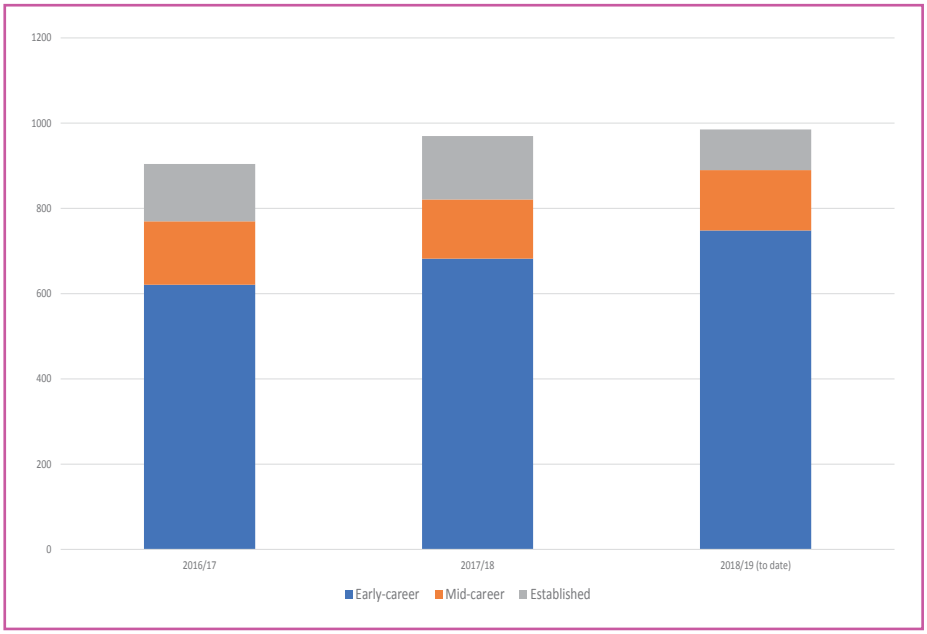
At a hearing on 28 February 2019, Mr Chris Cullen ACIEEM was found to be in breach of clause 5 of the *Code of Professional Conduct* having demonstrated a lapse of judgement in not managing a conflict of interest appropriately. Mr Cullen has been given a reprimand.

CIEEM is aware that there has been some coverage about the latter hearing on media/social media. CIEEM wishes to make clear that the findings that were made by the Board are as stated in the decision and that there was no finding that Mr Williams, nor Mr Cullen, has forged letters or otherwise behaved in any way unlawfully in this matter.

Membership Update

Stuart Parks
Head of Membership and Marketing, CIEEM

Six months on from the launch of our revised Qualifying membership grade we are pleased to be able to report that so far it appears to be very well received. We have already welcomed over 100 new members at this grade, increasing the total number of Qualifying members by 44%.



Membership applications per subscription year (Oct 1st - Sept 30th)

Encouragingly, every applicant is taking the time to engage with the Competency Framework as part of the application process and has been identifying not only their strengths but also their areas for development. Undertaking this process will stand them in good stead when it comes to planning their CPD and discussing with their managers and mentors how to develop their competence as professionals at the earliest stages of their career. In addition, what we are learning from these applicants also feeds nicely into our current review of the Professional Development Programme and our plans to develop a core package of training resources for those starting out as ecologists and environmental managers.

This growth in our Qualifying membership mirrors that across the board in that we continue to receive more applications for membership every month than ever before. We are now two thirds of the way through the current subscription year and have already surpassed the number of incoming applications received in the whole of the previous subscription year. A closer look at this growth in numbers also indicates a gradual shift in the skills, experience and levels of competence of those applying. Five years ago, we typically saw an even distribution of incoming applications with 33% being students, 33% at Basic level competence and the remainder at Accomplished level competence or above. Today we are seeing almost 50% of our incoming applications coming from students, and a further 30% at the equivalent of Basic level competence. This trend bodes well both for the future of the sector and of the Institute but necessarily means we will need to continue to review the benefits, services and advice we provide to ensure suitability and maintain the excellent rates of member retention that we typically see. In addition, the proportion of applications from members wanting to upgrade their membership remains healthy. This is vitally important for the continued growth and credibility of the Institute, particularly given the amount of time and expertise volunteered by members at these more senior levels. And to add some more good news, this volume of applications typically translates to increased membership as our current admission rate sits at an average of 85%.

If you are a current member, you may well have played a role in this continued success. If you have talked about CIEEM in a refreshment queue at an event; acted as a volunteer in a more formal role; promoted membership to a colleague; or acted as a sponsor or mentor for an applicant, this membership growth has been influenced by you too. Thank you. It benefits all members to have a growing, diverse and engaged membership base. Thanks too to the members who volunteer so much of their time to process a significant number of these incoming applications. We quite literally could not succeed in this vital area of our work without you.

If you find yourself in a position to talk to colleagues about becoming a member, do remember to encourage them to make use of the suite of support and guidance resources we've recently added to the website. There are short videos about the application processes and how to make use of the Competency Framework, as well as a revised guidance document and a more accessible version of the Framework itself. Watch out too for a new online self-assessment tool to help applicants identify their core strengths, and perhaps take a look yourself if you are considering upgrading your own membership this year.

Health and Wellbeing Survey – An Update

Sally Hayns CEcol MCIEEM
Chief Executive Officer, CIEEM

Our recent health and wellbeing survey attracted over 600 responses. We will be analysing the results in full over the coming weeks but here is an initial look at the survey results.

The rationale for the survey, and for next month's Summer Conference on the health and wellbeing theme, came from a number of sources. The Employment and Salary survey, the results of which we published last autumn, included numerous comments from respondents describing the (negative) impact of their role on their health and wellbeing. Terms such as 'burned-out', 'exhausted', 'intolerable pressure' and 'isolated' were not uncommonly used. Anecdotally, both through direct calls from members or conversations at conferences and events, we are hearing far too many stories of members struggling to cope with the hours, the type of work, the separation from families and money worries. The perceived low valuing of their role by others was also a common concern. This was clearly something we needed to explore more fully and both the survey and the forthcoming conference have provided us with opportunities to do so.

High-level data

Just over 50% of respondents to the survey work in consultancy, with the next highest proportion (15%) working in local/national government (excluding the Statutory Nature Conservation Bodies). Almost two thirds were Full members but just under a quarter (24%) are from the 'junior' grades of Graduate and Qualifying. Almost 90% of respondents work full-time with over half of those working in excess of 40 hours per week (most commonly 40-50 hours per week).

The most commonly cited issues affecting health and wellbeing for both employed and self-employed respondents were long working hours and unrealistic workloads and/or deadlines (both 59% of respondents). Just over 50% had concerns about the unsociable working hours and a similar proportion had been affected by the mental demands of the role (compared to 18.5% concerned about the physical aspects) and 48% reported the unsociable working hours as causing concern.

Over 50% of employed respondents worked for an employer that has a Health and Wellbeing Policy (in addition to a Health and Safety Policy) but only 45% of these were well implemented.

Significant or very significant mental health problems were reported by just over 20% of respondents whilst 11% reported significant or very significant physical health problems (although a slightly higher percentage of self-employed respondents had experienced physical health problems). A similar proportion (11%) had experienced significant or very significant behavioural changes. In all instances a much higher proportion (30-40%) reported moderate problems. In the past year, 15% of employed respondents had had more than five consecutive days off sick for colds/flu or physical illnesses whilst 16% had done so for mental health illness reasons. For self-employed respondents the figures are 8% and 7% respectively.

The majority of those who took the survey said that they do feel comfortable discussing issues around health and wellbeing either within their organisation (most commonly with line managers and co-workers) or, for self-employed respondents, with peers. Anonymous helplines, whether internal or external, had been used by 12% of respondents but 5% felt that they had no one that they could talk to within the workplace. Worryingly though almost 50% said that they would not disclose a mental health issue to their employer/line manager as a reason for their absence.

The most commonly recorded employer action to support health and wellbeing was to offer annual leave in excess of the statutory minimum (78%), flexible working hours (71%), measures to encourage/support physical activity such as running, cycling, etc. (50%), counselling (40%), work area assessment and adjustments (40%), stress management support (32%) and encouragement to undertake voluntary work during paid work time (32%).

In terms of direct support to individuals, the most requested action was for line managers to have a more realistic expectation of workload (22%) and practical help managing the work-life balance (20%).

Next steps

So what does all this mean? Well we will be using the results of the survey to inform the content of presentations at the Health and Wellbeing Conference next month (see page 21 for more information). This event will look at strategies for both individuals and employers to support health and wellbeing in the workplace. Over the next few months we will be doing some further analysis of the data, including looking for patterns between employed and self-employed members, differences between employment sectors and between seniority of roles. A more detailed report and analysis will be published either as a separate report in the summer or in the September issue of *In Practice*.

Thank you to all those who participated.

Student Hub:
New Qualifying Grade

How can we help you get where you want to go?

Chances are, like the rest of us, you decided to study ecology or environmental management because you care about the environment, you're passionate about conservation and you're fascinated by flora and fauna.

With the average salary for an ecologist starting at an aspirational £18k, you certainly didn't sign up with dreams of Lamborghinis and glamorous holidays in the Seychelles. No, you're going to be found freezing your wellies off in the back of a muddy 4X4, in the middle of the night, counting bats… And that's because you're doing something that you really care about, which is amazing, and laudable and, unfortunately, means a lot of people are going to assume you can live on passion and fresh air alone: they're going to expect you to work for free. At least for a bit.

And that's because a lot of people do end up doing just that. Competition for jobs in this sector is fierce and you're going to need a little more than just great grades and a strong moral compass to get ahead.

So, we've changed our membership structure to include a new grade: **Qualifying** – designed to help *you* get where you want to be. No longer do you have to prove to us what you're capable of in order to become a member at this level. No, instead, you tell us what your goals are, and we'll use all our years of experience to help you get there. Because if everyone's willing to work for free, then you're going to need the sort of CV that makes people think, *'Wow, over-achievers make me sick'*.

If you're currently a Student member, then the new Qualifying grade has been designed for you, as Student membership is only available for 12 months after the

end of your course. Ditto, if you've entered the profession via a more vocational route, then listen up.

Five reasons why you should upgrade and remain a member:

1. **Figure out where you're at**. Using our Competency Framework allows you to work out exactly what your strengths and areas for development are, so you can shout about the former and start putting in the legwork on the latter. By familiarising yourself with the Framework, you can build a stronger CV and talk confidently with prospective employers about the boxes you already tick and the ones you're proactively upskilling yourself on.
2. **Training that doesn't break the bank**. Once you know the areas that need some attention, you can start putting together a plan of action. We offer Member discounts on our training courses and our Member Network events are great and cost-effective ways to learn more.
3. **Sometimes it's not what you know…** Attending training and Member Network events are also brilliant ways to network. Because you never know, the nice person pouring tea on the butterfly walk may just be your next employer!
4. **Careers top tips**. As well as training and events, we host regular webinars aimed specifically at early careers professionals, with info gathered directly from the people you're hoping to get a job with, so you can be sure the advice is relevant to you.
5. **Our Membership speaks for itself**. Many employers specifically require you to be a CIEEM Member before they'll consider hiring you and, by becoming a Qualifying member, you're one step closer to having those much-coveted letters after your name!

How do you upgrade?

To upgrade your membership, you will need to apply for your chosen grade using the relevant application form. Fill this out and send it back to us as soon as possible. If you look on the upgrade pages within your My CIEEM area of the website, it will talk you through the process and will provide you with suitable links to guidance documentation and application forms. If you upgrade from a Student to Qualifying member you don't need to pay an admin fee, just the difference in subscription fee.

Please get in touch with the Membership Team if you have any questions about the upgrade process: membership@cieem.net.

British Ecological Society

From Evidence to Policy

Giving expert evidence to a committee of MPs allows science to be heard in the policy-making process, explains Dr Abigail McQuatters-Gollop of the University of Plymouth and the British Ecological Society's Brexit Policy Working Group.

In December 2018, I was asked to provide evidence to the House of Commons' Environment, Food, and Rural Affairs (EFRA) Committee as part of their inquiry scrutinising the UK government's new Fisheries Bill.

The UK Fisheries Bill is the plan for how the UK will manage its fisheries once we leave the EU Common Fisheries Policy. It's a subject which has been a high profile and controversial aspect of Brexit.

Giving evidence to MPs

Parliamentary committees find oral witnesses in several ways, such as through calls for written evidence. The EFRA Committee of MPs invited me based on my reputation in marine conservation and my ability to speak about science in non-technical language.

A committee clerk briefed me in advance on topics that would likely come up. I then prepared by reading (and re-reading) the new Fisheries Bill and explanatory notes, the previously published Fisheries White Paper, media articles about UK fisheries, and books and literature on fishing and Marine Protected Areas. I also consulted colleagues with parliamentary, fisheries policy and legal expertise to ensure that I thoroughly understood the Bill and how it links to conservation.

Additionally, I notified my MP (Luke Pollard – Shadow Fisheries Minister) that I would be appearing. Every time I've appeared as a witness or speaker in parliament, I've notified my MP so that he is aware of my involvement as his constituent. I later found out he watched my testimony and used it as evidence during a different part of the Bill's scrutiny.

Being prepared

On the day of the committee session, I arrived at the Palace of Westminster and met the other witnesses outside the committee room. We chatted about the Bill until we were called in to testify.

During preparation I'd outlined clear notes (colour-coded by topic for quick reference) and I brought these up with me during my examination. The committee isn't there to trap or trick witnesses, but to increase the MPs' level of understanding on a subject. So it's ok to refer to notes or to ask to do further research before responding later in writing.

I tried to speak slowly and clearly without using jargon when responding to committee questions, and I made sure to make my point first before backing it up with evidence. It is definitely intimidating facing a semicircle of MPs in a very formal setting, knowing that your testimony is being broadcast live online and will remain viewable forever. However, I tried to remind myself that I was the expert and I knew what I was talking about, and the committee was interested in my opinion and the evidence supporting it.

A rewarding experience

Acting as a witness is an opportunity to deliver science directly into the policy process as targeted and specific evidence. Being directly involved in decision-making in this way was an amazing experience.

When the EFRA Committee's report on the Fisheries Bill Inquiry was published I was excited to see they'd recommended improvements based on my (and other witnesses') testimony. Although appearing as a witness in Parliament is scary and requires significant preparation, the reward of helping to improve environmental management and conservation is definitely worth it.

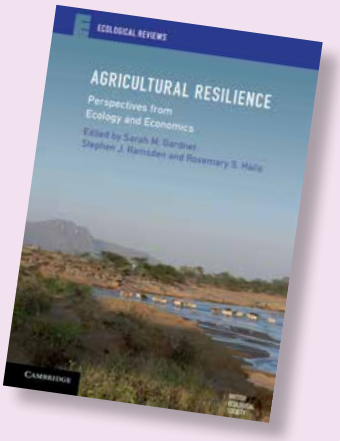
Get involved

The BES's policy team is always on the look out for ecologists willing to contribute their expertise in our policy work or looking for opportunities to gain experience working at the science-policy interface. Contact: Brendan Costelloe, BES policy manager, brendan@britishecologicalsociety.org

Farming Today

Agricultural Resilience is the latest book in the BES' Ecological Reviews series. It explores the economic, environmental and social uncertainties that influence the behaviour of agricultural producers and their subsequent farming approach. The importance of adaptability, innovation and capital are highlighted in enabling agriculture to persist under the pressures of climate change and the markets. The contributed chapters from ecologists and economists have been brought together and edited by Sarah Gardner of Gardner Lobo Associates, the University of Nottingham's Stephen Ramsden and Rosemary Hails of the National Trust. BES members can get a 25% discount – details in the members area of our website.

***Agricultural Resilience*, Cambridge University Press, ISBN 9781107665873, £34.99**



Academia Special Interest Group Report

Debbie Bartlett FCIEEM
University of Greenwich

Sharne McMillan CEnv MCIEEM
University of Hong Kong

The Academia Special Interest Group (ASIG) was established in 2018, primarily to provide a forum for those interested in working with academic institutions; the Terms of References are shown in Box 1.

Box 1. Agreed Terms of Reference for the Academia SIG:

1. To provide a voice for academics and represent sector interests within CIEEM.
2. To provide mutual support for academics in the sector and to facilitate information-sharing.
3. To encourage and support academic-industry links.
4. To contribute to and support, when requested, Standing Committees and the Secretariat in their work to engage with academic institutions on issues such as academic membership, student engagement and recruitment, addressing identified skills gaps and skills shortages and promoting degree accreditation.
5. To support CIEEM initiatives to influence the academic research agenda and promote the use of research evidence in professional practice.

In the initial phase of establishing the SIG, the CIEEM membership was asked for expressions of interest in joining the new ASIG and for volunteers for the committee. After elections the committee met and produced an outline plan that received Governing Board approval in September 2018. The next step was to gain wider input and some questions designed to inform the future direction of the ASIG were piloted at a meeting during the annual conference, held in Glasgow in November 2018. A questionnaire was sent to all ASIG members and a brief summary of responses follow.

Question 1: How can we better prepare students for the workplace?

Training was identified as a key requirement by 69% of respondents (Figure 1) with strong emphasis on practical survey and ID skills, biodiversity planning, legislation and licensing. Transferable skills were mentioned in 19% of responses, specifically communication/ writing but also time management, and interview skills. The need for accreditation and appropriate acknowledgement of qualifications combined with real life/ work practice was emphasised, with the suggestion that tutors should have experience/understanding of the workplace and the skills employers are seeking.

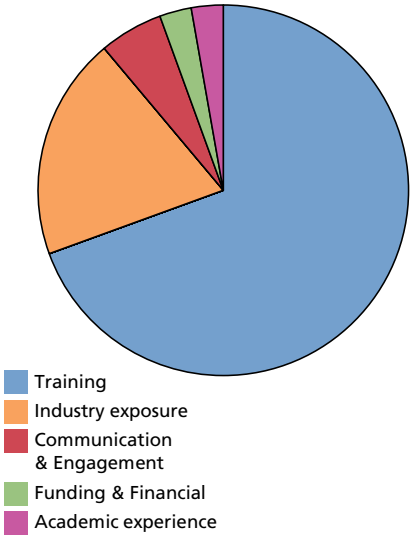


Figure 1. Responses to Question 1

Question 2: How does/should research inform practice? And practice inform research?

Communication was identified as the most important factor in facilitating research informed practice and vice versa, with 27% of respondents commenting on the lack of connection between practical ecology and research. 18% felt practice should inform research and 37% that research should inform practice, providing practical solutions. The topic of research funding was raised, perhaps surprisingly, by just 6% of respondents.

Question 3: How could the ASIG raise awareness of academic research relevant to practice?

Communication of research relevant to practice was mentioned in 84% of responses and the need for co-production emphasised. Suggestions for bridging this gap included a dedicated webpage, workshops at regional and national meetings, regular bulletins, *In Practice* articles, and use of social media.

Question 4: How could CIEEM develop and improve the benefits of membership to academics?

Relatively few full-time academics are CIEEM members, although many are linked to universities as part-time lecturers. The key factor is cost. The sector has lower earnings than consultancy and employers do not pay professional body fees. The issue of diversity was raised by 8% of respondents, and the importance of increasing student as well as academic membership.

Question 5: Is our 'good practice' good enough? Identify areas where there are issues?

27% of responses suggested research data, including monitoring, should form the basis of 'good practice', with regular review. Concern was expressed about the time lag for incorporating research and reluctance to publicise failures and so prevent repetition of mistakes. Suggestions to improve standards included defining 'good practice', increasing expectations and enforcing compliance. Unwillingness to change current practice and the likelihood that questioning standards would be unpopular were identified as barriers to improvement.

This is a preliminary report; more details and proposed actions will be published at a later date.

Thoughts on the issues raised and additional responses to the questions would be welcomed – please email d.bartlett@greenwich.ac.uk.

Member Network News

With regional Section Committees across England and national Sections in Wales, Ireland and Scotland, as well as Special Interest Groups (SIGs) focussing on specific topics, we have something for everyone.

Each network is run by a committee of volunteers, providing opportunities to share knowledge, meet likeminded people and learn more about the science and practice of our profession.

There are currently about 170 Member Network volunteers doing amazing work all over the UK, Ireland and beyond. If you'd like to find out about what they get up to and how you can get involved, please visit www.cieem.net/member-networks.

SCOTLAND

(Stalking) Scotland's Bean Geese: Talk on behalf of CIEEM's Scottish Committee

19 February 2019, Edinburgh

Other members of the Scottish Section Committee no doubt get bored of me (Brian Minshull) droning on about the wintering population of taiga bean geese *Anser fabalis* that I am privileged to work on, together with a small team of other keen individuals. This population involves just 240 individuals which winter on the Slamannan Plateau in Central Scotland (nowadays the only such population wintering in the British Isles).

Nevertheless, my fellow Committee members have occasionally suggested that I should organise an event to tell others about my involvement with these birds. This I did on 19 February 2019, attended by some 16 or so members.

Read more at: https://cieem.net/blog-stalking-scotlands-bean-geese/

SOUTH EAST ENGLAND

Greenwich Peninsula Ecology Park

24 March 2019, Greenwich

The South East Section Annual Members' Meeting was held at the Greenwich Peninsula Ecology Park in South London, owned by The Land Trust and managed by The Conservation Volunteers (TCV).

In addition to hearing about the activities of CIEEM and the South East Section at the annual meeting, attendees heard from Paul Hetherington about Buglife's B-lines project and Peter Massini of the Greater London Authority about urban greening. Site tours were led by Simon Pile of the Land Trust and Joanne Smith of The Conservation Volunteers. All on a gloriously sunny Sunday by the Thames.

Read more at: https://cieem.net/south-east-section-members-explore-greenwich-peninsula-ecology-park/

Ecological Restoration and Habitat Creation SIG Conference 2019

Practical Restoration and Creation: Lowland and Upland Grasslands

19 June 2019, Chesterfield

One of the aims of the Ecological Restoration and Habitat Creation Special Interest Group (ERHC SIG) is to promote the practical skills and evidence base for ecological restoration and habitat creation. This first SIG conference will focus on practical experience and case studies illustrating the design, implementation, management and monitoring for restoration and creation of grassland habitats.

Book your place at: https://events.cieem.net/Events/Event-Listing.aspx

SOUTH EAST ENGLAND

Leading with the landscape to secure ecosystem services: The new South Downs National Park Local Plan

1 April 2019, Midhurst

Hosted by the South Downs National Park Authority (SDNPA) at their headquarters in Midhurst, officers Ruth Childs (Landscape) and Katharine Stuart (Policy) introduced the emerging SDNPA Local Plan, likely to be adopted later this summer (subject to modifications). South East Section Members and SDNPA staff alike had the opportunity to ask questions, provide feedback and better understand how ecosystem services can be delivered through scheme design. A workshop session allowed participants to work together to identify opportunities for the inclusion of positive ecosystem services measures, which can also deliver ecological protection and enhancement.

Read more at: https://cieem.net/south-east-members-and-sndpa-explore-how-to-lead-with-the-landscape/

Look out for upcoming events in your area and keep up to date with what's been going on at www.cieem.net/member-networks.

CIEEM

THANK YOU!

National Volunteers' Week 1-7 June 2019

We'd like to take the opportunity to say a massive thank you to our community of passionate and dedicated volunteers that are such an integral part of CIEEM.

Each year 320 of you dedicate 19,000 hours of your time. That's the equivalent of 10 full time jobs!

You're there come rain or shine and we couldn't do what we do without you.

So, **THANK YOU** from everyone at CIEEM for your passion, expertise and commitment!

New Members

The decision on admission is usually taken by the Membership Admissions Committee or Registration Authority under delegated authority from the Governing Board but may be taken by the Governing Board itself.

CIEEM is pleased to welcome the following individuals as new and Chartered members:

ADMISSIONS

Chartered Environmentalist (CEnv)
Dr Frances Giaquinto.

Full Members (MCIEEM)
Ross Ahmed, Dr Alison Collins, Alistair Huntly, Dr Catharine Mayne, Dr Edward Morrison, Claire Neale, Owen Peat, Luci Ryan, Dr Martin Varley, Dr Barry Walls.

Upgrades to Full Membership (MCIEEM)
Rachel Barker, Jennifer Carr, Georgia Croxford, Sarah Denne, Eleanor Frew, Laura Jones, Samuel Pegler, Catherine Wiseman.

Associate Members (ACIEEM)
Amy Dowers, Christopher Hill, Suzanne Jenkins, Zoe Keeble, Russell Keen, Linda Kerrison, Katie Oliver, Jessica Smallcombe, Louisa Theeman, Margaret Trigg.

Upgrades to Associate Membership (ACIEEM)
Katherine Bird, Heather Campbell, Jonathan Carter, Emma England, Amy Finnegan, Becca Grainger-Wood, Briony Hill, Jessica Hinds, Gemma Holmes, Aaron Isaacs, Mark Morgan, Michal Ostalowski, Sara Rodriguez Pecino, Sarah Shorter, Joshua Styles.

Graduate Members (Grad CIEEM)
Edward Banfield Hicks, Zoe Barrett, Edward Basham, Rhiannon Brenchley, Emma Bruce, Joshua Butterworth, Luke Cartlidge, Jennefer Cawson, John Cheese, Adrian Cox, Sarah Coxhead, Jenny Davidson, Eleanor Delaney, James Field, Katharine Garratt, Iain Gilmore, Joshua Havlin, Sophie Hocart, Jack Howell, Robert Jefferies, Emily McCollum, Nicola Morton, Rachel Naden, Hannah Newton, Matthew Owen, Lorna Rowe, Síofra Sealy, Andrew Selman, Jonathan Slessor, Phillipa Stirling, Emma Valbret, Stuart Watson, Matthew Wisby.

Upgrades to Graduate Membership (Grad CIEEM)
Emma Baker, Samuel Braine, Joseph Chidzey, Amber Connett, Dr Andrea Drewitt, Emma Griffiths, Alexandre Hodges, Sarah Nicholson, Carl Platt, Teresa Sullivan.

Qualifying Members
Helen Allinson, Charlotte Alsop, Alice Bailey, Nick Bell, Joanna Bertwistle, Daniel Blake, Kimberley Bowman, Edie Burns, Matthew Caiels, Tom Carrick, George Caterer, Joanne Conway, Katie Dalton, Susanne Dunne, Joseph Evans, Sam Evans, Molly Foulds, Jade Furlong, James Garside, Derry Gibson, Finn Goddard, Matthew Griffiths, Miles Haslam, Jack Hawksley, Sarah Higginson, Nancy Inman, Maithri Jayasuriya, Lausanne Jenkins, Samuel Kench, Martin Kistell, Zinnia Kumar, Rebecca Lloyd, Mónica Lozano Subiranas, Noreen Lynch, Laura Mann, Georgia Marchington, Jordane Marsh, Nathan Mcilwrath, Olivia Mckechnie, Luke Measey, Joel Moore, Samuel Morris, Zoe Simone Newbery, Natasa Nikolic, Mark Oakes, Rebecca Owens, Philip Pell, Suzanna Platts, Deirdre Reidy, James Rigby, Sibrand Rinzema, Charlie Roberts, Laura Roche, Maria Slade, Jessica Snow, Hannah-Marie Stanton, Rory Straker, Rhiannon Taylor, Rachel Thompson, James Thornton, Eleanor Walker, Katie Watkins, Naomi Watson, Clare Wheeler, Mariko Whyte, David Williamson, Jamie Willmott, Dr Drew Wilson, Ruth Woolston, Catherine Wright, Ryan Yeates, Rachel Young.

Upgrades to Qualifying Membership
Natasha Chinn, Hayley Dean, Natasha Hannah-Lyons, Isaac Hogan, Evan Norcliffe, Joanne Reynolds.

Student Members
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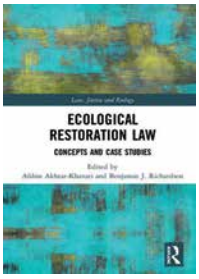
Recent Publications



Ecological Restoration Law: Concepts and Case Studies

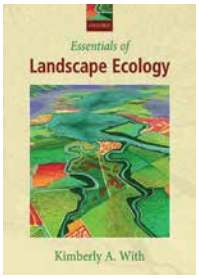
Editors: Afshin Akhtar-Khavari, Benjamin J. Richardson

ISBN: 9781138605015

Price: £115.00/ from £18.50 (eBook)

Available from: www.routledge.com

Ecological has been a low priority of environmental laws around the world, which tend to focus on rehabilitation of small sites rather than landscape scale restoration. Using case studies, this book explores a more ambitious agenda for ecological restoration law. Current laws and other governance mechanisms are outlined, and the philosophical and methodological bases for inclusion of ecological restoration in law are considered.



Essentials of Landscape Ecology

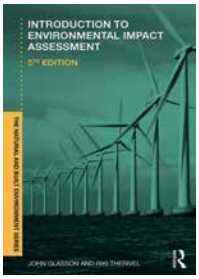
Author: Kimberly A. With

ISBN: 9780198838395

Price: £49.99

Available from: www.nhbs.com

Landscape ecology has emerged as a science to investigate the interactions between natural and anthropogenic landscapes and ecological processes across a wide range of scales and systems. This book presents the principles, theory, methods, and applications of landscape ecology, supplemented by examples and case studies from a variety of systems, including freshwater and marine. Subject areas include: the core concepts of landscape ecology, connectivity, population dynamics, community structure, ecosystem function and more.



Introduction to Environmental Impact Assessment

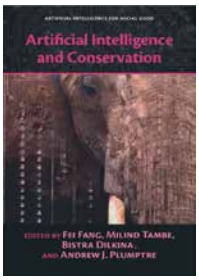
Author: John Glasson, Riki Therivel

ISBN: 9781138600751

Price: £40.99

Available from: www.routledge.com

The fifth edition of *Introduction to Environmental Impact Assessment* reflects on many significant changes in Environmental Impact Assessment (EIA) procedures, process, practice and prospects over the last decade. This book provides an update on the revised European Union EIA Directive, UK practice and procedures, best practice and a variety of case studies. The authors also provide an overview of future actions for the EIA process, as well as a discussion of the development of SEA legislation and practice.



Artificial Intelligence and Conservation

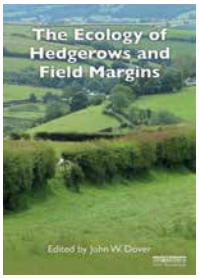
Editors: Fei Fang, Milind Tambe, Bistra Dilkina, Andrew J. Plumptre

ISBN: 9781138562981

Price: £39.99

Available from: www.nhbs.com

Artificial Intelligence and Conservation focuses on research advances in AI that benefit the conservation of wildlife, forests, coral reefs, rivers, and other natural resources. The book gives both an overview of the field and an in-depth view of how AI is being used to understand patterns in wildlife poaching and enhance patrol efforts in response, covering research advances, field tests and real-world deployments. Other areas of conservation are also considered, including protecting natural resources, ecosystem monitoring and bio-invasion management.



The Ecology of Hedgerows and Field Margins

Author: John W. Dover

ISBN: 9781138562981

Price: £39.99

Available from: www.routledge.com

This book reviews and assesses the current state of research on hedgerows and field margins. The book outlines definitions, current and historic management, the impact of pesticides, the decline in hedge stock and condition, and new approaches to hedge evaluation using remote sensing techniques. The pollination and biological pest control benefits provided by hedges and field margins are also considered along with the ecology of some of the major groups that are found in hedgerows and field margins, such as, butterflies and moths, carabid beetles, mammals, and birds. Finally, the authors introduce the neglected area of hedges in the urban environment.

Effects of Climate Change on Birds

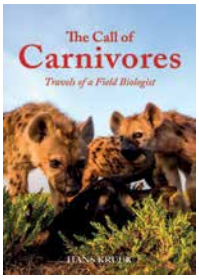
Editors: Peter O. Dunn, Anders Pape Møller

ISBN: 9780198824275

Price: £37.99

Available from: www.nhbs.com

Due to a long tradition of extensive research, birds provide a longer-term data set for analysing the effects of climate change compared with any other class of animals. Although interest in climate change issues is rising, a lack of general knowledge regarding the environmental consequences remains. The book synthesizes the current level of knowledge on methods for studying climate change, population consequences and interspecific effects. The authors also highlight new methods and recommend areas for future research.



The Call of Carnivores: Travels of a Field Biologist

Author: Hans Kruuk

ISBN: 9781784271930

Price: £20.00

Available from: www.pelagicpublishing.com

Hans Kruuk is a behavioural ecologist who has spent his life studying carnivores, from the Serengeti savannahs and Kalahari deserts to the Scottish Highlands, from the Galápagos Islands to the Far East. This book describes the methods, challenges and rewards of the science of behavioural ecology from a personal account. Exclusive line drawings and behind the scenes photographs of animal behaviour are included.

Free downloads that may be of interest to members:

– Protected Planet Report 2018: Tracking Progress Towards Global Targets for Protected Areas

– Island Invasives: Scaling Up to Meet the Challenge

Both available from: https://portals.iucn.org/library/

Bat overpasses: An insufficient solution to restore habitat connectivity across roads

Fabien Claireau, Yves Bas, Sébastien J. Puechmaille, Jean-François Julien, Benjamin Allegrini, Christian Kerbiriou

Journal of Applied Ecology 2019; 56: 573-584
https://doi.org/10.1111/1365-2664.13288

Roads have many negative effects on wildlife, including their role in habitat fragmentation. Habitat fragmentation affects bats during their daily movements between roosts and foraging areas. Bat overpasses have been proposed to reduce the impact of roads, but they have rarely been tested. This study assesses whether bat overpasses are effectively used by bats, testing three overpass designs using acoustic flight path reconstruction (AFPR). Results suggest that the proportion of bat crossings along the commuting route was the same with or without an overpass. The authors emphasise the importance of field testing the effectiveness of mitigation measures, such as those intended to offset the impact of roads on biodiversity, and highlight that such measures should not be implemented based on their theoretical effectiveness alone.

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The consequences of land sparing for birds in the United Kingdom

Anthony Lamb, Tom Finch, James W. Pearce-Higgins, Malcolm Ausden, Andrew Balmford, Claire Feniuk, Graham Hirons, Dario Massimino, Rhys E. Green

Journal of Applied Ecology 2019; Online
https://doi.org/10.1111/1365-2664.13362

Land sparing has been proposed as a strategy to reconcile biodiversity conservation with agricultural production. Previous studies have shown that most species would benefit if food demand was met through high-yield farming combined with the protection or restoration of natural habitat. However, most of these studies come from landscapes covered by large areas of natural habitat and without a long history of intense human modification. This study tests whether biodiversity responses differ in human-dominated landscapes. Estimates of bird population density were use in different (semi-) natural habitats, and forecasts of population density in farmland habitat, to assess the future consequences for birds of land-sparing scenarios in the United Kingdom. Results show land sparing has the potential to benefit UK bird populations but would likely have negative impacts on farmland bird species.

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Globally important islands where eradicating invasive mammals will benefit highly threatened vertebrates

Nick D. Holmes *et al*.

PLOS ONE 2019, 14(3): e0212128.
https://doi.org/10.1371/journal.pone.0212128

Introduced invasive species have been responsible for hundreds of extinctions, the majority of these on islands. This study identifies globally important islands for invasive mammal eradication programmes, which are shown to have a disproportionate benefit for preventing future extinctions. Results show that that if introduced mammals were removed from just 169 islands then 9.4% of the Earth's most threatened island species would benefit. Islands are ranked according to where eradicating invasive mammals would benefit most highly threatened vertebrates and socio-political feasibility is considered.

Open access at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0212128

Maize-dominated landscapes reduce bumblebee colony growth through pollen diversity loss

Annika Louise Hass, Lara Brachmann, Péter Batáry, Yann Clough, Hermann Behling, Teja Tscharntke

Journal of Applied Ecology 2019; 56: 294-304
https://doi.org/10.1111/1365-2664.13296

This study shows that high pollen diversity leads to better bumblebee colony performance under field conditions, and that the maintenance of floral diversity in agricultural landscapes is crucial to ensure that bumblebees can fulfil their nutritional needs. However, the study shows that the heterogeneity of crops, at least under the currently very low levels of crop rotation, does not contribute to this aim. In contrast, crop identity and timing of mass-flowering crops turned out to be important factors, as maize reduced pollen resources, while late blooming oilseed rape was beneficial to bumblebee colonies.

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Keystoneness, centrality, and the structural controllability of ecological networks

E. Fernando Cagua, Kate L. Wootton, Daniel B. Stouffer

Journal of Ecology 2019; Online
https://doi.org/10.1111/1365-2745.13147

Centrality metrics have often been used to identify "keystone" species. While centrality is useful when predicting which species' extinctions could cause the largest change in a community, it says little about how these species could be used to attain or preserve a community state. This paper introduces an approach to quantifying the extent to which network topology can be harnessed to achieve a desired state. It also allows quantification of a species' control capacity. The authors show that, while central species were also likely to have a large control capacity, centrality fails to identify species that, despite being less connected, were critical in their communities.

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Integrating ecosystem services into environmental decision-making

Alina Congreve, Iain D. Cross

Journal of Applied Ecology 2019; Online
https://doi.org/10.1111/1365-2664.13341

Natural capital describes the stock of renewable and non-renewable natural resources available to society. Ecosystem services are the societal benefits derived from natural capital. These terms have become more prominent in key national environmental policy documents, including the 25 Year Environment Plan and the Environment Wales Act (2016). However, major practical challenges remain for the implementation of an ecosystem services approach to environmental decision-making in the UK. This paper is aimed at practitioners and academic ecologists who face challenges in developing an ecosystem services approach to decision-making. The paper uses freshwater environments to highlight where collective research and action by the ecological research community and practitioners could lead to enhanced ecological and societal outcomes.

Open access at: https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2664.13341

Population responses of farmland bird species to agri-environment schemes and land management options in Northeastern Scotland

Gergana N. Daskalova, Albert B. Phillimore, Matthew Bell, Hywel E. Maggs, Allan J. Perkins

Journal of Applied Ecology 2019; 56: 640-650
https://doi.org/10.1111/1365-2664.13309

Despite land stewardship supported by funding from agri-environment schemes (AES), farmland birds are declining across Europe. To investigate the contribution of AES towards farmland bird conservation, abundance of five farmland bird species across 13 years and 53 farms were compared. The study documented a weak effect size of participation in agri-environment schemes on farmland bird abundance. Among different land management options, the authors found that species-rich grasslands, water margins, and wetland creation enhanced breeding bird abundance, highlighting the importance of relatively undisturbed herbaceous or grassland vegetation for farmland conservation.

Open access at: https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2664.13309

Optimizing carbon storage and biodiversity co-benefits in reforested riparian zones

Kristen E. Dybala, Kristin Steger, Robert G. Walsh, David R. Smart, Thomas Gardali, Nathaniel E. Seavy

Journal of Applied Ecology 2019; 56: 294-304
https://doi.org/10.1111/1365-2664.13272

Climate change and biodiversity loss are two global challenges that can be addressed simultaneously through reforestation of previously cleared land. However, carbon markets can encourage reforestations that focus on maximizing carbon storage, potentially at the expense of biodiversity conservation. This study identifies synergies and trade-offs between carbon storage and biodiversity in their relationships to forest stand features, indicating opportunities to optimize reforestation design and management to achieve multiple goals.

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Environmental benefits of leaving offshore infrastructure in the ocean

Ashley M. Fowler *et al*.

Frontiers in Ecology and the Environment 2018; 16: 571–578
https://doi.org/10.1002/fee.1827

The removal of thousands of structures associated with oil and gas development from the world's oceans is well underway, yet the environmental impacts of this decommissioning practice remain unknown. This study surveyed environmental experts to determine best decommissioning practices in the North Sea. Partial removal options were considered to deliver better environmental outcomes than complete removal for platforms as a they have the potential to deliver biodiversity enhancement, provision of reef habitat, and protection from bottom trawling. The authors provide recommendations to guide the revision of offshore decommissioning policy, including a temporary suspension of obligatory removal.

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Maintaining ecosystem properties after loss of ash in Great Britain

Louise Hill, Gabriel Hemery, Andy Hector, Nick Brown

Journal of Applied Ecology 2019; 56: 282-293
https://doi.org/10.1111/1365-2664.13255

In Britain, ash dieback *(Hymenoscyphus fraxineus)* has severe impacts on common ash *(Fraxinus excelsior L.)* populations, and the emerald ash borer *(Agrilus planipennis Fairmaire)* is likely to add to the impact in future. This will cause significant changes to the character and functioning of many ecosystems. Here the authors present a method to locate areas most ecologically vulnerable to loss of a major tree species and identify the resultant damage to ecosystem properties. Practical recommendations are also given for the ash dieback outbreak in Britain to help conserve functional traits in ecosystems affected by the loss of ash.

Open access at: https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2664.13255

Conventional methods for enhancing connectivity in conservation planning do not always maintain gene flow

Jeffrey O. Hanson, Richard A. Fuller, Jonathan R. Rhodes

Journal of Applied Ecology 2019; 56: 913-922
https://doi.org/10.1111/1365-2664.13315

This study investigates the ability of plans for protected area systems to maintain gene flow when they are generated using conventional methods for promoting connectivity. Results show that conventional methods for enhancing connectivity in conservation planning, such as spatially clustering priority areas or providing connected sections of suitable habitat, were generally unable to maintain high levels of gene flow and failed. The authors suggest that conservation plans could be substantially improved by directly using genetic data, although whether this is a good choice for a particular situation will also depend on the costs of obtaining these data.

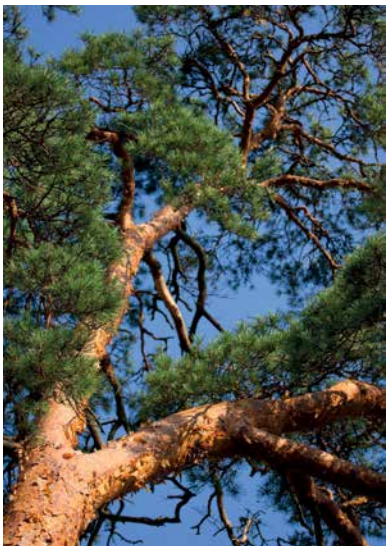
Correspondence: jeffrey.hanson@uqconnect.edu.au

Differences between primary and secondary plant succession among biomes of the world

Karel Prach, Lawrence R. Walker

Journal of Ecology 2019; 107: 510-516
https://doi.org/10.1111/1365-2745.13078

Studies of plant succession are often distinguished by the severity of the disturbance that triggers them. Using two anthropogenic disturbances, this study examines the common assumption that primary and secondary succession differ. Successional trajectories were compared in terms of the likelihood of a return to target vegetation, changes in species richness, type of trajectories, and the importance of alien species. Primary and secondary seres differed in all of these aspects. Results of this study show that broad generalisations about succession are possible which could provide a practical framework for land managers to guide restoration efforts.



Open access at: https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2745.13078

Forthcoming Events

For information on these events please see *www.cieem.net*.

Conferences		
Date	**Title**	**Location**
19 June 2019	Ecological Restoration and Habitat Creation Special Interest Group Conference – Practical Restoration and Creation: Lowland and Upland Grasslands	Chesterfield
4 July 2019	Summer Conference 2019 – Health and Wellbeing in the Ecology and Environmental Management Profession	Birmingham
24 September 2019	Scottish Section Conference – Climate Change: Its Impact on Scotland's Wildlife & Landscapes	Stirling
19-20 November 2019	Autumn Conference – Planning for Success: Maximising Biodiversity Net Gain Through the Planning and Permitting Process	Llandudno

Webinars		
7 October 2019	Delivering the diversity in Biodiversity Net Gain	Online

Training Courses		
June 2019		
6	Otter Survey, Impacts and Mitigation	Dunblane
11	Calculating and Using Biodiversity Units	Manchester
11	Otter Ecology and Surveys	Stafford
11-12	Flying high – Drones for Ecology and Land Management	Richmond Park
12	Otter Mitigation	Cannock
13	Grass and Sedge Identification – Neutral and Calcareous Grasslands	Salisbury
15	Bat Handling and Identification	Herne Bay
19	Beginners guide to the NVC	Carlisle
20	Using Indicator Species for Habitat Assessment (Phase I and NVC) – Grasslands	Salisbury
24	Wildflower Identification – Neutral and Calcareous Grassland	Salisbury
25	Water Vole Ecology & Surveys	Derbyshire
26	Water Vole Mitigation	Derbyshire
29	Hazel Dormouse Handling and Survey Methods	Herne Bay
July 2019		
3-5	Working with Crayfish: Survey Methods, Ecology, Mitigation, Licensing and Invasive Species	Settle
8	Wetland Habitat Identification, Evaluation and Management	Swansea
24	Badger Ecology and Survey Techniques	Lincoln
25	Badger Impacts and Mitigation	Lincoln
August 2019		
15-16	Advanced Bat Survey Techniques	Wotton-under-Edge
28	Identification of Invasive Alien Plants	Richmond
29	Identification of Invasive Alien Plants	Richmond
30	Hazel Dormouse-Handling and Survey Methods	Herne Bay
September 2019		
4	Biodiversity Net Gain Through Development	Bristol
5-6	Introduction to Phase 1 Habitat Survey	Linlithgow

Our Ecology team work throughout the year carrying out surveys to identify, record, and monitor species and their habitats. As we enter summer we are looking for enthusiastic and capable new people to join our growing team of experienced ecologists.

Seasonal Roles: Spring and Summer are always busy seasons so we are in search of seasonal field surveyors and experienced ecologists to support our national team, with particular focus on Edinburgh, Belfast, Manchester, Leicester, Guildford, London, Cardiff and the South West.

Permanent Vacancies: In addition to seasonal vacancies, we also have permanent vacancies from Assistant to Principal level across the national team.

Our ecologists work on a variety of projects across the UK – from developing wintering bird mitigation strategies, to minimising impacts on biodiversity whilst maximising developable areas.

At WYG we believe in a good work-life balance and recognise that our employees may need flexible working throughout different stages of their career. We appreciate that everyone is different and give our employees time to develop their skills and specialise in their own area of ecology.

Find out if you could join one of our award-winning teams across the country and enjoy support for training and our excellent benefits package including:

- Company Car for all grades
- Excellent Flexible Benefits Package
- Bonus day off for your birthday
- Progression, Training & CPD

Search and apply for our current vacancies at www.**wygcareers.com** or email your cv to **ecology@wyg.com**

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www.**wyg.com**