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Climate Change Adaptation and Mitigation

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Welcome

Climate change

Climate change is many things – a scientific question, a technological challenge, a political conundrum, a series of moral dilemmas and a multiplier of other risks. Because it has so many faces, is so pervasive and has such profound ramifications it is very hard to tackle. Where to begin in cutting emissions, and who should pay?

And because there has been a successful campaign in the media to confuse the scientific discussion, for many, including senior figures in politics and business, even those questions are irrelevant. After all, why take action to solve a problem that may not exist? In part ideological and in part psychological, there is little real science behind the widespread denial that we have a problem.

Such is the context that has led to near paralysis when it comes to taking effective action on climate change. As the evidence mounts as to both the causes and consequences, at the global level emissions continue to increase while decisions across a range of policy areas exacerbate future vulnerability to the expected impacts.

Under these circumstances it strikes me as vital that practitioners in those disciplines that are in a position to act, step back and take stock of the real nature of the problem. That process leads me to increasingly see the climate change challenge as less about technology and politics and more about psychology. That in turn leads to a discussion about narratives and the mental frames of reference through which people hear about climate change and its implications.

For the most part the presentation of climate change is based on a combination of peril, implied guilt and inevitable sacrifice. No wonder those who seek to insert an element of doubt are so successful, even when they have the flimsiest grounds for the claims they make. But what might work better?

One thing is a more positive story. When action to combat and adapt to climate change is presented through the prisms of job creation, economic advantage, enhanced security and better health, a different reaction might be expected.

If that is correct then how to convey the message becomes a very important question. The mass media for the most part can't do science and because bias and 'balance' tend to trump facts, different routes to changing awareness and opinion are needed. One approach could be to shift the narrative more through doing things, as well as talking about them.

After all, a focus on making positive changes and showing those to as many people as possible is more likely to build support for change than trying to get accurate reporting from certain newspaper editorials or science-based policy from an ideological minister who is unable to read data.

Renaturalising rivers can help reduce flood risk while rebuilding fish populations and creating recreational opportunities. The restoration of blanket bogs to increase carbon storage can reduce the cost of supplying water. Offshore wind farms help diminish reliance on energy supplies from regions riven with conflict and electric cars are cheaper to run than fossil-fuel powered equivalents. Low carbon lifestyles can be better for people's health while cities made ready for climate change impacts can be far nicer to live in.

Awareness about all of that and a whole lot more could build quite a different public reaction, and this is why it is time to go around the climate change deniers. Their day will in any event soon be done. As Nature speaks and lays out the realities of a warmer world, it will not be for want of evidence that we'll struggle to cope. It will be more for a widely owned positive view of how things could work better. The sooner we can break that barrier the better.

Tony Juniper is a CIEEM Patron, President of the Society for the Environment and a Fellow with the University of Cambridge Institute for Sustainability Leadership. His new book, *What Nature Does for Britain*, will be published in February 2015.

Information

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Editor

Dr Gillian Kerby (gillkerby@cieem.net)

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CIEEM Office

**43 Southgate Street, Winchester,
Hampshire, SO23 9EH, UK**

T: 01962 868626

E: enquiries@cieem.net

W: www.cieem.net

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Natural England publish Climate Change Adaptation Manual

This Adaptation Manual is a resource to help conservation managers and advisors to make informed decisions about adaptation. It brings together recent science, experience and case studies, and is intended to be an accessible entry point to a range of available resources and tools that can support practical adaptation.

<http://publications.naturalengland.org.uk/publication/5629923804839936>

Climate & Us

Launched in February 2014, Climate & Us is a collaboration between EDF Energy, the University of Exeter and the Met Office to help people, businesses and communities understand climate change and its relevance to the UK at local and national level, with a focus on the challenges and opportunities presented by adaptation and mitigation. The core content is organised by region and theme, and follows the structure of the Climate Change Risk Assessments first presented to Parliament in 2012, and now in their second cycle. Beyond the UK, Climate & Us also offers non-practitioners a clear overview of climate change science, and the wider international framework for climate negotiations. Visit <http://goo.gl/KZWHU6> for more information. Feedback and contributions (articles and blogs) are welcomed. Please contact info@climateandus.com or visit <http://eepurl.com/Yhltz> to receive the bi-monthly e-newsletter.

UNEP-WCMC briefing highlights role of biodiversity in addressing climate change

The UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) has released a policy brief connecting the dots between protecting biodiversity and acting on climate change. The brief – *Addressing Climate Change: Why Biodiversity Matters* – discusses the potential negative effects of climate change mitigation programmes on biodiversity. It concludes biodiversity conservation can support climate change mitigation and adaptation goals if all potential impacts are weighed carefully in the policymaking process.

<http://goo.gl/wfyh9>

New UK National Ecosystem Approach Report

The *UK National Ecosystem Assessment Follow On* report has been developed with support from Defra and continues the work instigated in the UK to respond to the 2006 Millennium Ecosystem assessment which led to the 2011 UK National Ecosystem Assessment report.

<http://bio-diverse.org/2014/07/15/new-ukneaf-report/>

State of Scotland's environment outlined in new report

This report provides a comprehensive, impartial assessment of Scotland's environment and how it is changing, based on the latest data from a wide range of sources. This is the first major update since *The State of the Environment Report* was last published in 2011.

http://www.sepa.org.uk/about_us/news/2014/state_of_scotland%E2%80%99s_environment.aspx



First national model for Bovine TB calls for more focus on cattle

A team of researchers has produced the first national model to investigate the spread of bovine TB. The results derived from the model demonstrated that the majority of herd outbreaks are caused by multiple transmission routes – including failed cattle infection tests, cattle movement and reinfection from environmental reservoirs. The study suggests that improved testing, vaccination of cattle and culling all cattle on infected farms would be the most effective strategies for controlling the disease. The model proposes that whilst badgers form part of the environmental reservoir they only play a relatively minor role in the transmission of infection.

http://www2.warwick.ac.uk/newsandevents/pressreleases/first_national_modell/

<http://www.nature.com/nature/journal/v511/n7508/full/nature13529.html>



New study says small-scale badger culls may boost spread of bovine TB

This study shows that small-scale culling changes badgers' behaviour in ways that risk increasing TB transmission among badgers and exacerbating cattle TB incidence rather than reducing it.

<http://www.bbc.co.uk/news/science-environment-27770272>

<http://www.pnas.org/content/111/25/9193>

Environmental Audit Committee publishes report on Marine Protected Areas

The Environmental Audit Committee has published its report on Marine Protected Areas. In November 2013 the Government designated 27 Marine Conservation Zones (MCZs) – well short of the 127 sites recommended by the project groups it had set up. This slow pace has been disappointing and suggests a lack of Government commitment to this initiative.

<http://www.publications.parliament.uk/pa/cm201415/cmselect/cmenvaud/221/221.pdf>



New protection for Scotland's seas

Scotland's iconic marine species and habitats will be better protected following the designation of 30 Marine Protected Areas. Sites will protect a range of habitats and species including flameshell beds, feather stars, the common skate and ocean quahog, a large mollusc which can live for centuries. One of the sites – the North East Faroe Shetland Channel – is estimated to be the largest Marine Protected Area in the EU.

<http://news.scotland.gov.uk/News/New-protection-for-Scotland-s-seas-f1e.aspx>

Framework for Cumulative Impact Assessments (CIA) related to MPAs

The aim of this study has been to provide a detailed review and evaluation of methods for conducting CIAs both within and beyond the marine environment. The review has identified strong case studies and clear outline methodologies from the literature, evaluating where CIA methodologies have worked and their strengths and weaknesses.

<http://publications.naturalengland.org.uk/publication/6341085840277504>

ENEP Newsflash highlights

Issue 34 - <http://www.efaep.org/issue-34>

- Summer 2014 update on EU funding opportunities
- New EU initiative to halt biodiversity loss and combat wildlife crime
- Web Streaming of conference on Mapping and Assessment of Ecosystems and their Services (MAES) in Europe
- Consultation on EU No Net Loss initiative



Issue 35 - <http://www.efaep.org/issue-35>

- Time for change in Brussels
- First meeting of new Italian Presidency of the European Union to discuss reinforcement of Green growth strategy
- ENEP participates in second Green Infrastructure Implementation and Restoration (GIIR) Working Group in Brussels on 23rd June

Sign up to receive the Newsflash directly at www.environmentalprofessionals.eu

New tool to identify best management plans for Natura 2000 sites

A new decision-making aid to identify the best type of management plan for Natura 2000 sites has been developed. Using extensive data on different facets of biodiversity and human impacts, the researchers created two indices to show where conservation measures need to be integrated with socio-economic development.

http://ec.europa.eu/environment/integration/research/newsalert/pdf/381na6_en.pdf

New Scottish species reintroduction code launched

Scotland's Environment and Climate Change Minister has launched a ground-breaking code for animal and plant reintroductions. The Scottish Code for Conservation Translocations, and the accompanying guidelines, provides information to individuals and organisations considering animal or plant reintroductions in Scotland.

<http://www.snh.gov.uk/news-and-events/press-releases/press-release-details/?id=1036>

New online tool launched to help LPAs assess development issues around SSSIs

Local planning authorities (LPAs) in England will be able to assess whether a proposed development is likely to affect the country's 4,128 SSSIs thanks to a new simple-to-use online tool produced by Natural England. The Impact Risk Zones (IRZs) dataset is a GIS tool which maps zones around each SSSI according to the particular sensitivities of the features for which it is notified and specifies the types of development that have the potential to have adverse impacts.

<http://www.naturalengland.org.uk/ourwork/planningdevelopment/impactriskzonesgistoolfeature.aspx>

Plantlife's Farmland Report for Wales

Wales' farmland is rapidly becoming the domain of a few species where once there was abundant diversity, with increased intensification resulting in wild flowers such as prickly poppy and rough poppy being squeezed out of the landscape.

http://www.plantlife.org.uk/about_us/news_press/red_alert_wales_poppy_declining

New study says European agricultural policy is failing the environment

The European policies designed to encourage a more biodiverse environment that is better able to support wildlife and plants are failing. In fact, analysis of the reforms designed to "green" the EU Common Agricultural Policy (CAP) suggests they neither encourage greater wildlife abundance nor provide adequate protection for vulnerable habitats such as grasslands.

<http://www.cieem.net/news/188/new-study-says-european-agricultural-policy-is-failing-the-environment>

Rhododendron Control Initiative in Killarney National Park

The Minister for Arts, Heritage and the Gaeltacht, Jimmy Deenihan TD, has announced a new project – Adopt a Woodland in Killarney National Park – to assist with the control of *Rhododendron ponticum* in the National Park.

<http://www.ahg.gov.ie/en/PressReleases/2014/June2014PressReleases/htmltext,17978,en.html>

Bat Survey Good Practice Guidelines – 3rd Edition

Following BCT's consultation requesting feedback about the 2nd edition of *Bat Surveys Good Practice Guidelines*, which closed at the end of summer 2013, they are aiming to publish a 3rd edition in winter 2014/2015. They hope that the editorial board will consist of the 2nd edition authors (who represent BCT, NRW, ALGE and ecological consultancies) plus representatives from NE, SNH, CIEEM and an LPA (to be confirmed).

http://www.bats.org.uk/news.php/238/new_edition_of_bat_surveys_good_practice_guidelines_to_come

Nature offers a great return on investment

A new report demonstrating that investment in the environment offers excellent value for money has been published by Natural England. The report, *Microeconomic Evidence for the Benefits of Investment in the Environment* (MEBIE 2), assesses the evidence across a wide range of themes, including economic growth, health, social cohesion and resilience to climate change.

http://www.naturalengland.org.uk/about_us/news/2014/090614.aspx

Government refuses to raise ambition of HS2's environmental protections

The Government's response to an Environmental Audit Committee report, on HS2 and the environment, rejects the Committee's call for a more ambitious objective than 'no net biodiversity loss'. The response also discounts the Committee's call to provide greater 'environmental compensation' (or offsetting) for ancient woodlands destroyed by the rail line.

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/environmental-audit-committee/news/hs2governmentresponsepublication/>

Natural England's National Character Area project completed

Natural England's National Character Area project, defining all of England's 159 major landscape areas, has been completed. The result is a unique, free and highly accessible information resource, highlighting how England's varied landscapes function and how they can be cared for.

<http://www.naturalengland.org.uk/publications/nca/default.aspx>

E-learning

CIEEM has recently commissioned an e-learning feasibility study to investigate the potential for delivering CPD courses through a range of online approaches. We see e-learning as a means of improving the accessibility of courses for everyone but we recognise that there are some aspects of learning, such as practical field-based teaching, which are an important part of our professional development programme. The feasibility study has been designed to help us understand what types of e-learning might be appropriate, what implementation options are available, whether e-learning can be cost-effective and, most critically, whether e-learning is something our members want.

Higher Education Apprenticeships

Following a meeting with the Department of Business Innovation and Skills it has become clear that the Government will not support higher education apprenticeships to support graduates taking that first step into the profession. We will be continuing to explore other means of achieving this.

In the meantime the Government is very keen that professional bodies investigate apprenticeships that support non-graduates gaining entry into the profession (and professional grade membership) as an alternative to a degree. Such apprenticeships would be 4 – 6 years in length and would include an entitlement to work-based and classroom-based training. It could be that the training is designed and offered in such a way that the apprentices get a degree at the end of their apprenticeship.

LISS/CSCS Cards

There are still a number of issues regarding members' obtaining the Professionally Qualified Person card for visiting / working on construction sites and we, with the help of CIEEM Fellow Mike Oxford, have been liaising with BALI and CSCS regarding changes to the 'rules' to ensure that our members have equivalent access to the right card(s) as other professions. A full update will appear in the December issue of In Practice but in the meantime we do have the opportunity to influence the content of the ROLO health and safety course in order to ensure it is appropriate for ecologists and environmental managers. If you would like to suggest ideas on appropriate course content please email your suggestions to enquiries@cieem.net or contribute via the discussion thread on Linked In.

Diversity Survey

CIEEM's Diversity Working Group is keen to gain a better understanding of what diversity issues impact upon people working in ecology and environmental management. An online survey will be launched this month. We would encourage as many members as possible to take part so that we get as comprehensive a picture as possible.

Natural England Licensing

Natural England have had a lot of problems with their online licensing applications and we have been trying to help so thank you to those CIEEM members who recently gave some time to help test the new forms. Problems still remain with the format/detail required in the forms and, following a letter from the CIEEM president to Natural England, a follow-up meeting is scheduled to take place soon.

Chartered Ecologist Deadline

Full members and Fellows are asked to note that the final deadline for Chartered Ecologist applications in this calendar year is the **17th October 2014**. New guidance on applying for the Chartered Ecologist award is now available on our website.

Professional Standards Committee

We are looking for two new members to join the Professional Standards Committee (PSC). The role of PSC is to identify plan and undertake activities to promote good practice standards amongst members, to keep the Code of Professional Conduct and Disciplinary Procedures under review and to assess cases of alleged breaches of alleged breaches of the Code of Professional Conduct by members or applicants and, where necessary, to refer cases for further scrutiny by a Disciplinary Board.

PSC meets 4 times a year, usually in London, and members are required to contribute to projects and decision-making (usually by email) between meetings as well as to undertake preliminary assessments of disciplinary cases as and when required (for which training will be provided). Travel expenses to attend meetings are covered by CIEEM.

Applicants must be Full members or Fellows of CIEEM. Applicants from any employment sector are welcome although the committee is particularly keen to encourage applications from members working in the voluntary sector or for larger consultancies.

The deadline for applications is the **19th September 2014**. Applications should be made using the appropriate form which is available from the members' area of the website. Please note that PSC members will be asked for evidence of being up-to-date with their CPD record.

SocEnv launches a new professional register: Registered Environmental Technician

The Society for the Environment (SocEnv) has established a new professional register for Registered Environmental Technicians (REnvTech). The Society is answering the call by the Technicians Council to raise the profile, status and numbers of technicians in the workforce following an important report by the UK Commission for Employment and Skills in 2009. The report highlighted an alarming skills gap between the number of technicians presently working in the UK, and the 450,000 needed by 2020 to underpin a growing innovation economy. REnvTech, not only recognises the value and importance of technicians in a wide variety of environmentally-related fields, but also offers a career ladder to Chartered status – Chartered Environmentalist (CEnv).

<http://www.socenv.org.uk/news/socenv-launches-renvtech/>

Staff Changes

Following the restructuring of the Secretariat we are pleased to welcome two new members of staff. **Annie Hall** has joined us as Membership Administrative Officer, working as part of the Membership Team which will be led by our new Membership Manager, **Stuart Parks**. We wish them well in their new roles.

Rob Strachan Obituary

Rob Strachan, ecologist and author of *The Water Vole Conservation Handbook*, died in May following a short illness. Most recently, Rob worked as Biodiversity Technical Specialist with Natural Resources Wales focusing on Priority Biodiversity Action Plan species and habitats associated with wetlands and rivers. He was the author of a great many publications on water vole, otter, mink and pine marten, but also of several books with broad public appeal, such as *The Mammal Detective*. Rob spent much of his spare time passing on his enthusiasm for wildlife and gladly shared his extensive knowledge. He was a trainer for CIEEM, The Mammal Society, various Wildlife Trusts, The Vincent Wildlife Trust's Mammals in a Sustainable Environment (MISE) project and a part-time lecturer with Aberystwyth University. He was also an excellent botanist, keen birder, moth recorder and a bat trainer.

Rob will be sorely missed on both a personal and professional level. His presence at so many conferences and training workshops combined with his books and papers made him ubiquitous. People who had never met him knew his name and he essentially became a very human 'living legend'. But he was in no sense an overbearing individual, and remained humble with regard to his broad range of achievements.

His absence could have significant negative repercussions for a broad number of the projects he keenly supported, and those of us who wish to see the many projects he enthusiastically pursued continue will have to consider our own individual levels of commitment.

For the full obituary please visit the CIEEM website at: <http://www.cieem.net/news/198/rob-strachan-obituary>

Penny Lewns CEnv MCIEEM and Derek Gow MCIEEM



The Cardiff University Otter Project (www.otterproject.cf.ac.uk) was one of the many projects supported by Rob (photo by Dave Lewns)

Erratum: Dean, M., Gow, D. and Andrews, R. (2014). Water voles – a preview of new guidelines for survey and mitigation. *In Practice*, **84**: 19-22.

Please note that the reference to Markwell 2008 [Markwell, H. (2008). Large scale mitigation: a case study using water voles. *In Practice*, **62**: 7-10.] was made in error.

Planning for climate change adaptation – it's time to face those difficult decisions

Geoff Darch

Principal Consultant, Climate Futures & Environmental Change, Atkins Limited

Recent events such as the winter floods have highlighted the vulnerability of biodiversity to climate extremes. Future climate change will stress ecosystems further, especially if we try to constrain natural processes. This will mean facing some difficult decisions, particularly where uncertainties are high. However, through use of robust decision-making techniques, combined with stakeholder collaboration at local, regional and national scales, we have an opportunity to achieve sustainable adaptation that will benefit us and the biodiversity on which we depend.

Between 2012 and 2014 many parts of the United Kingdom have faced hydrological extremes that are unprecedented since records began (see for example Marsh *et al.* 2013, Met Office 2014). Drought was followed by inland flooding and a major tidal surge on the west and east coasts. Many different habitats and species have been affected, especially at the coast (see for example the review by The Wildlife Trusts 2014). While we do not yet know the full impact in terms of biodiversity, it appears that some species such as wading birds have benefited (*ibid.*).

Climate change is exacerbating our weather extremes, as well as shifting the average climate. The recent tidal surge would have been significantly more severe if mean sea level had been 50 cm

higher; this is the approximate rise under a conservative end-of-century projection (the central estimate of the medium emissions scenario), and excludes changes to storm surges themselves (Lowe *et al.* 2009). Wetter winters with heavier downpours will lead to more flooding similar to that seen in the Somerset levels and elsewhere in the UK over the past two winters.

So surely now is the time to reconsider our strategy for responding to climate impacts. The human instinct is to restore conditions – putting things back the way they were before – as quickly as possible. But unless the events are extremes that are expected to decline in future, doing this will increase the 'adaptation deficit' – a measure of how well adapted something is to the prevailing climate – storing up problems for the future. We may also miss out on opportunities to use natural habitats more creatively in managing climate impacts on society, for example to reduce flood risk.

Action is underway to understand potential impacts. For example, Natural England has a research programme on climate change that has identified impacts in a number of diverse geographical areas across England and has started to identify adaptation measures (Natural England's National Character Area Climate Change Project). The UK Terrestrial Biodiversity Climate Change Impacts Report Card (Morecroft and Speakman 2013; Speakman, this issue), published last year, demonstrates how climate change is already affecting habitats and species. Impacts include northern movement of species and earlier biological activity in warmer springs. A range of future risks is anticipated.

Principles for adaptation have already been developed (Hopkins *et al.* 2007, Smithers *et al.* 2008) and Natural England and the

RSPB have just published an Adaptation Manual (see Morecroft, this issue; Natural England and RSPB 2014). This includes reiteration of principles for sustainable adaptation (Macgregor and Cowan 2011) such as that adaptation should increase resilience and that approaches should be flexible. The National Adaptation Plan, published last year (HM Government 2013), includes focal themes for the natural environment on building resilience to climate change impacts, and preparing for and accommodating change. The Adaptation Manual recognises the need for planning site- and landscape-scale adaptation, including site objective setting and improvements to connectivity.

Legislation in this area lags behind. The Habitats Directive 1992 and Water Framework Directive 2000 have relied on subsequent publications and processes to include climate change adaptation, for example the European Commission's Biodiversity Communication (2006) and Water Framework Directive's Common Implementation Strategy. The latter produced guidance titled River Basin Management in a Changing Climate (European Commission 2009). However, the Sustainability Reductions initiative relating to both Directives, which aims to reduce abstractions of water from the environment where they are considered to be damaging protected habitats or preventing the achievement of Good Status, does not appear to take climate change into account. In contrast, water companies have a legal obligation to include the impact of climate change in their Water Resource Management Plans.

In the past, changing site designations has been a reactive process. For example, the re-designation of the SSSI at Porlock



Portholme SSSI/SAC, Cambridgeshire, during a flood event

in West Somerset (Natural England 2002) was undertaken after a gravel barrier was breached in a storm in 1996, demonstrating a failure mode where a natural system cannot adjust freely, in this case to sea level rise (Orford undated). In 2008 Natural England published a SSSI notification strategy, stating that a feature of the SSSI series should be an ability to respond dynamically and to be resilient to the predicted effects of climate change (Natural England 2008). Natural England is developing its approach to changes to Conservation Objectives, interest features and site boundaries; it is likely to be increasingly required in future.

In some cases habitats are unlikely to be naturally resilient – repeated floods and/or droughts, or a very severe event as at Porlock – will fundamentally and permanently alter the ecology. Allowing or actively transforming a habitat is a complex

and often controversial issue, especially at the landscape scale. Understandably there are strong economic interests twinned with deep-rooted cultural values which imbue a sense of place. But if we do not anticipate and actively manage for the future, then one of two situations will arise. Either the natural environment will adapt itself or we will be forced to spend increasing resources trying to maintain the status quo.

Uncertainty is often cited as a reason for inaction or delay. Of course we do not exactly know how the future will turn out: there are uncertainties in the impacts on and responses of individual species, habitats and, crucially, the interactions between different species. For example, we are already aware of stresses imposed by a loss of synchronicity; some populations of the pied flycatcher *Ficedula hypoleuca* in continental Europe are declining because they now breed after the time of peak

caterpillar abundance, which has become earlier (Burger *et al.* 2012).

Nonetheless, uncertainty and complexity are not unique to ecology and techniques that are explicitly focussed on decision-making under uncertainty are now being used in other areas of adaptation planning. For example in water resources planning, which is subject to large uncertainties over climate change as well as population and demand, adaptation pathways have been constructed to help frame the decision space on major adaptations (see for example Darch *et al.* 2011). This type of analysis can be extended to incorporate costs using ‘real options’ techniques.

Robust decision-making methods might be suitable for evaluating adaptation associated with certain habitats that are highly vulnerable, i.e. highly exposed to climate hazards, sensitive to change and with low natural adaptive capacity. These include

Feature Article: Planning for climate change adaptation - it's time to face those difficult decisions (contd)

wetlands, coastal habitats, and where there are significant uncertainties, for example in the size and timing of impacts or the nature of the adaptation measures.

Adaptation can only be informed by technical exercises such as impact assessments and robust decision-making methods. The questions about adaptation raised in the new Adaptation Manual illustrate that it has to be a collaborative process at local, regional and national scales and involving, among others, local residents, land owners, local authorities, NGOs, environmental agencies, tourism bodies and business. This makes adaptation difficult, but it is time for society to face the future positively. If we do not we are actually deciding to make life harder for future generations. The lesson from Gaia (Lovelock 1995) is that nature will ultimately adapt itself; but it is just that we may not like the consequences.

About the Author



Dr Geoff Darch is Principal Consultant for Climate Change & Environmental Futures at Atkins and is Chair of CIWEM's Climate Change Network. He leads applied research and consultancy projects in the UK and overseas with a focus on climate risks and adaptation of natural and built infrastructure.

The author would like to thank several colleagues for comments on a draft version of this article. The views expressed are those of the author and not necessarily those of any organisation represented.

Contact Geoff at:

geoff.darch@atkinsglobal.com
Follow Geoff on Twitter
@GeoffDarch

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Adaptation to a changing climate in practice

Julian Wright
Environment Agency

Mike Morecroft
Natural England

The evidence is clear that the climate is changing, and we are beginning to observe the impacts of this on the UK's wildlife. Evidence shows a clear northward and upward shift in many temperature-sensitive species, including some new arrivals from continental Europe.

Warmer springs are causing budbreak, flowering, laying of eggs and other biological events to occur earlier in the year, and the composition of plant and animal communities is changing in a way that is consistent with warming temperatures (see Terrestrial Biodiversity Climate Change Impacts Report Cardⁱ). This raises the question of how we can adapt conservation and environmental management to minimise the adverse effects of climate change and take advantage of any opportunities? This set of *In Practice* articles seeks to address this question. This introduction covers some of the background to our understanding of climate change, its impacts on biodiversity, and principles of good adaptation. The other articles in this series then set out the tools and support that can help with making practical decisions on the management of specific habitat types and in developing a landscape-scale response to biodiversity management. It is hoped that together they will help *In Practice* readers address climate change in their work in a way that makes a real difference to ensuring a vibrant future for wildlife in the UK and beyond.

The East Coast storm surge of December 2013, the largest since 1953, and the flooding experienced in the south and south west in January and February 2014 have refocused public and political attention



Temperature-sensitive species are experiencing changes in their range, for example the Dartford Warbler. Photo taken in North Wales in 2011. © Ron Jones, Beacon Camera Club.

on the risks we face in the UK from climate change. The Intergovernmental Panel on Climate Change (IPCC) report released in October 2013 on The Physical Science Basisⁱⁱ for climate change is the synthesis of the latest scientific understanding of the evidence for climate change, endorsed by the governments of 195 member countries of the IPCC (IPCC 2013)ⁱⁱⁱ. It states with great clarity that:

'Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia.'

It also concludes that the evidence for human influence on the climate is clear and has been 'the dominant cause of the observed warming since the mid-20th century.'

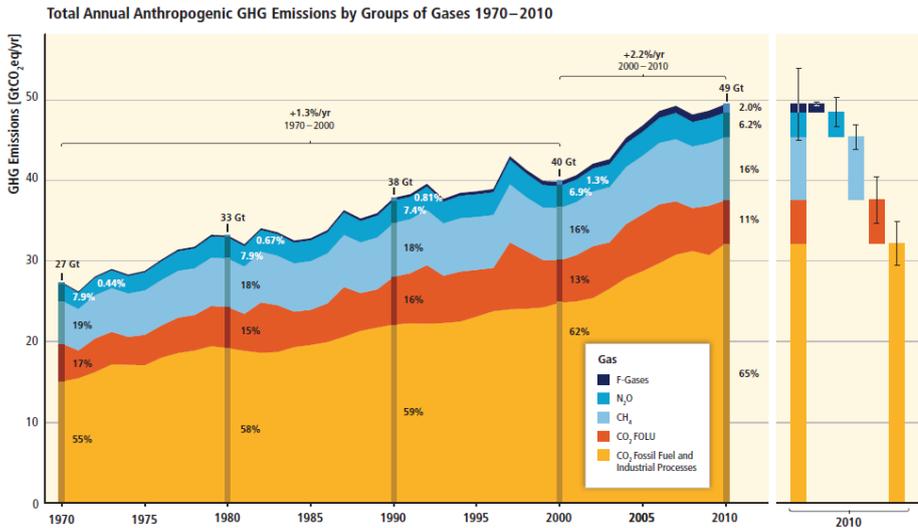
At the national scale, the Climate Change Act 2008ⁱⁱⁱ has committed the UK to cut greenhouse gas emissions by 80% by 2050. We have made some progress

towards this – although care needs to be taken in interpreting these results as a number of different factors have led to the recent fall in emissions (for example the recession and milder winters - see the Committee on Climate Change progress report^{iv}). At the global scale, however, emissions of greenhouse gases continue to not only increase, but the rate at which they increase is continuing to grow – annual emissions grew on average by 2.2% per year from 2000 to 2010 compared to 1.3%



Environment Agency Chairman Lord Chris Smith at Burrow Mump on the Somerset Levels

Feature Article: Adaptation to a changing climate in practice (contd)



Total annual anthropogenic GHG emissions (GtCO₂eq/yr) by groups of gases 1970 – 2010 (reproduction of Figure SPM.1 from IPCC AR5 mitigation report IPCC, 2014). CO₂ from fossil fuel combustion and industrial processes; Forestry and Other Land Use (FOLU); methane (CH₄); nitrous oxide (N₂O); fluorinated gases covered under the Kyoto Protocol (F-gases).

per year from 1970 to 2000, and about half of our cumulative emissions since the industrial revolution have occurred in just the 40 years to 2014 (IPCC 2014^v).

In this context, continued climate change is inevitable and likely to be dramatic over the course of this century unless there is a strong change of direction. Under 'business as usual' increases in emissions, the best model projections indicate that global temperature is likely to rise by more than 2°C, the internationally agreed threshold for what constitutes 'dangerous' climate change, and could rise by over 4°C by the end of the century. Alongside increases in temperature we will see significant changes in the global water cycle and patterns of rainfall. In general, the contrast in precipitation between wet and dry regions and between wet and dry seasons will tend to increase.

We need to start preparing for these changes now if adaptation is to be effective. This is particularly the case for sectors that might be slow to react - where the decisions that are made now have long lead-in times. In the UK, the Climate Change Act 2008 sets the framework for adaptation, with provisions that require Government to develop a comprehensive climate change risk assessment every five years as well as national adaptation programmes to deal with the risks raised. The first UK Climate Change Risk Assessment^{vi} was published in 2012 and the first National Adaptation Programme^{vii}

for England and reserved and non-devolved matters was published in July last year. The Act also allows the Secretary of State to direct public bodies and statutory undertakers such as water companies to report on their climate change risks and the actions they are taking in response. Over 100 organisations including the Environment Agency, Natural England and the Forestry Commission have so far reported under this Reporting Power^{viii}. Finally the Climate Change Act established an Adaptation Sub-Committee within the Committee on Climate Change to provide advice to Government and track progress on adaptation. The Adaptation Sub-Committee's 2013 progress report *Managing land in a changing climate*^{ix} will be of particular interest to *In Practice* readers, covering as it does wildlife, peatlands and coasts. The Environment Agency's Climate Ready Support Service is providing coordination and support across sectors to ensure that key organisations are equipped to deliver effective adaptation in line with the National Adaptation Programme.

The UK Climate Change Risk Assessment includes biodiversity and ecosystems services as one of eleven sectors that were examined in detail, and provides a focus on risks in relation to soils including peatlands, pests, diseases and non-native species, coastal zones, species movement, water and fire. Climate change is recognised as an additional pressure on top of existing

challenges, and the Risk Assessment notes, in line with the Lawton report (*Making Space for Nature: A review of England's Wildlife Sites and Ecological Network, 2010*^x), that the current network of sites designated for biodiversity is often too small and too fragmented to allow natural adaptation of ecosystems to take place.

The National Adaptation Programme takes us some way in starting to adapt to these challenges, and includes the natural environment alongside chapters on built environment, infrastructure, healthy and resilient communities, agriculture and forestry, business, and local government. The National Adaptation Programme was developed through a process of co-creation including engagement across conservation organisations, and hopefully represents a common view from those involved in understanding and planning adaptation in the natural world. These stakeholders developed the vision that 'The natural environment, with diverse and healthy ecosystems, is resilient to climate change, able to accommodate change and valued for the adaptation services it provides' and four main objectives focusing on building ecological resilience, accommodating the changes that are inevitable, valuing how the natural environment can help other sectors become more resilient and improving the evidence base – reflecting the principles set out in the Natural Environment White Paper^{xi}. The National Adaptation Programme thus recognises that, although we can do much to build resilience in the natural environment through reducing existing pressure and improving the current condition of habitats, climate change means that change is inevitable and we should manage the environment in a way that recognises this. (see green box opposite)

In this way the National Adaptation Programme builds on previous work to develop principles for adaptation to sit alongside the old England Biodiversity Strategy (England Biodiversity Strategy Climate Change Adaptation Principles: *Conserving biodiversity in a changing climate, 2008*^{xii}).

There is much we can do at the national scale to help deliver these objectives for adaptation. Pertinent issues include ensuring that climate risks and adaptation are built

into delivery of the Common Agricultural Policy, particularly the New Environmental Land Management Scheme, and River Basin Management Planning under the Water Framework. Natural England, the Forestry Commission and the Environment Agency are working with many others to try and ensure this is the case and that funding will be adequately directed towards the climate change challenge. However the majority of the decisions that will support practical adaptation in the natural environment will be taken by individuals working at a more local scale and whose specialism is not climate change.

The four adaptation objectives for the natural environment in the National Adaptation Programme:

- **To build the resilience of wildlife, habitats and ecosystems (terrestrial, freshwater, marine and coastal) to climate change, to put our natural environment in the strongest possible position to meet the challenges and changes ahead.**
- **To take action to help wildlife, habitats and ecosystems accommodate and smoothly make the transition through inevitable change.**
- **To promote and gain widespread uptake in other sectors of adaptation measures that benefit, or do not adversely affect, the natural environment.**
- **To improve the evidence base to enhance the knowledge and understanding of decision makers, land managers and others of the impacts of climate change on the natural environment and how best we can influence adaptation or accommodate change.**

To date, actual implementation of on-the-ground, practical adaptation action has been patchy. There have been a few examples, particularly realignment at coastal sites in response to rising sea-levels and increasing risks to freshwater habitats (for example see the RSPB Titchwell Marsh Coastal Change Project^{xiii}). However, many aspects of adaptation are technically challenging and habitat- or place-specific and, up to now, access to the necessary

information to guide these decisions has been hard to find. Recently a number of products have been developed that seek to address this knowledge gap, and we are delighted to be able to highlight them within this set of articles.

Climate change is complicated, and for most conservationists pressured workloads mean that there is little time to digest all of the information that is out there in order to be able to apply it to their work. The challenge is therefore to provide support that has already done most of the legwork in determining the specific, likely impacts of climate change for particular habitat types or aspects of conservation management, and the sensible, practical adaptation actions that might be applied in response. The common theme amongst the tools and information sources described in the articles in this series is that they take robust evidence and judgement and seek to communicate it in a way that is accessible and easily applicable.

About the Authors



Julian Wright is Senior Advisor for Climate Change and Natural Environment in the Environment Agency's Climate Ready Support Service. Julian is responsible for

embedding adaptation to climate change into the work of the Environment Agency and other organisations involved in managing the natural environment.

Contact Julian at: julian.wright@environment-agency.gov.uk



Mike Morecroft is Principal Specialist in Climate Change at Natural England. Mike is an ecologist and has worked on climate change issues on and off

since the late 1980s. Mike is actively involved in research, publishing over 100 papers, reports and book chapters, but in recent years his focus has been on the application of science to help conservation respond to the challenges of a changing climate.

Contact Mike at: mike.morecroft@naturalengland.org.uk

We hope you enjoy taking a look at these sources of support. Please do not hesitate to get in touch with any of the authors with your thoughts on how we might improve tools and support for climate change adaptation in future. We wish you well in your role in securing a positive future for wildlife and habitats, people and communities.

Notes & References

i <http://www.lwec.org.uk/resources/report-cards/biodiversity>

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iii <http://www.legislation.gov.uk/ukpga/2008/27/contents>

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vi <https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report>

vii <https://www.gov.uk/government/publications/adapting-to-climate-change-national-adaptation-programme>

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x <http://archive.defra.gov.uk/environment/biodiversity/documents/201009space-for-nature.pdf>

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xii https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69270/pb13168-eb5-ccap-081203.pdf

xiii <http://www.rspb.org.uk/reserves/guide/titchwellmarsh/coastalchange/index.aspx>

Climate Change Adaptation Manual

Mike Morecroft
Natural England

'Climate Change Adaptation Manual: Evidence to support nature conservation in a changing climate' is the title of a new resource for conservation managers and advisors. It was published in June by Natural England and the RSPB, in partnership with the Environment Agency's Climate Ready Support Service and the Forestry Commission.

Overarching principles for climate change adaptation have been published before, but these have been high level documents and have not been focused on providing resources to use in specific circumstances. This level of detail is important to enable practical action on the ground; for example, different issues apply to wetlands and grasslands and different tools are available.

The manual is a hands-on document giving up-to-date, detailed information for conservation managers and advisors to help them prepare for and respond to a changing climate. Potential users include nature reserve managers, conservation organisations, ecological consultants, local authority ecologists and those working at the larger scale in Nature Improvement Areas, Areas of Outstanding Natural Beauty and National Parks.

The adaptation manual is based on a scientific assessment and practical experience of climate change impacts and the effectiveness of adaptation measures. In particular, it builds on experience gained from climate change impact assessments and adaptation planning at National Nature Reserves run by Natural England and at RSPB nature reserves, together with contributions from a range of partners including the RSPB, Environment Agency, Forestry Commission, Wildlife Trusts and National Park Authorities.

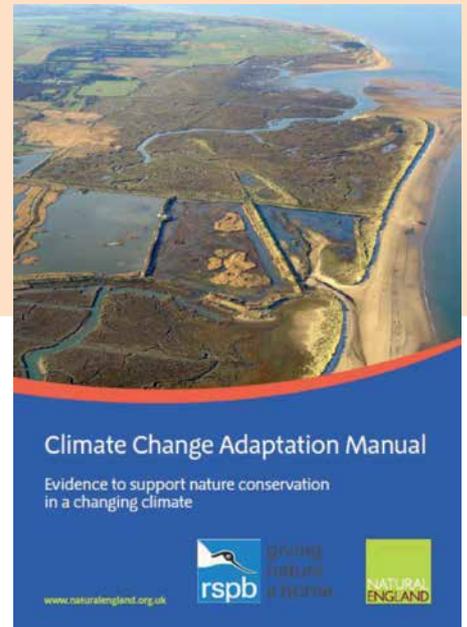
It is divided into three sections, focusing on:

- the key concepts for making decisions about adaptation and the impact of climate change on the natural environment;
- climate change impacts and potential adaptation responses for 27 of England's most important habitats
- the relationship between climate change and the delivery of ecosystem services.

The second section focusing on important habitats is the largest. For each of the habitats, there is a basic introduction to the habitat, an assessment of potential climate change impacts and adaptation responses. Environmental Stewardship options to support adaptation actions are also included, as well as case studies and references.

Climate change adaptation is a fast-moving field and we hope to produce regular updates of the adaptation manual as our knowledge and experience increase. We also intend to expand the scope to include, for example, more species-specific information. We would welcome feedback, new information and suggestions for future development of the manual.

The Climate Change Adaptation Manual can be downloaded from Natural England's publications catalogue: <http://publications.naturalengland.org.uk/publication/5629923804839936>



About the Author



Mike Morecroft is Principal Specialist in Climate Change at Natural England. Mike is an ecologist and has worked on climate change issues on and off

since the late 1980s. Mike is actively involved in research, publishing over 100 papers, reports and book chapters, but in recent years his focus has been on the application of science to help conservation respond to the challenges of a changing climate.

Contact Mike at: mike.morecroft@naturalengland.org.uk

The Climate Change Report Cards – tools for understanding the impacts of climate change on the environment

Lydia Speakman
Natural England

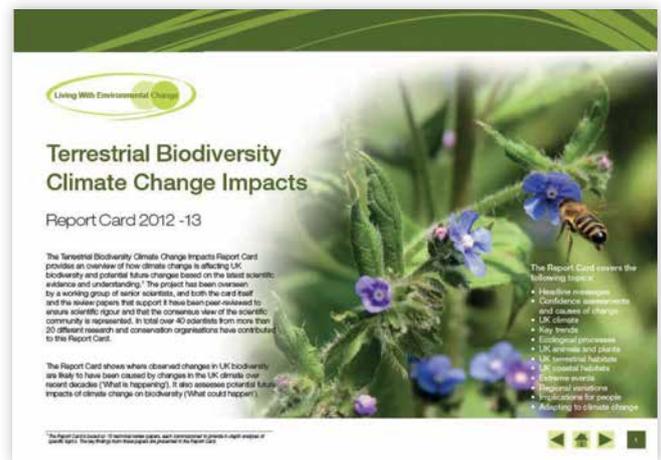
The Climate Change Report Cards provide an overview of the impact of climate in the UK. They provide an accessible summary of the latest scientific evidence to help inform policymakers, decision-makers and those involved in environmental management. They are freely available, together with links to thorough review papers for those who want to look at a particular issue in further detail.

Three report cards are currently available on terrestrial biodiversity, fresh water and the marine environment, with cards for health and built infrastructure in production. The first card – the Marine Climate Change Report Card – was produced in 2006 by the Marine Climate Change Impacts Partnership (MCCIP). An update is produced every two years with an in-depth, topic-based report in alternate years. The next Marine Special Report will be on the implications of climate change on Marine Protected Areas. Report cards for Terrestrial Biodiversity and Water were published in 2013 under the Living with Environmental Change Partnership (LWEC) led by Natural England and the Environment Agency respectively. The 2015 update of the Terrestrial Biodiversity Report Card will cover additional topics as well as updating information in the 2013 card.

Terrestrial Biodiversity

The Terrestrial Biodiversity Report Card covers 19 topics including range shifts, species interactions, phenology, migration, key habitats, pest and diseases, reproductive processes and species interactions. Key points can be summarised as follows:

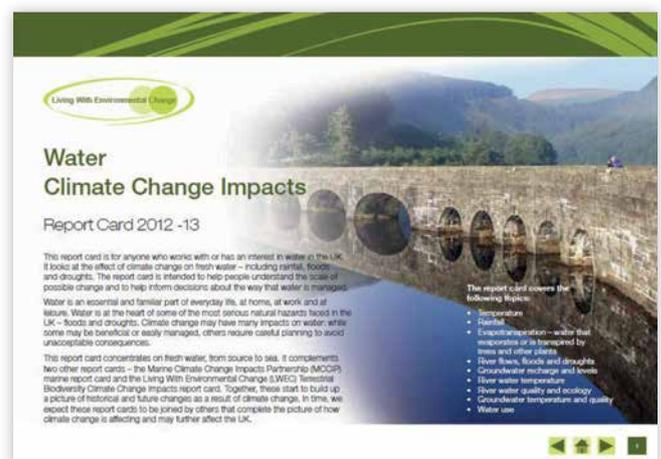
- There is strong evidence that climate change is already affecting UK biodiversity. Impacts are expected to increase as the magnitude of climate change increases.
- Many species now occur further north and at higher altitudes than in previous decades.
- Warmer springs in recent decades have led to many biological events occurring earlier in the year (e.g. flowering, laying and hatching of eggs). The speed of response varies among species, with implications for some interspecific interactions.
- There is evidence of changes in the composition of plant and animal communities, consistent with different species' responses to rising temperature.



- Some habitats are particularly vulnerable to climate change. The risks are clearest for montane habitats (to increased temperature), wetlands (to changes in water availability) and coastal habitats (to sea-level rise).
- Climate change exacerbates the risk that non-native species (including pests and pathogens) may establish and spread.

Water

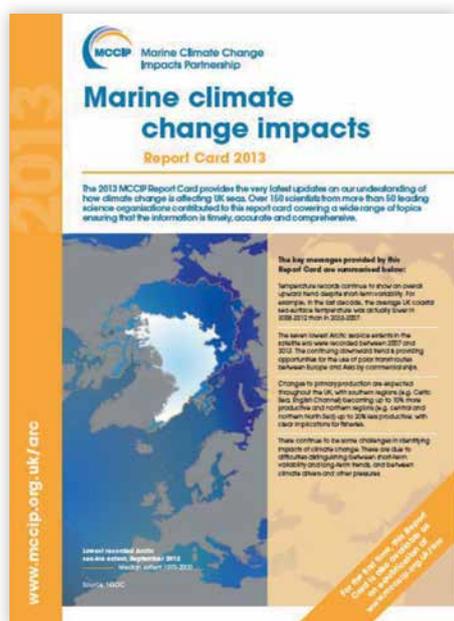
The Water Report Card focuses on nine aspects of the water environment: temperature; rainfall; evapotranspiration; river flows, floods and droughts; ground



Feature Article: The Climate Change Report Cards – tools for understanding the impacts of climate change on the environment (contd)

water recharge and levels; river water temperature; river water quality and ecology; groundwater temperature and quality; and water use. It highlights the complexity inherent in identifying impacts on the aquatic environment. There is strong, consistent data showing that the water temperature of lakes and rivers is increasing. Trends in rainfall patterns and evapotranspiration are less conclusive: average annual rainfall has changed little over the last three centuries although there is some evidence for decreased summer rainfall and over the last thirty years more winter rain has been falling in heavy events.

Marine



The most recent Marine Report Card, published in November 2013, looks at observed and predicted change across 33 marine and coastal topics. These range from ocean acidification, fisheries and inter-tidal habitats, to the risks of coastal flooding. Identifying impacts of climate change in the marine environment continues to be challenging because of the difficulty of distinguishing between short-term variability and long-term trends, and between climate drivers and other pressures. However, a number of important trends are highlighted:

- Temperature records continue to show an overall upward trend despite short-term variability, e.g. in the last decade the average UK coastal sea-surface temperature was lower in 2008-2012 than in 2003-2007.

- The seven lowest Arctic sea-ice extents recorded by satellite were between 2007 and 2013. The continuing downward trend is providing opportunities for polar transit, commercial shipping routes between Europe and Asia.
- Changes in primary production are expected throughout the UK, with southern regions (e.g. Celtic Sea, English Channel) becoming up to 10% more productive and northern regions (e.g. central and northern North Sea) up to 20% less productive. There are clear implications for fisheries.

All the Report Cards present a short summary of observed and projected trends alongside an assessment of the level of confidence for each headline message. These assessments of confidence use the IPCC's confidence scales, which seek to capture the amount and quality of the evidence supporting the statement and the level of agreement between sources. Recent Marine Report Cards have not only reported confidence levels on each topic, but also indicate whether the degree of confidence about a topic has changed as a result of the latest scientific research.

The Report Cards have proved popular; they provide a co-ordinating framework to evaluate and make accessible the latest climate change research beyond academia. For example, they were used by the Climate Change Committee, the UK's statutory watchdog on climate change, and form part of the evidence for the Climate Change Risk Assessment, which is a 5-yearly assessment required in the Climate Change Act, 2009. They are also used by Local Authorities and a range of

public, private and voluntary organisations to inform adaptation and conservation policy and strategy. They are a useful teaching tool and a valuable resource for individuals and voluntary natural history and nature conservation bodies.

The Climate Change Report Cards can be accessed at:

- Terrestrial Biodiversity: <http://www.lwec.org.uk/resources/report-cards/biodiversity>
- Water: http://www.lwec.org.uk/sites/default/files/attachments_report_cards/Water%20Card%20English%20web.pdf
- Marine: <http://www.mccip.org.uk/annual-report-card/2013.aspx>

Notes

MCCIP is a partnership between marine scientists and sponsors from the UK and devolved governments, their agencies and industry. The principal aim of the partnership is to develop a long-term, multi-disciplinary approach to understanding the implications of climate change in our seas.

LWEC consists of 22 public sector organisations that fund, carry out and use environmental research and observations. They include the UK research councils, government departments with environmental responsibilities, devolved administrations and government agencies.

About the Author



Lydia Speakman is a Senior Advisor at Natural England and together with Mike Morecroft, was the project coordinator and author of the Terrestrial Biodiversity Climate Change Report Card.

Contact Lydia at: Lydia.Speakman@naturalengland.org.uk

National Biodiversity Climate Change Vulnerability Model

Sarah Taylor
Natural England

The National Biodiversity Climate Change Vulnerability Model allows users to assess the vulnerability of priority habitats to climate change with a view to building resilience. It uses a GIS-based spatial assessment approach designed and trialled by Natural England. A wide range of partners including Local Authorities, National Parks and Nature Improvement Areas have provided useful feedback, amendments and support for the approach. We hope that CIEEM members will use the model as part of the evidence base to assist in assessments of the vulnerability of the natural environment to climate change.

Introducing the approach

The challenges from climate change make it a priority for action in environmental management. The theoretical principles of climate change adaptation are often difficult to apply in practice so practical tools are needed to help decision makers. The National Biodiversity Climate Change Vulnerability Model (NBCCVM) approach allows non-specialists to assess habitat vulnerability based on widely accepted principles of climate change adaptation

for biodiversity (Hopkins *et al.* 2007). The assessment provides a high level indication of the relative vulnerability of priority habitats in different places, helping to identify which interventions would be most effective at increasing resilience in a changing climate. The approach provides the following:

- a spatially explicit assessment of the relative vulnerability of priority habitats, based on established climate change adaptation principles;

- a suite of map-based GIS outputs at a variety of scales, which can be used (in conjunction with other relevant spatial data) to target action to build biodiversity resilience; and
- a flexible, GIS-based, decision support tool that allows updated or locally specific datasets to be incorporated and adaptation principles to be combined to reflect local circumstances and priorities.

The NBCCVM assessment methodology uses a GIS-based 200 x 200 m grid to assess areas of priority habitat for their:

- **Intrinsic Sensitivity** to Climate Change – assigning high, medium or low sensitivity to habitats based on direct climate change impacts on the basis of expert judgement and scientific literature.
- **Adaptive capacity** – a range of different local factors can increase or decrease the ability of the habitat to adapt to climate change; the model therefore includes measures of habitat fragmentation, topographic variation and management and condition.

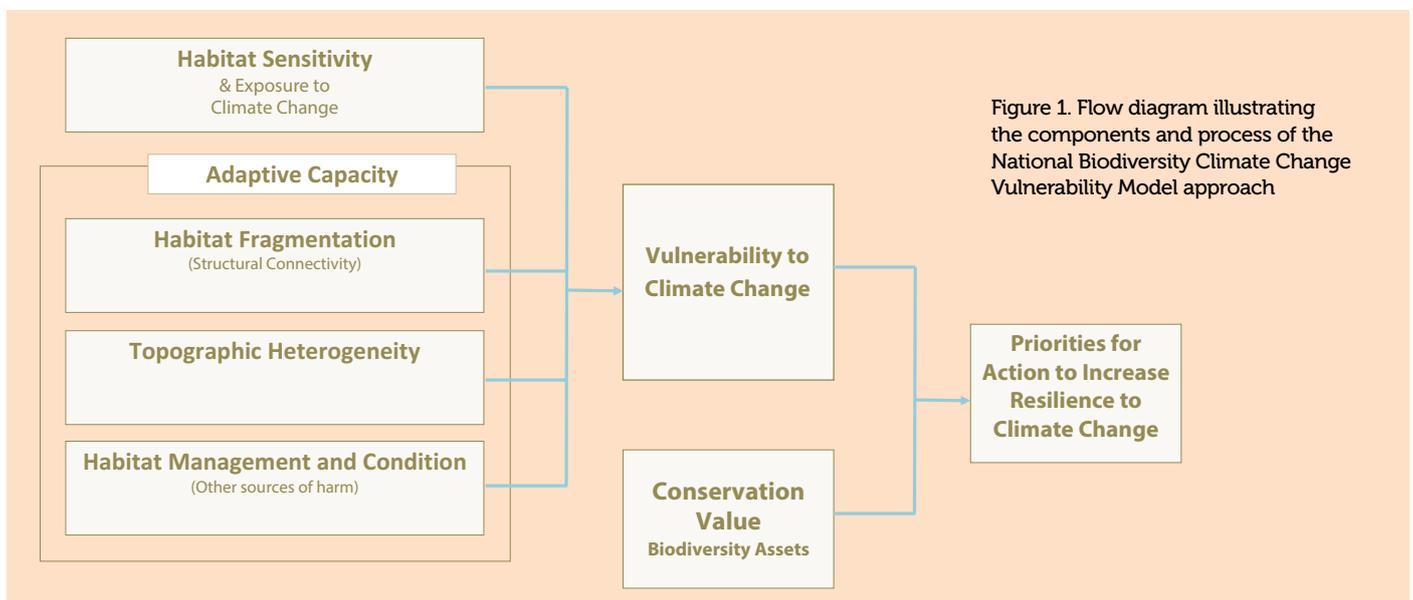


Figure 1. Flow diagram illustrating the components and process of the National Biodiversity Climate Change Vulnerability Model approach

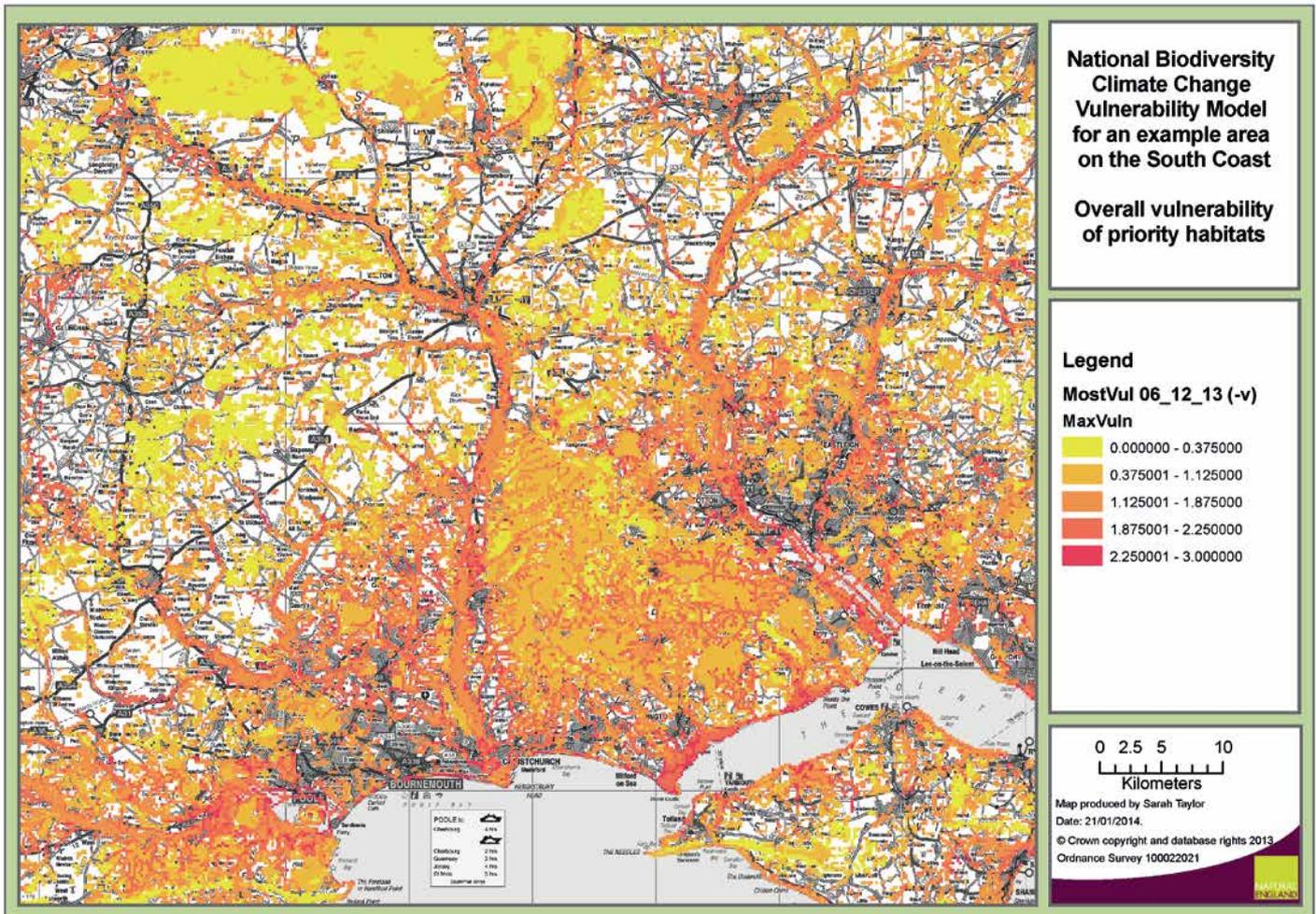


Figure 2. A map showing the Overall Vulnerability Assessment results for an area on the South Coast of England, combining the Sensitivity, Fragmentation, Topographic Heterogeneity and Management and Condition metrics.

- **Conservation Value** – assigning a classification to reflect the designation status of protected sites.

The sensitivity and adaptive capacity elements described above are added together to produce an overall national assessment of the vulnerability of priority habitats to climate change. Combined with the conservation value element, outputs from the NBCCVM allow management actions to be prioritised (Figure 1).

Maps are also generated to give a visual representation of the areas vulnerable to climate change across the country.

The map in Figure 2 shows the results of the Overall Vulnerability assessment (Sensitivity + Fragmentation + Topographic Heterogeneity + Management and Condition) for an example area on the South Coast. The range of colours represent the range of vulnerability to climate change for the most vulnerable

habitat overall in that cell, taking into account the sensitivity and adaptive capacity elements. The red cells are the most vulnerable across the metrics and the yellow cells are the least vulnerable. This helps to identify areas that may benefit from adaptation action across a range of broad actions. The GIS data can be interrogated to show the habitats present in each square and, in the case of this assessment which includes all priority habitats, to show which priority habitat is giving the overall score for the cell.

Feedback from users and applications of the model

The model was designed with a range of users in mind. It needed to be straightforward and easily understandable by individuals with a range of ecological expertise. The approach underwent comprehensive trialling and feedback was used to refine the model.

As a response to feedback, to enable us to 'run the model' in an interactive and flexible way and facilitate updates, we created the National Biodiversity Climate Change Vulnerability Assessment Tool (NBCCVAT). This tool enables us to:

- re-run assessments of vulnerability using updated or local data;
- change or combine weightings within the assessment in different ways;
- test the impact of habitat creation and management scenarios on vulnerability.

A range of uses for the vulnerability assessment data have been suggested by partner organisations who are trialling the approach:

- Local Authorities – to inform Local Plan policies, green infrastructure strategies and local ecological network planning as a key addition to their existing evidence base (e.g. Kirklees Council have used the data in their green infrastructure

planning to provide information on the vulnerability of priority habitats as one of their green infrastructure assets, with particular reference to the fragmentation of habitats in some parts of the district).

- National Parks – in conservation management planning and ecological network design, and to add to the evidence base when reporting under the Climate Change Act Adaptation Reporting Power.
- Nature Improvement Areas (NIAs) – in planning and monitoring, e.g. three NIAs have used the data in their connectivity indicator reporting (Collingwood Environmental Planning 2013); Wild Purbeck NIA is using the tool to utilise local datasets to provide a more detailed assessment for the area; Greater Thames Marshes NIA is using it as a key part of the evidence base for external funding bids.

Kate Collins, Director at Sheils Flynn, the consultancy that trialled the NBCCVM for the Greater Thames Marshes NIA, and who is leading the bid for external funding said that *“Natural England’s Climate Change Vulnerability Model has provided a valuable evidence base which has informed stakeholder discussions and provided evidence to support the development of a Climate Adaptation Strategy for the Greater Thames Marshes. The maps provided will underpin our bid for EU funding and will enable us to make the case for further investment, habitat creation and management, helping our NIA partnership to pursue a project which we hope will be an international case study for best practice in this field.”*

The data has also been used by the Adaptation Sub-Committee of the Climate Change Committee in their progress report on ‘Managing the land in a changing climate’ (Committee on Climate Change 2013).

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- The national scale assessment data can be found at https://www.transferbigfiles.com/9bb305b1-8321-46c0-bba4-b6d4d3c95bef/FkEZzb1RM2NQ_SZ27r7HhA2
- For more information about the trial of NBCCVM on Nature Improvement Areas, see the report on *Assessing and enabling climate change adaptation in Nature Improvement Areas*. – <http://publications.naturalengland.org.uk/publication/5935762914672640?category=10003>

Natural England’s use of the data will include within the New Environmental Land Management Scheme (as set out in the National Adaptation Programme); NE designations strategy; work on ecological network planning and the use of spatial tools; Biodiversity 2020 targets, particularly the 1D target (Restoring at least 15% of degraded ecosystems as a contribution to climate change mitigation and adaptation); and NE work with Local Authorities on spatial planning.

We hope the assessment data and tool coming out of the National Biodiversity Climate Change Vulnerability Model approach will help inform future projects, adaptation action and partnership working. It forms a key part of our work towards understanding how our natural environment will change and adapt in the future.

We also hope that as CIEEM members you will find the data from the assessment are a useful addition to the evidence base you use to embed climate change adaptation in to the work you do. We invite you to read the full report and download the data and to get in touch to provide feedback on your thoughts about the assessment and how you use the data.

About the Author



Sarah Taylor is a Senior Advisor at Natural England and, together with Michael Knight and the GeoData Institute at the University of Southampton, developed the

National Biodiversity Climate Change Vulnerability Model approach. Sarah will be happy to provide further information on the approach.

Contact Sarah at: sarah.taylor@naturalengland.org.uk

The Wetland Tool – Adapting wetlands to deal with future climate change

Alice Skinner
Environment Agency

Harriet G. Orr
Environment Agency

Mike Acreman
Centre for Ecology and Hydrology

James R. Blake
Centre for Ecology and Hydrology

Wetlands are particularly vulnerable to the impacts of climate change because of their sensitivity to changes in water availability. Anticipating changes to wetlands would allow managers to start to adapt, but this is difficult because climate change information can be complex and hard to interpret. We have developed the Wetland Tool for Climate Change to show how climate change may affect valued wetland features and to support wetland managers as they plan adaptation strategies. The Wetland Tool is freely available online and can be used without any expertise in climate modelling. We hope that all CIEEM members will find this article interesting and that members involved in wetlands or climate change find the Wetland Tool a useful addition to the other tools and resources presented in this special issue of *In Practice*.

Introduction

Wetlands are an important part of the UK landscape but they are a diminishing and degraded resource. This is despite recent efforts to protect and restore them.



Reedbeds such as this one at Ham Wall RSPB nature reserve may be vulnerable to future changes in climate. © Environment Agency

Wetlands help to buffer developed areas from the effects of flooding, improve water quality, capture and lock up carbon, and provide fertile land for grazing (Maltby *et al.* 2011). They support a rich and varied wildlife and are popular for a variety of activities such as bird watching. The Wildfowl and Wetlands Trust has over 200,000 members and receives nearly one million visitors per year to its nine wetland sites (Mark Simpson, WWT, pers. comm.). A recent partnership initiative set out a 50-year vision for England's freshwater wetlands, showing where new wetlands could be created and current wetlands restored (Wetland Vision 2008).

Wetlands are sensitive to changes in the amount and quality of water available throughout the year, making them potentially vulnerable to the impacts of

climate change. Drying out of wetlands in spring and summer due to reduced rainfall, river flows and groundwater levels and higher evaporation rates (Watts and Anderson 2013) may lead to changes in characteristic wetland plant communities, breeding waders and migratory birds. An increase in the frequency of extreme weather events could lead to changes at some sites while other climate change impacts, such as an extended growing season and changes in distribution, may also be important.

Previously, information on how individual wetlands might change has come from climate change projections that are complex and that may be hard to interpret. Adaptation strategies can take years to design and implement so it is important to anticipate changes as early as possible

The Wetland Tool was developed as a preliminary risk-screening tool but in some instances where decisions include large financial investments or are dependent on very complex drainage schemes, more detailed analysis might be appropriate. This could include refining the Wetland Tool using local site and hydrological data or developing a bespoke hydrological model of the individual wetland.

Case Studies

Wetland managers are approaching climate change adaptation in a number of ways; there is no 'one-size-fits-all' response. Common themes include:

- Building on past experience;
- Resisting or accepting change;
- Coping with variable conditions;
- Taking a large-scale approach and building networks of sites;
- Adaptive management; (Macgregor and van Dijk 2014) (see Box 'Putting adaptation into practice').

We present two case studies to illustrate how wetland managers are changing their management to adapt to the projected impacts of climate change and how the Wetland Tool can be used to facilitate this process.



Chippenham Fen is one of only three sites in the UK with Cambridge milk-parsley *Selinum carvifolia*. Without management intervention the Fen may be less suitable for this species under future climate conditions. Photo by Mike Taylor, Natural England.

Chippenham Fen

Chippenham Fen is located in eastern Cambridgeshire. The site is a National Nature Reserve notable for internationally important habitats including purple moor grass and rush pastures, saw-sedge and reed fen, rare plants like Cambridge milk-parsley *Selinum carvifolia*, and its invertebrate, bird and mammal communities. Natural England, who manage the site, are concerned about how climate change might have an impact on the important features of the Fen.

The Senior Reserves Manager has used the Wetland Tool in conjunction with guidance documents, such as the Climate Change Adaptation Manual (Natural England 2014; Morecroft, this issue), and local knowledge to help shape an adaptation plan as part of the regular five-year site management plan. Like many site managers, he has previously struggled to make effective adaptation decisions in the face of uncertainty about the direction, magnitude and timing of change, and a limited staff and budget. He found the Wetland Tool useful in supporting field observations, focusing thinking and illustrating the magnitude of change and would encourage other managers to use it to support planning decisions and bids for funding.

Anecdotally, reserve staff comment that the site is too wet in winter and very dry in summer. They are concerned about future water levels and the impact on the reserve. Outputs from the Wetland Tool confirm that water levels could drop significantly across the spring and summer months, to as low as one metre below surface level on average. Important vegetation communities may struggle to cope with these levels of change and, without active water level management, drier plant assemblages more suited to the new conditions are likely to dominate.

Using the Wetland Tool has prompted staff at Chippenham Fen to consider the hard question of whether to accept or resist possible change. These are difficult decisions to make and it is clear that they often require input at a more strategic level than the individual site, particularly if change may impact negatively on protected features. Other wetland managers in East Anglia have addressed this in various ways including: taking on major capital projects (such as flood defences) to protect current interest features; accepting the need for greater flexibility in existing targets; and making major changes to conservation targets to accept or facilitate change (Macgregor and van Dijk 2014).

The proposed adaptation actions for Chippenham Fen are designed to be modifiable and, as a minimum, not regretted under all the likely future scenarios. Actions include:

- Artificially managing water levels during times of low spring flow using an existing but unused licence to abstract water directly from the chalk aquifer. Natural England is considering the effectiveness of such a measure in raising water levels across the site and its sustainability in the long-term. The importance of this site means that actions are being planned now to cope with future water availability.
- Exploring options for creating more, bigger, better and more connected habitats (Lawton *et al.* 2010). Working with neighbouring landowners to adopt agri-environment schemes requires long-term planning and the Wetland Tool can be used to justify the time and effort required to investigate and pursue these options.

- Considering what level of change to accept and when. Designing monitoring programmes now to keep track of change and log the intensity of management will aid decisions in the future about the cost effectiveness of maintaining the status quo. Even if some features of the site are allowed to change, the site will remain an important nature conservation resource.



Wetland drying may shorten the period suitable for snipe to raise their young at Otmoor RSPB reserve. © Environment Agency

Otmoor

The RSPB manages the wetland nature reserve Otmoor, near Oxford. It contains floodplain grazing marsh, reedbeds and is a haven for wildfowl, such as teal *Anas crecca* and wigeon *Anas penelope*, and for breeding waders, such as lapwing *Vanellus vanellus*, redshank *Tringa totanus* and snipe *Gallinago gallinago*. The RSPB has considered the impacts of climate change on the important features of the site and potential adaptation measures have been included within the site management plan, which is reviewed every five years.

Otmoor is entirely rain-fed and, in the absence of adaptation measures, water levels are expected to fall more rapidly in spring and summer in the future due to reduced rainfall and increased evaporation. The important wet grassland communities are already vulnerable to change and may become more so in the future. If the site dries out earlier in late spring and summer, wading birds such as snipe will have less time when conditions are suitable to raise young.

The RSPB has created two reservoirs on site to deal with current and future water availability. Winter rainfall is pumped into these reservoirs and used to supplement water supply to the wet grassland. Valuable

reedbed habitats have also been created in the reservoirs, which now support bearded tit *Panurus biarmicus* and water voles *Arvicola amphibius*. The reservoir system provides the flexibility to deal with both extreme events and gradual change. During the dry winter of 2011/12 there was not enough rainfall to fill the reservoirs and, although a licence to abstract water from the River Ray exists, flows were so low that this was also unavailable. As a result, the RSPB have revised their water management to cope better with future extreme conditions. Instead of drawing down the water in both reservoirs annually (which was done to increase the growth of the reeds), water is now only taken from one reservoir, leaving the other full so that there will be enough water for the next year should the winter be dry.

A range of parameters is monitored across the site including water levels, rainfall, vegetation, and breeding and wintering birds. These data will support future evidence-based decision-making and allow assessment of the effectiveness of adaptation actions.

Some final thoughts

In summary, wetlands are uniquely vulnerable to climate change due to their sensitivity to changes in water availability and the fragmentation of the remaining habitat. It is important that action is taken to adapt the remaining wetland resource to the effects of climate change but to do this information is needed on how wetlands might change with a changing climate and the risks and opportunities this would bring.

The Wetland Tool is another source of information that adds to local site knowledge to empower site managers to take account of climate change. There are a number of other useful resources (see the Further Reading section at the end of this article). If you haven't yet considered adaptation for wetlands, we recommend that you start by looking at the Wetland Tool and read the box 'Putting adaptation into practice' for tips on getting started.

We hope that you find the Wetland Tool useful and we would welcome feedback from your experiences (email alice.skinner@environment-agency.gov.uk).

Putting adaptation into practice

- Visit the Wetland Tool for Climate Change http://www.ceh.ac.uk/sci_programmes/water/wetlands/climatechangeassessmenttoolfor_wetlands.html
- Read Part 1 and the Wetland sections of Part 2 of the Climate Change Adaptation Manual (see below).
- Consider the following points (adapted from Macgregor and van Dijk, in press):
 - How you have been impacted by and dealt with extreme weather events in the past (such as drought and flood) and how you might cope if these become more frequent or even 'normal' at your site in the future.
 - What can you do to plan for more variable conditions in the future?
 - Whether you could accept (or even embrace) change in parts of the site or in specific features (i.e. particular species or communities). Are there some areas/features that you will protect at any cost? Are there any features that you are legally obliged to protect?
 - Are there opportunities for large-scale approaches or working across sites? Can you join up habitat patches within and between sites, influence management of surrounding land or co-ordinate management across a number of sites?
 - Whether you know enough about how your site works, or how plant and animal populations and water levels are changing over time, to make evidence-based decisions on management and conservation objectives in the future.
- Let us know whether the Wetland Tool has been useful to you in informing decisions for medium- and long-term site management. Please send all feedback to Alice Skinner at alice.skinner@environment-agency.gov.uk.

Feature Article: The Wetland Tool – Adapting wetlands to deal with future climate change (contd)

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Further Reading

The Wetland Tool for Climate Change.

http://www.ceh.ac.uk/sci_programmes/water/wetlands/climatechangeassessmenttoolforwetlands.html

UK Climate Projections – Provides information on observed climate data, climate change projections, and marine and coastal projections.

<http://ukclimateprojections.metoffice.gov.uk/>

Future Flows and Groundwater Levels Project

– Provides data and information on the expected impact of climate change on river flows and groundwater levels in Britain.

http://www.ceh.ac.uk/sci_programmes/water/futureflowsandgroundwaterlevels.html

National biodiversity climate change vulnerability model

A high-level indication of the relative vulnerability of priority habitats to climate change (see Taylor, this issue).

<http://www.naturalengland.org.uk/ourwork/climateandenergy/climatechange/vulnerability/nationalvulnerabilityassessment.aspx>

Climate Change Adaptation Manual

Background information on adaptation, detailed information on climate change impacts and potential adaptation responses for a range of habitats (see Morecroft, this issue).

<http://publications.naturalengland.org.uk/publication/5629923804839936>

Climate change report cards

Overviews of how climate change is and may affect UK biodiversity and water, based on the latest scientific evidence and understanding (see Speakman, this issue).

<http://www.lwec.org.uk/resources/report-cards/biodiversity>

The Wetland Vision for England

A 50-year vision for England's freshwater wetlands.

www.wetlandvision.org.uk

The Broads Climate Change Adaptation Plan

An example of an adaptation plan.

http://www.broads-authority.gov.uk/_data/assets/pdf_file/0015/400047/Draft-climate-change-adaptation-plan.pdf

Climate Ready Support Service for England

Advice and support to enable public, private and voluntary sectors adapt to climate change.

climatechange@environment-agency.gov.uk

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About the Authors



Alice Skinner is a scientist working on climate change adaptation with a special interest in wetlands. Alice has an MSc in Ecology and Management of the Natural Environment

from Bristol University and she joined the Environment Agency in February 2009. Please contact her for any queries about the Wetland Tool or this article.

Contact Alice at: alice.skinner@environment-agency.gov.uk

Harriet Orr is a climate change impacts and adaptation scientist and leads a research team who provide evidence to support good decision making within the Environment Agency.

Contact Harriet at: harriet.orr@environment-agency.gov.uk

Mike Acreman is Science Area Lead on Natural Capital at the Centre for Ecology and Hydrology, and visiting Professor of Ecohydrology at University College, London. He is co-Editor of Hydrological Sciences Journal and a specialist in wetland hydrology.

Contact Mike at: man@ceh.ac.uk

James Blake is an expert in hydro-ecological processes and numerical modelling, with particular interests in climate change impacts on wetlands and the feasibility of large scale wetland restoration. James has a PhD in Hydrology from the University of Bristol and he joined the Centre for Ecology and Hydrology in 2003.

Contact James at: jarib@ceh.ac.uk

Ecological Site Classification – A tool to aid tree species choice to help adapt woodland to a changing climate

Mark Broadmeadow and Duncan Ray
Forestry Commission

Ecological Site Classification is a free to use, web-based, decision support system to guide species choice in British woodlands. The guidance is appropriate to both the management and restoration of semi-natural woodland and commercial forestry. The model incorporates climate change projections giving an indication of the future performance and suitability of 57 native and exotic species. It is a useful tool for guiding current and future site suitability when considering planting new woodland or restocking/enriching/diversifying species in existing woodland and will give an indication as to how existing woodlands may respond to the impacts of climate change. It can be accessed, following registration, at <http://www.eforestry.gov.uk/forestdss/>.

Introduction

Woodlands provide many benefits – or ecosystem goods and services – to society, including wildlife habitat, timber and woodfuel, sites for recreation and tranquillity, carbon storage and clean water. It is incumbent on us as

conservationists, woodland managers and nature reserve managers to ensure that the woodlands we plant, restock and manage continue to deliver those important services to future generations. Choosing the right planting stock is critical as, unlike agricultural crops, it will determine the woodland's performance, function and condition for decades and centuries to come; it is, quite literally, a once in a lifetime decision.

While the decision over what to plant may have been relatively straightforward in the past, based on what grew well locally on similar soils, species choice is now more challenging. The recent rise in the number of pest and disease outbreaks affecting British woodlands (Anon. 2012) highlights the risks of limited species diversity, while climate change and its inherent uncertainty means that we cannot continue to blindly

follow past practices; in some cases, it will be right to continue past planting choices, but this should be an active decision and not simply 'business as usual'. Ecological Site Classification provides woodland managers with a decision support system to inform – but not dictate – species choice, giving an indication of the likely impacts of climate change on a wide range of native, near native and exotic tree species.

Model description

Ecological Site Classification (ESC) was initially developed as a site-based decision support system to provide guidance on species choice and native woodland suitability in Britain (Pyatt *et al.* 2001). For a given site (grid reference required), species suitability is predicted on the basis of four climatic factors (warmth, exposure,

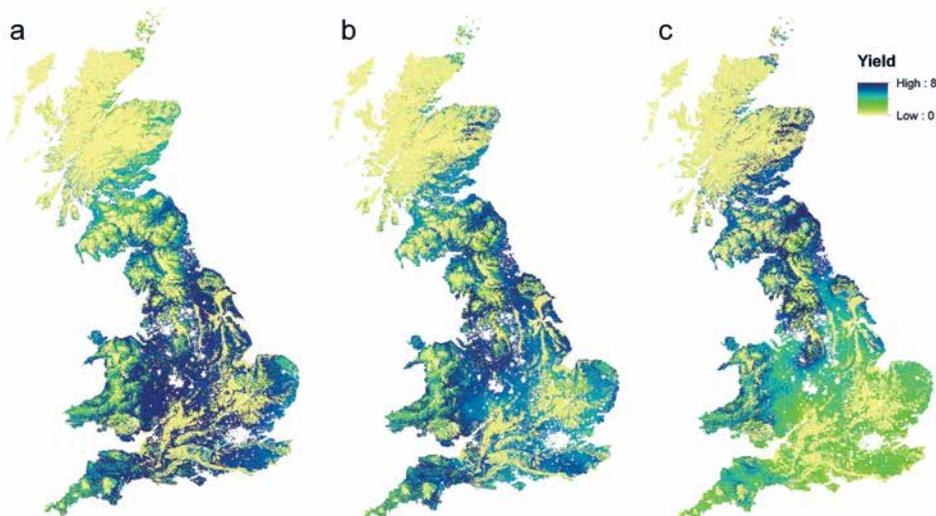


Figure 1. ESC projections of growth rates of pedunculate oak *Quercus petraea* across Great Britain under baseline (1961-90) climate (left hand panel, a) and (UKCIP02) high emissions scenarios for the 2050s (centre panel, b) and the 2080s (right hand panel, c).

Feature Article: Ecological Site Classification – A tool to aid tree species choice to help adapt woodland to a changing climate (contd)

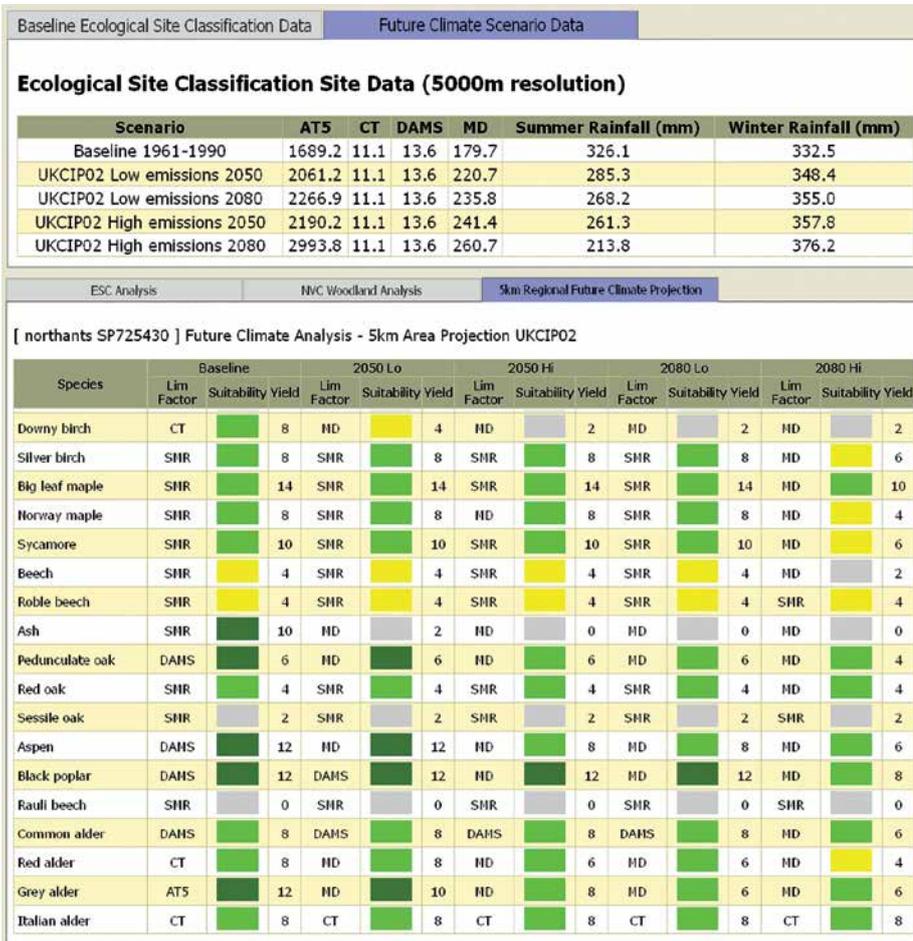


Figure 2. ESC screenshot showing growth rate (yield class) and suitability output for a range of species. Key: grey – Unsuitable; yellow – Marginal; light green – Suitable; dark green – Very Suitable.

climatic wetness and continentality) and two site factors (soil wetness and soil fertility). Suitability or productivity is modelled on the basis of a site's warmth, expressed by accumulated temperature and the next most limiting factor in the model, which reduces the maximum potential yield of a given species on sites in Britain. The underlying climate data represent the 1961-90 average climate at a spatial resolution of 250 m. The data have been modified by incorporating the UKCIP02 climate change scenarios (Hulme *et al.* 2002) to provide an indication of the likely effects of climate change on tree species suitability. Changes to species suitability are assessed for the full range of climate change scenarios (Low and High emissions). The suitability models for individual species are based on growth performance informed by the application of expert judgement, together with knowledge of physiological requirements of species in Britain.

ESC output provides an indication of current and future species suitability, based on timber production for 57 species. Suitability is classed as 'very suitable', 'suitable', 'marginal' and 'unsuitable' (See Figures 1 and 2). While timber production is unlikely to be an important objective for most conservation sites, if a species is classed as unsuitable, either now or in the future, it is likely to struggle and indicates that other species should be considered.

ESC also provides an indication of suitability of the site for the full range of National Vegetation Classification (NVC) woodland types (Rodwell 1991), based on the same climatic and site factors as for tree species suitability. Suitability is based on the vegetation community assemblage rather than just the tree species; in many cases, the tree species will be the most resilient of the vegetation community. Where the woodland type is projected to become less suitable or unsuitable, this

indicates that there may well be significant changes to species composition, which may, in time, warrant changes to the conservation objectives for the site. Figure 3 shows how changes in projected climate influence the suitability for W9 (upland ash) communities across Great Britain.

What ESC tells us, and what it doesn't

As with any model, the outputs are only as good as the information that goes into it. The limitations of the model and implications for how the outputs are interpreted need to be considered.

- The underlying soils data for ESC are very coarse resolution. This is suitable for a preliminary assessment but any decisions over planting choice should be based on more detailed site-specific 'user input' of soils information.
- Soil type, topography and aspect will vary across a site. Whilst soil variability can be reflected in ESC, topography and aspect cannot, yet both represent opportunities to enhance resilience through careful location of species within the site.
- The climate projections currently used in ESC are the UKCIP02 climate change scenarios, which are relatively severe in terms of the projected decline in summer rainfall, a key determinant of future suitability. However, a recent analysis (Petr *et al.* 2014) using the UKCIP09 probabilistic climate projections (Murphy *et al.* 2009) for three species across 51 sites gave broadly similar results to the standard ESC model.
- We don't know exactly how climate change will unfold; if we did, woodland planning management and adaptation to climate change would be more straightforward. The output from ESC should be used to give an indication of likely trends in future performance or suitability. It should also be used to flag concerns over planting a significant proportion of a particular species if its suitability is predicted to decline dramatically.
- ESC models the impact of changes to the mean climate but **not** the impacts of extreme climatic events such as severe drought, flooding or cold. However, extreme events are

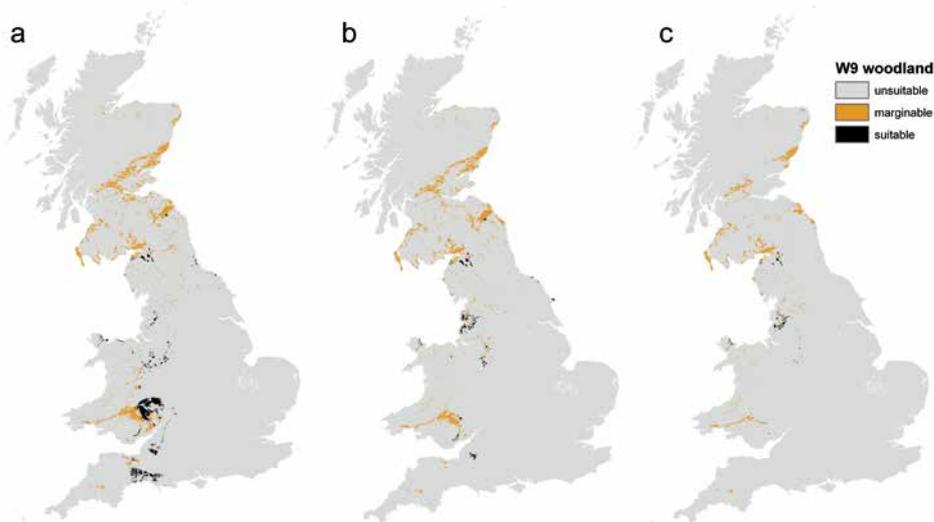


Figure 3. Suitability for W9 (*Fraxinus excelsior* – *Sorbus aucuparia* – *Mercurialis perennis*) woodland communities under baseline (1961-90) climate (left hand panel, a) and (UKCIP02) Low (centre panel, b) and High (right hand panel, c) greenhouse gas emissions scenarios for the 2050s.

likely to affect species' suitability and/or survival; and so the incorporation of the relatively severe UKCIP02 climate projections in ESC is consistent with this understanding.

- ESC does not incorporate the impacts of current or future insect pest and disease outbreaks so these threats will need to be considered separately.

Recommendations for using ESC

- Ensure you have detailed information on soil type and its variability across the site; collect the necessary data (by digging soil pits) if the information is not already to hand.
- Use ESC to indicate how tree species and native woodland communities may be affected by climate change – and consider whether, in time, conservation objectives of the site might need to be amended.
- Review ESC output before establishing new woodland, and diversifying/enriching/ restocking existing woodland, to check the future suitability of the species you are considering planting.
- Depending on any constraints placed by the woodland type and management objectives (priority habitat, conservation, amenity, timber production) use ESC to identify what other species could be planted (less frequently planted native species, near native species such as

downy oak *Quercus pubescens*, sweet chestnut *Castanea sativa* and walnut *Juglans regia*, or exotic species) to diversify the woodland and increase the chances of long-term survival.

Acknowledgement

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About the Authors



Mark Broadmeadow is the Forestry Commission's principal adviser on climate change and has been encouraging the forestry sector to adapt to climate

change since the turn of the century.

Contact Mark at: mark.broadmeadow@forestry.gsi.gov.uk.



Duncan Ray leads Forest Research's Land Use and Ecosystem Services research programme and has developed ESC over the past 20 years.

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The UK Forestry Standard's *Forests and Climate Change Guidelines* ([http://www.forestry.gov.uk/pdf/FCGL002.pdf/\\$FILE/FCGL002.pdf](http://www.forestry.gov.uk/pdf/FCGL002.pdf/$FILE/FCGL002.pdf)) outline good forestry practice requirements, while both the FC England (<http://www.forestry.gov.uk/climatechangeengland>) and Forest Research (<http://www.forestry.gov.uk/fr/climatechange>) web-pages provide further information resources, including an Information Note on Climate Change Adaptation in England's Woodlands.

Climate Change Mitigation in Rural Landscapes

Lydia Speakman
Natural England

Mark Broadmeadow
Forestry Commission

New approaches and tools are being developed to improve our understanding of how the management and conservation of the natural environment can reduce greenhouse gas emissions, and protect and enhance natural carbon stores found in our soils and vegetation. Many of these initiatives are not only incentivising climate change mitigation activities, but are also delivering on adaptation, supporting improved financial viability of land management businesses and helping to achieve conservation targets for priority habitats.

Climate change mitigation in the wider landscape

Adaptation needs to go hand-in-hand with mitigation in addressing climate change; a fact recognised by the international community and enshrined within the UK's 2008 Climate Change Act. Alongside the establishment of the National Adaptation Programme, the Act commits the UK to delivering on reducing its overall carbon emissions by 50% by 2025 and 80% by 2080 based on the 1990 baseline. Whilst the agricultural sector is a relatively small contributor to greenhouse gases (9% in 2010), the potential contribution of agriculture and the UK's wider land use, land-use change and forestry sector (LULUCF) is increasingly recognised. Since 1998, the LULUCF has acted as a net carbon sink (7.0 Mt CO₂e in 2012; Miles *et al.* 2014)



as a result of increased carbon uptake by woodland and storage in harvested wood products, changes in the balance between cropland and grassland, and a significant reduction in the use of horticultural peat.

The importance of blanket bog and woodland have been long recognised for their carbon sequestration and carbon storage potential, but other marine and terrestrial habitats such as sea grass meadow and dwarf shrub heath also provide important carbon sequestration

benefits. A detailed analysis of key habitats in Natural England's report *Carbon storage by habitat* (Alonso *et al.* 2012) highlights the importance of reducing disturbance and erosion of terrestrial soils and coastal and marine substrates and sediments; and maintaining and restoring biodiverse native habitats to maximise their carbon storage potential. While Rural Development Programme funding (Environmental Stewardship and the new England Land Management scheme

Dendles Wood. Woodland provides an important natural carbon store.



Re-wetted peatlands at Thorne, Humberhead Levels.



2015-2020: see later section) provides some finance for climate change mitigation activities, this is insufficient to achieve all that could be accomplished in rural land management. Carbon markets represent a future potential source of income and two schemes (The Peatland Code and the Woodland Carbon Code) have been developed in the UK to increase the flow of private sector and corporate-responsibility funding into carbon-based habitat improvement/creation projects.

Peatlands

A range of organisations including Moors for the Future and Peatscapes have pioneered new approaches to restoring damaged blanket bog to protect existing carbon stores and support carbon sequestration, which are also delivering wider benefits for nature conservation, improved water quality and flood management (see Anderson, this issue). The IUCN UK Peatland Programme has issued a call for 1 million hectares, just under half of UK peatlands, to be in good condition or under restoration management by 2020, but to succeed such projects will need to attract financial support from the private sector. The **UK Peatland Code** is designed to attract businesses wanting to support peatland restoration, by providing an open, credible and verifiable basis for business sponsorship of specific UK peatland restoration projects. The Peatland Code is currently being piloted with the aim of ensuring that restoration delivers tangible climate change mitigation benefits, alongside other environmental benefits.

Woodlands

The **Woodland Carbon Code** (WCC), launched in 2011, provides a voluntary standard for woodland creation projects in the UK. It provides assurance and clarity about the carbon savings of any given woodland carbon project. The Code also seeks to ensure that these woodlands are

not just delivering carbon benefits, but will also deliver for biodiversity and are sustainably managed, as set out in the UK Forestry Standard.

The WCC's 'carbon look-up tables' provide a detailed breakdown of the likely carbon storage of different tree species under different management regimes. The Ecological Site Classification decision support system is used to predict growth rates for individual species, consider the future effects of climate change and amend species choice, as necessary, to establish resilient woodland (see Broadmeadow & Ray, this issue). The carbon savings associated with a WCC project can count towards an organisation's net greenhouse gas emissions, as set out in Government's Environmental Reporting Guidelines (Defra 2013), while the wider benefits to society and the environment can also be set out using the UK Corporate Responsibility Reporting Plan (Tubby 2013). Woodland creation funded through WCC schemes can buffer existing woodland to strengthen ecological networks, or expand the area of priority woodland habitat on previously cultivated or brownfield sites.

Farmed land

The agricultural sector's **Voluntary Greenhouse Gas Action Plan** focuses on measures to reduce emissions by encouraging energy efficiency, improving stock management and reducing the use

Feature Article: Climate Change Mitigation in Rural Landscapes (contd)

of fertilisers. The role of schemes such as **Catchment Sensitive Farming** in reducing diffuse pollution in water catchments through inefficient use of fertilisers or contamination from manure has been successful in encouraging the adoption of new practices and technology; a secondary benefit is that such schemes have delivered over 1 MtCO₂e reduction in greenhouse gas emissions between 1990 and 2010 (Defra 2012). Incentives are provided to farmers through **Environmental Stewardship** for options such as the creation of buffer strips, hedgerow planting and habitat creation. These have been developed to protect soil and water resources, and enhance biodiversity or landscape and historic features and have been shown to support climate change adaptation. They are also helping to protect key carbon stores and improve carbon sequestration of key habitats. A study by the University of Hertfordshire concluded that Environmental Stewardship makes a significant contribution to climate change mitigation and estimated that uptake across England has resulted in a reduction in greenhouse gas emissions by approximately 4 Mt CO₂e per annum (although it is acknowledged that there is the potential for 'displaced' emissions if agricultural production increases away from the Stewardship agreements to replace any loss of production) (Warner *et al.* 2011; see Natural England Technical Information Note 107 (Natural England 2012) for further information).

The **CALM Carbon Accounting Tool** for land managers developed by the Country Land & Business Association enables land managers to calculate their annual emissions of greenhouse gases against the carbon sequestration potential of their soils, natural vegetation and trees. It also allows users to assess the impact of environmental stewardship options and tree planting using the Woodland Carbon Code, under different scenarios. The CALM tool assesses emissions and sequestration across the whole land holding, in contrast to other carbon footprinting calculators which look at end-to-end processes associated with the production of a specific product (e.g. milk), and should therefore provide a more accurate assessment of the impact of different land management practices.

Environmental Stewardship is being replaced by a new scheme, currently known as the **New Land Environmental Management Scheme (NELMS)** forming part of the Rural Development Programme 2014-20. NELMS will incorporate measures that can support climate change mitigation (e.g. tree planting, woodland creation, habitat restoration), and spatial analysis of soil carbon stores and sequestration potential will be included in the spatial targeting of the new scheme. That mitigation will continue to be part of the new generation of environmental stewardship is testament to the recognition of the value of the natural environment in carbon management, not just for the contribution it will make in helping to deliver UK carbon targets, but as an analogue for the delivery of much wider environmental, social and economic benefits, including supporting measures for climate change adaptation.

Notes

CO₂e (CO₂-equivalent or equivalent CO₂): The concentration of carbon dioxide that would cause the same amount of radiative or climate forcing as a given mixture of carbon dioxide and other greenhouse gases such as methane and nitrous oxide.

About the Authors



Lydia Speakman is a Senior Adviser on climate change for Natural England.

Contact Lydia at: Lydia.Speakman@naturalengland.org.uk



Mark Broadmeadow is the Forestry Commission's principal adviser on climate change and has been a member of the Woodland Carbon Code's Steering Group since its inception in 2009.

Contact Mark at: Mark.Broadmeadow@forestry.gsi.gov.uk

Tools

- UK Woodland Carbon Code <http://www.forestry.gov.uk/carboncode>
- UK Peatland Code <http://www.iucn-uk-peatlandprogramme.org/peatland-gateway/uk/peatland-code>
- UK Forestry Standard <http://www.forestry.gov.uk/ukfs>
- Catchment Sensitive Farming www.naturalengland.org.uk/ourwork/farming/csf/default.aspx
- The CALM Carbon Accounting Tool <http://calm.increment.co.uk/>

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Helping nature adapt in a changing climate: turning principles into practice

Christina Wood
Scottish Natural Heritage



Plate 1. Loch Leven and surrounding agricultural land. © Lorne Gill/SNH

Climate change poses one of the biggest threats to Scotland's nature and landscapes. Whilst nature has a great capacity to cope with change, the speed and scale of recent climate change is proving too quick for many species to either move or adapt in situ. This is aggravated by the fragmented and degraded nature of many

species' populations and habitats in the UK. The effects of climate change on nature have been widely recognised and the evidence continues to grow, with impacts such as changes in species distributions and community composition starting to emerge (e.g. DEFRA 2012, Morecroft and Speakman 2013).

Harnessing nature's capacity to adapt is one of the best tools we have to manage the impacts of climate change, and underlies many guiding 'principles' of adaptation. In Scottish Natural Heritage (SNH) we are turning adaptation principles into practical action. Here, we look at an example of a low-risk, 'no-regrets' adaptation option put in place at Loch Leven National Nature Reserve (NNR), and explore a more radical option at Creag Meagaidh NNR.

The guiding principles of adaptation in nature conservation

Adaptation Principles are based on good ecological theory, but there has been very little practical testing or assessment of the approaches. This is partly because adaptation measures are often developed with minimal knowledge compared to other land management decisions. Accepting this uncertainty and finding ways to deal with it are important. There will be 'no-regrets' options (see Table 1, SNH principle #1 *reduce other pressures*), but also higher risk adaptation measures to consider when other options have failed (e.g. *consider translocation* #8, Table 1). Timescales must also be considered. While some adaptation measures, such as *improving habitat management* in a grassland by modifying grazing, are relatively quick, taking just a couple of years for improvements in ecosystem health and resilience, other measures can take decades. For example *enhancing habitat diversity* in woodland management has a long lead-in time. Therefore, it is important that we start helping nature adapt now. Working across Scotland's National Nature Reserves (NNRs), SNH is leading on new ways of managing nature to cope with a changing climate.

Turning principles into practice

Reducing other pressures - 'no-regrets' adaptation

At Loch Leven NNR (Map 1; Plate 1) climate change is one of several interacting impacts on water quality (Dudley *et al.* 2012). Surrounded by towns, villages, arable, cattle farming and industry, the loch has long battled with water pollution from nutrient-laden run-off. Detailed water quality monitoring¹ indicates that whilst point source discharges were addressed in the late 1990s and levels of pollution have declined over the last 5 years, pollution from land management is still significant. More frequent, intense rainfall events and wetter winters mean soil and nutrients are washed into burns, drainage ditches and ultimately into the loch. During warm, dry and calm weather, naturally-occurring algal blooms are made worse by too many nutrients. Drier, warmer springs and summers are expected in future, along

Table 1. SNH's Adaptation Principles in response to climate change (Scottish Natural Heritage 2012, p17).

Adaptation Principles – helping nature adapt to climate change	
<p>1. Reduce other pressures on ecosystems, habitats and species, e.g. pollution, grazing, habitat fragmentation and invasive non-native species.</p> <p>2. Make space for natural processes including geomorphological, water and soil processes and species interactions.</p> <p>3. Enhance opportunities for species to disperse by reducing fragmentation and increasing the amount of available habitat.</p> <p>4. Improve habitat management where activities such as grazing, burning or drainage cause declines in diversity or size of species populations, or where modifying management could improve resilience to climate change.</p>	<p>5. Enhance habitat diversity, e.g. by varying grazing or plant-cutting management on grassland or moorland, or creating new habitat on farms.</p> <p>6. Take an adaptive approach to land and conservation management, e.g. by changing objectives and management measures in response to new information.</p> <p>7. Plan for habitat change where assessments indicate that losses of habitats or species are inevitable, e.g. as a result of sea level rise.</p> <p>8. Consider translocation of species in circumstances where assessments indicate the likely loss of a species despite new management measures, and where there are suitable areas for nature to adapt.</p>

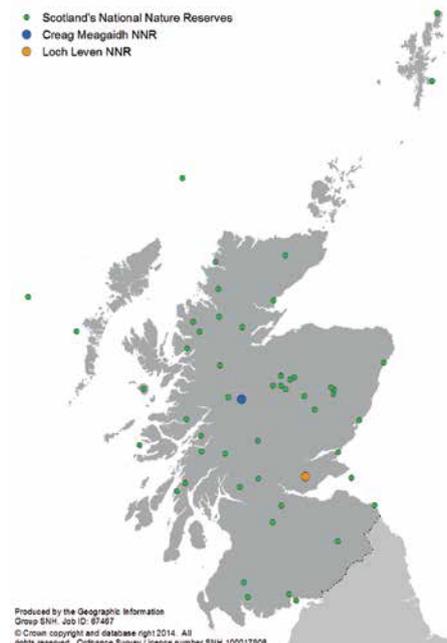
with wetter winters and more extreme rainfall events (UKCP09; Met Office 2009), so to future-proof the loch and the many benefits it brings to local communities and industries, we have to continue to reduce the pollution pressures on the loch. SNH is working with farmers to reduce the risk of nutrient and soil losses, building on work in the late 1990s to create buffer

strips (Plate 2) either side of watercourses to help prevent soil-laden run-off entering the burns. Erosion-prone crops such as potatoes require innovative solutions such as silt traps, filter fencing, interceptor drains and tanks where erosion is locally severe (Plate 3). Buffer strips continue to play an important role, along with soil testing, stading improvements and the careful use of fertilisers and manures.

A sustained effort at the catchment scale to reduce nutrients entering Loch Leven is improving water quality discharged into the loch. The freshwater ecosystem in the loch now stands a better chance of being able to cope with the additional pressures that hotter, drier summers or other climate-driven changes may bring.

Translocation – a 'last resort' climate change adaptation strategy?

Different responses are needed where we cannot reduce or manage the pressures on a vulnerable ecosystem. For example, in mountain-top communities climate change will exacerbate other stressors such as over-grazing, nitrate deposition and recreational pressure. Some specialist species will be replaced by more common species typical of lower altitudes (Britton *et al.* 2009, Ross *et al.* 2012). Where a species is likely to be lost despite management measures, and where there is suitable habitat at



Map 1. The distribution of Scotland's NNRs highlighting the location of Creag Meagaidh and Loch Leven NNRs.

another location, more radical adaptation measures, such as assisted colonisation (a type of translocation), will be necessary (Brooker *et al.* 2011).

Some species are able to track their preferred conditions, or ‘climate space’, as the climate changes but other species may become stranded because:

- **they are unable to undertake ‘climate tracking’** due to reproductive or dispersal barriers. For example, some plants produce very few, large seeds that tend to fall close to the parent. The rate of spread of the species is therefore often very low.
- **they have nowhere to go**, for example the Arctic-alpine lichens and bryophytes that thrive on our highest mountains are cold-adapted and already occupy ground at the highest altitudes where temperatures are coolest and cloud cover is highest.

In these cases, conservation translocations may be an appropriate way to minimise local extinction. However, there are important considerations that practitioners must address when considering this type of intervention, see Table 2.

As well as assessing risks, any planned translocation needs to consider what the wider benefits are, and question such interventionist action. Is it worth the risk, time and costs? SNH and the Royal Botanical Garden Edinburgh, on behalf of the National Species Reintroduction Forum, have produced a ‘*Scottish Code for Conservation Translocations*’ to guide the process of evaluating whether a translocation is appropriate, and if so, how to increase the likelihood of successful outcomes, and reduce the likelihood of problems and conflict. In all cases, practitioners should consider whether other adaptation actions (Table 1) represent better investment of resources.

Assisted colonisation: learning lessons from lichens at Creag Meagaidh NNR

SNH, the James Hutton Institute and Royal Botanical Gardens of Edinburgh are investigating whether the vulnerable mountain-top lichen *Flavocetraria nivalis* can be translocated to track specific climatic conditions. The lichen has a very limited range at high altitudes, mostly



Plate 2. A stream and buffer strip near Milnathort in the Loch Leven catchment. Densely vegetated buffer strips trap soil from neighbouring fields, preventing it from entering the water courses. © Lorne Gill/SNH (Inset) Plate 3. A silt trap full of eroded soils from nearby fields. © Neil Mitchell/SNH

Table 2. Key considerations for practitioners planning to use translocation as a climate change adaptation measure. Adapted from the *Scottish Code for Conservation Translocations* (see <http://www.snh.gov.uk/protecting-scotlands-nature/reintroducing-native-species/scct/> for more information).

Considering Translocation	
Legislative	Statutory or non-statutory status of: <ul style="list-style-type: none"> – species (e.g. European Protected Species?) – donor population/site (e.g. SSSI, NNR, National Park?) – recipient habitat/site (as above).
	Determining ‘native range’ – how do we determine whether the recipient site is within a species’ range? Clear definitions of range are commonly lacking (particularly in under-recorded species).
Climate Change	Assessed level of threat from climate change – is there evidence that the species is highly vulnerable?
	Assessed and identified characteristics of the species that make translocation acceptable and likely to succeed – is there a clear understanding of habitat requirements and biotic interactions? Is there evidence to suggest the receptor site will remain suitable in the future?
Biological	Translocation distance – local, regional, (inter)national?
	Threat to the source population – could removal of individuals have a direct and measurable impact on the remaining population?
	Chance that establishment following the translocation may cause loss/reduction of important habitat or other species , e.g. grazing impacts from large herbivores? Predation?
	Spread of pests and diseases – does the species have native pathogens and pests or does it suffer from major problems, e.g. ash/ash dieback, amphibians/chytrid fungi?
Socio-economic	Species likely to spread beyond the confines of the release site , e.g. could the species become invasive?
	Likelihood of strong social resistance to translocation – is it likely to cause local concern or major opposition from some groups (e.g. predators being released near livestock)?
	Harm to human health and well-being – could the translocated species act as a vector for harmful pathogens? Is it a large predator?
	Harm to human livelihoods – are there local problems or concerns, e.g. killing livestock, harming populations of commercially important species, restricting access to commercially important sites?
	Sufficient resources – is the translocation and follow-up management well-funded? If not, it may result in poor management and negative conservation outcomes or socioeconomic problems.

in the Cairngorm Mountains. Its current distribution suggests potential sensitivity to human-induced climate change under UKCP09 scenarios (e.g. Jenkins *et al.* 2010). This makes it a good choice for a climate change, adaptation-focused, translocation trial. It is also a low-risk species, being slow growing and with no capacity to reproduce rapidly, disperse widely or out-compete native plants in the recipient community. The challenge is to find sites with suitable conditions for the lichen to thrive on the more westerly mountain plateaux at Creag Meagaidh NNR.

How do we identify translocation receptor sites?

Although Creag Meagaidh sits outside the target species' core range in the main Cairngorm massif (Map 1), field surveys indicate that it is likely to hold some suitable recipient habitat for *F. nivalis*. Climate 'envelope' models have been used to map distribution and the associated range of climate conditions and then predict where such conditions might occur in the future on Creag Meagaidh.

Samples of the lichen have been translocated (moved) from sites in the Cairngorms to localities predicted by the model to hold suitable conditions on Creag Meagaidh. The lichens are being monitored (over 4 years, until 2015) to see whether survival matches the modelled predictions. Continued re-survey of the lichens on Creag Meagaidh will ground truth the model's ability to predict sites suitable for the lichen under today's conditions.

We can learn lessons about the processes, risks and benefits involved by undertaking translocation trials on relatively benign species such as lichens. The Creag Meagaidh project will yield specific (i.e. lichen-relevant) and generic guidance about translocation as a climate change adaptation measure.

The next challenge is to find out which factors are critical in driving lichen success and failure, and whether the predictive model could be improved to take this into account. Getting this right is vital if we want to predict where suitable conditions for a species may occur in the future (based on climate projections). Assisted colonisation can only be used as an adaptive management tool for biodiversity

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conservation under climate change if we can do this with some confidence.

Despite the risks, there are many potential benefits to evidence-based translocations that are carefully planned and well-resourced. In species under threat and at the edge of their natural range (such as *F. nivalis*), extinction risk can be reduced by:

- establishing populations in areas where the species will be subject to reduced levels of threat (e.g. by moving into more suitable climate space).
- improving a population's adaptive capacity by increasing its size, genetic health and resilience.
- establishing 'bridging populations' to aid migration and/or gene flow.

There is much still to be learnt about assisted colonisations and other forms of translocation, but trials like Creag Meagaidh are encouraging us to be imaginative in our response to climate change. Having the foresight to think beyond existing species' ranges and to consider the possibilities for new ranges is crucially important for conservation science and management. Do let us have your views – we can only learn by trying, and listening.

Note

1 Loch Leven water quality is monitored by the Centre for Ecology and Hydrology. More information at: http://www.ceh.ac.uk/sci_programmes/water/scottishfreshwaterecosystems-lochleven.html

About the Author



Christina Wood leads much of SNH's work on climate change. She works part-time on Adaptation, and the rest of her time on SNH's Peatland ACTION project. She is based at the SNH Torlundy Office, near Fort William.

Contact Christina at:
christina.wood@snh.gov.uk

Conserving carbon in peat in the face of climate change

Penny Anderson CEcol FCIEEM
Director Penny Anderson Associates

Anyone concerned about climate change will be interested in the importance of the historic carbon store and the potential for new sequestered carbon in peat. In upland Great Britain, the implications for nature conservation as well as climate change are given for this in terms of the hydrological and ecological condition of peat. Some of the methods and results of the many GB projects to restore blanket peat are presented.

Carbon in peat

Soil organic carbon holds some six times more carbon than all the forests of the world and 30% of this is in approximately 3% of the land area holding peat. Drained and degraded peats occur on 0.3% of the land but are emitting 6% of greenhouse gases (Joosten 2010). There is more peat in the tropics - Asia is the world's top peat carbon emitter; Europe is second (Joosten 2012 pers. comm.). Indeed, the main cause of peat loss and degeneration on a worldwide scale is drainage and clearance for agriculture (Joosten 2010).

In the UK, 40-50% of soil carbon is stored in only 8% of the land area, which is equivalent to about 20 years of UK CO₂ output (Moors for the Future 2007). Most of this carbon store is in peat, but around 80% of our peatlands are losing carbon due to various forms of damage. This contributes to the alarming figure of 80% of all carbon losses from UK soils being derived from upland peat soils (Bellamy *et al.* 2005).

So what does this all mean and what are the consequences, at least in Britain? If,



Figure 1. Gullying and bare peat in blanket bog

like me, you accept that climate change is **the** biggest threat for mankind and the environment, then peatland restoration is critically and urgently required. The importance of peat both as an historic carbon store and in capturing carbon in new peat (Lindsay 2010) shows that effective restoration could change the carbon equation significantly if part of a low carbon economy. The essential requirements are a wet environment with a stable water table just below the surface most of the year and a well-vegetated surface with plenty of peat forming *Sphagnum* species.

Reasons for poor peat condition in upland Britain

There are a multitude of reasons, often interacting, for poor peat condition in upland Britain, the consequent release of stored carbon and lack of active peat formation (Lindsay 2010):

- Miles of densely packed drains (grips, mostly dug with grant aid in the 1960s and 1970s);
- Extensive bared peat and gully systems mostly probably initiated from wildfires, especially in the South Pennines and Peak District (Figure 1);
- Centuries of burning and overgrazing;
- 200 years of air pollution, particularly sulphur dioxide from industrial centres close to moors, which increased peat acidity beyond that tolerated by *Sphagnum* species;
- Conifer planting, often including drainage;
- Peat extraction, from blanket bogs as well as lowland raised mires;
- Drainage and 'improvement' for agriculture, although currently less widespread than in the past;
- Localised damage from recreational access and illegal 4x4 vehicles and motorbikes.

Feature Article: Conserving carbon in peat in the face of climate change (contd)

The carbon is being lost through decay and shrinkage of the peat as it dries; much is discharged into the air; some enters streams leading to discoloration which has to be removed by water companies in a process that is environmentally damaging in itself; more ends up as peat sediment. Some peat blows away in drought conditions. The famous post in Holme Fen NNR (Cambridgeshire) now stands 4 m above ground level – the amount of shrinkage since 1850 owing to surrounding drainage operations.

New carbon is not being sequestered fully, if at all, where the peatlands are too dry as a result of drainage or gullying (Figure 1), and no longer support the peat-forming *Sphagnum* species in sufficient quantity.

Initiatives to restore peat in the UK

Attempts to revegetate bare peat started after widespread and often severe wildfires during the extreme drought in 1975-6. Much experience was gained in the Peak District and North York Moors in the following years (North York Moors National Park 1986, Anderson *et al.* 1997), but efforts focused on repairing bare peat surfaces rather than in making them wetter. Rewetting was started on lowland raised bogs and fens (Rowell 1988, Stoneham and Brooks 1997). Extensive grip blocking in the uplands began around 2000 (e.g. Wallage *et al.* 2006, Armstrong *et al.* 2010) and has since expanded, including a wide variety of projects throughout GB and Ireland.

The key players are nature conservation bodies (statutory and NGOs), Forestry Agencies and landowners plus the water companies. The latter are significant – United Utilities' SCaMP¹ was the first project where the regulator, OFWAT, permitted money to be spent on catchment management both to restore SSSI condition and to reduce colour issues (dissolved organic carbon) in drinking water rather than end-of-pipe engineered solutions. This approach has now been extended to other water companies. Many projects have focussed on nature conservation objectives, but carbon is at the centre of all – keeping it in the peat and providing the conditions for sequestration of more.



Figure 2. Bare peat revegetation under SCaMP, heather visible after 6 years (Photo by Andy Kean)



Figure 3. Plastic dams in a gully, raising water tables in the peat

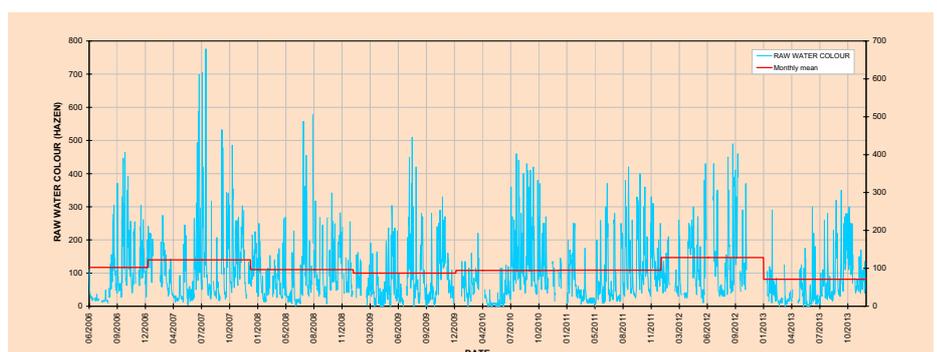


Figure 4. Slight but statistically significant reduction in colour after grip blocking (2007) in a SCaMP catchment

What are the techniques and results?

Peat restoration projects involve one or more of the following: revegetating bare peat; blocking grips, drains and gullies; removing conifers; and establishing sustainable long-term land management practices. The results are encouraging, but we are still a long way from restoring active peat in the most degraded locations.

Revegetation

Much expertise was gained through the Peak District's Moorland Management Project (Anderson *et al.* 1997). Here, not only was there more bare, eroding peat than anywhere else, but the peat had been acutely acidified (pH < 3) by air pollution. This prevented nutrient uptake and plant growth. The addition of lime and fertiliser to raise pH and nutrient levels enough to support blanket bog vegetation, the use of geojute (a jute mesh), a nurse grass seed mix and heather brush (cut material holding ripe seeds) were found by trial and error to be the most effective way of establishing blanket bog vegetation (Anderson *et al.* 1997). This general specification is now used widely; with new logistics for aerial and large scale treatments developed by Moors for the Future and other restoration projects (Anderson *et al.* 2009).

Early monitoring showed that bare ground reduced quickly and blanket bog species colonised the nurse grasses and establishing heather (Figure 2, Anderson *et al.* 1997). Such revegetation also reduces significantly the amount of particulate organic carbon reaching watercourses (J. Price, pers. comm.). Three years after revegetation, the SCaMP project also detected signs of reduced dissolved organic carbon (Penny Anderson Associates 2012). Furthermore, SCaMP, Allott *et al.* (2009) and Price (J. Price, pers. comm.) found that revegetating bare peat raises the water table and with reduced perturbation, possibly related to changes in surface reflectivity and evapo-transpiration rates and retention of moisture in the vegetation. Although active blanket bog needs a water table within 10-15 cm of the surface, this partial rewetting increases resilience to wildfire and drying out. Holden *et al.* (2008) has shown experimentally that cottongrass-dominated

blanket peat has half the runoff velocity compared with bare peat and that runoff is even lower from a *Sphagnum*-dominated surface. Revegetating bare peat is therefore important but would be better with a good *Sphagnum* cover.

Grip and gully blocking

The effectiveness of grip blocking is well demonstrated. Dams are made of peat, plastic piling, heather bales or wood depending on local circumstances. A sequence of dams, with each pool passing back to the next dam, is usually needed to avoid failures and reduce erosion (Figure 3).

Monitoring at a catchment scale shows that dams can reduce sediment loss (Armstrong *et al.* 2010) and dissolved

organic carbon (DOC), often within two years (Figure 4), although it can sometimes take longer (Wallage *et al.* 2006, Armstrong *et al.* 2010, Wilson *et al.* 2010; Penny Anderson Associates, unpublished data). Water tables are elevated quite quickly and perturbations are reduced after comprehensive dam blocking leading to *Sphagnum* increases (Figure 5) in dam pools and adjacent blanket bog (Figure 6).

Most areas of extensive bare peat are also gullied, often severely. Gully blocking is a fairly recent technique that attempts to reduce the dry nature of damaged peat. The gullies are part of the dendritic drainage pattern so water has to be accommodated within them, making damming more complicated than for grips. Dams use the



Figure 5. Bowland (SCaMP) before grip blocking in 2007 (left) and after blocking (2013) Abundant *Sphagnum* in pools plus raised water table in peat. (Photo by Andy Kean)

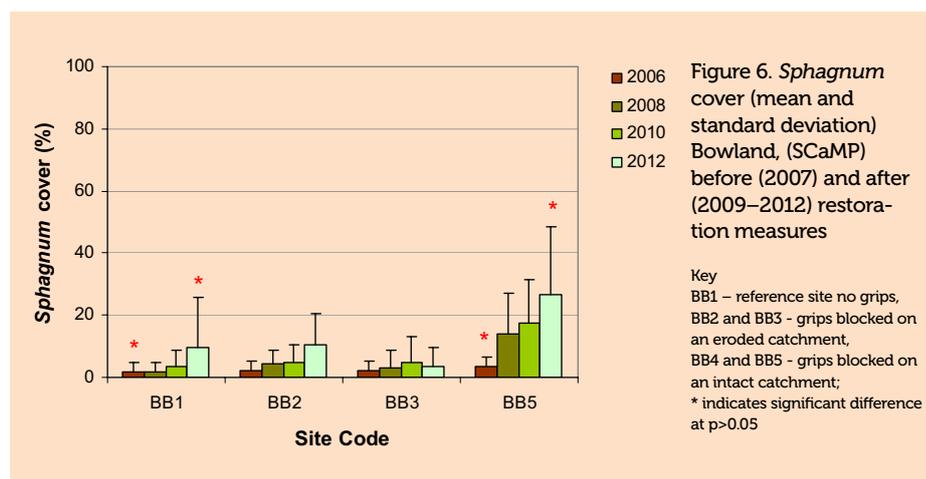




Figure 7. Low dams of stones holding water in deep gullies.

same materials as for grips, plus stone, which can blind with sediment over time (Figure 7). Most dams tend to be positioned to part fill the deeper gullies. It is too soon to judge the effectiveness of gully blocking but water tables should be raised and wetter blanket bog should result, compared with undammed gullied peatland.

Holding water in blocked grips and gullies as well as in the peat could influence the hydrological runoff characteristics. Downstream flooding depends on the peak of discharge as well as the total volume of water moving down the streams/rivers. Peat in good condition has a limited capacity to absorb more rainfall, thus reducing the degree to which it can buffer flooding. Rain-fed peatland catchments tend to have a very flashy hydrological regime (Holden 2009) with a rapid response to rainfall and low baseflows. Contrary to popular view, therefore, peat is not a sponge that can trap rainfall releasing it slowly, thus reducing downstream flooding potential. Only by blocking all the grips and drains in a catchment, is the downstream flooding curve peak likely to be reduced and extended, as found by Wilson *et al.* (2010) after extensive grip blocking in the Lake Vyrnwy RSPB Project.

Conifer removal

Conifers remove water from peat through evapo-transpiration as well as through their weight. Thus, the peat shrinks and may dry out (Lindsay 2010). Cracks can develop in peat under a long-term conifer crop, making the hydrological integrity of the peat difficult or impossible to restore (Anderson 2010). Where conifers are removed and drainage blocked, it may take time to achieve the wetland conditions needed for active blanket bog growth (Anderson 2010). Although some projects have reported successful restoration of water table levels to within 10-15 cm of the surface, in others, despite many dams, water tables have not altered (Anderson 2001).

Management outcomes

The rewetting of peatlands has positive effects on wildlife. Not only does *Sphagnum* cover increase but there are indications of increases in other typical blanket bog species like cranberry *Vaccinium oxycoccos* and bog asphodel *Narthecium ossifragum*. Carroll *et al.* (2011) has shown significantly increased crane fly populations after grip blocking – a critical source of food for many birds. Some species could be lost in the Peak District moors owing to climate

change resulting in reduced food availability and higher temperatures (Pearce-Higgins 2010); hopefully, rewetted blanket peat will delay this.

Where revegetation has taken place without full rewetting, dry blanket bog vegetation develops and persists (Penny Anderson Associates 2012). Heather in the revegetation mix can become dominant, excluding some of the earlier-colonising blanket bog species, so more cottongrasses (*Eriophorum* spp.) and crowberry *Empetrum nigrum* are being added now, using micro-propagated plants, rather than heather.

Micro-propagation of *Sphagnum* is also being developed (see <http://www.beadamoss.co.uk>) that can be spread onto the early stages of re-vegetation where there is adequate moisture (Hinde *et al.* 2010). Now that sulphur dioxide pollution has reduced, *Sphagnum* species are reappearing unaided in the South Pennines – an encouraging sign. Having a significant cover of peat-forming *Sphagnum* is critical as they affect the overall hydrology through their water-holding capacity.

Final Thoughts

This paper focuses on blanket bog restoration in England, set within the wider peatland and carbon context. There are a wide variety of peatland restoration projects from Devon to Scotland, and Wales to Ireland. Many have multiple objectives, but nature conservation is benefiting from them all. Greater plant diversity and increased *Sphagnum* cover will help to move these priority habitats towards more favourable condition – important since many are SSSIs, SACs or SPAs². Supporting the upland farming community and contributing to the rural economy is central to SCAAMP and other projects. This shows how peatland restoration projects can contribute to wider ecosystem services, and some have featured in recent appraisals (Waters *et al.* 2012). The development of the Peatland Carbon Code as part of the Payment for Ecosystem Services research initiated by Defra (<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18642>) would provide new funds and has the potential to increase peatland restoration projects as part of Corporate Social Responsibility

sponsorship and carbon offsetting. Even more important, if the carbon lost from peat were included in the IPCC calculations related to climate change, it would stimulate greater interest in restoring peat and could provide a real incentive to finance much more restoration work.

Check the web if you are interested in appreciating the scale of the work being undertaken; take the time to visit; be inspired by the huge effort; applaud the success; spread the word and help to secure the future of peatlands in the UK.

Acknowledgements

I would like to thank John Box for both suggesting the paper and providing constructive comments on the first draft. All figures/ photographs are produced or taken by Penny Anderson Associates or Penny Anderson.

Notes

1 SCaMP – Sustainable Catchment Management Programme

2 SAC – Special Areas of Conservation, SPA – Special Protection Areas for birds

About the Author



Penny Anderson is sort of retired from the long established ecological consultancy, Penny Anderson Associates, of which she is still a Director. She has specialised over the last 35 years

in peatland restoration amongst other things.

Contact Penny at:

penny.anderson@pennyanderson.com

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The LIFE Programme 2014-2020: supporting the EU strategy on adaptation to climate change

John Houston CEnv MCIEEM

The EU LIFE programme for the period 2014-2020 is significantly different from its predecessors by being a programme for the environment and climate action. This article explains the significance of the changes and gives some of the background to the EU approach to climate change adaptation. CIEEM members should also be aware of the scope of the EU strategy on adaptation to climate change which underpins much of this work.

The EU strategy on adaptation to climate change

Europe is already facing unavoidable impacts of climate change, which will affect the full EU territory, although with regional differences. The EU response has been to allocate at least 20% of its €960 billion budget for the period 2014-2020 to climate change-related action. This represents around a threefold increase from the 6-8% share in 2007-2013.

The EU Adaptation Strategy (European Commission 2013)ⁱ aims to contribute to a more climate-resilient Europe by enhancing the preparedness and capacity to respond to the impacts of climate change at local, regional, national and EU levels, by developing a coherent approach and by improving coordination. It supports the development of national adaptation strategies and the links between these and national risk management plans, in line with the UN Framework Convention



Titchwell Marsh Reserve ©John Houston

on Climate Change. It confirms that substantial funding will be available over the next six years for climate mitigation and adaptation, including through the climate action sub-programme of the LIFE regulation.

Other key actions include bridging the knowledge gap (e.g. through the Horizon 2020 research and innovation programme) and to support Climate-ADAPTⁱⁱ as the 'one-stop shop' for adaptation information in Europe. The Climate-ADAPT website gives an overview of the EU approach to climate change adaptation with information provided by sector, including biodiversity, coastal areas, and agriculture and forestry.

The EU Adaptation Strategy supports ecosystem-based approaches that provide multiple benefits, such as reduced flood risk, less soil erosion, improved water and air quality, and reduced heat-island effects. Projects with demonstration and transferability potential will be encouraged, as will green infrastructure and ecosystem-

based approaches to adaptation, and projects aiming to promote innovative adaptation technologies.

The EU Biodiversity Strategy to 2020ⁱⁱⁱ states that 'ecosystem-based approaches to climate change mitigation and adaptation can offer cost-effective alternatives to technological solutions, while delivering multiple benefits beyond biodiversity conservation'.

European Environment Agency Report: Adaptation in Europe

The direction of the EU Adaptation Strategy is echoed in the publication 'Adaptation in Europe' published in 2013 by the European Environment Agency^{iv}. The report defines adaptation as 'actions responding to current and future climate change impacts and vulnerabilities (as well as the climate variability that occurs in the absence of climate change) within the context of ongoing and expected societal change. It means not only protecting against negative impacts, but building resilience and also taking advantage of any benefits from these changes'.

Tim Cowan, RSPB's Stone-Curlew Project Officer, recording a stone-curlew nest on semi-natural habitat in the Brecks. ©John Houston

The EEA report stresses that adaptation and mitigation (i.e. the reduction of greenhouse gas emissions) are complementary actions. Both are EU priority areas and need coherent, flexible and participatory approaches.

The LIFE Programme for the Environment and Climate Action

The Directorate Generals for Climate Action (DG CLIMA) and Environment (DG ENV) have drawn up the new LIFE programme for the environment and climate action^v. LIFE is a successful delivery mechanism and, despite an overall reduction in the EU budget, the new programme's budget has increased to €3.456 billion.

The new LIFE programme introduces the two sub-programmes of environment and climate action. It is still a relatively small fund and it will continue to have a focus on capacity building and acting as a catalyst by disseminating solutions and best practices and by promoting innovative technologies. It is complementary to other EU funding programmes and the new category 'Integrated Projects' encourages the preparation of strategic projects using funding from several EU sources and national sources. It also encourages a closer partnership with the EU research programme 'Horizon 2020', which could be valuable to climate change projects that would benefit from closer links to scientific monitoring. LIFE projects can often provide ideal open-air laboratories to measure the effects of management actions.

The priority focus for nature conservation in the LIFE Nature programme is on the implementation and management of the Natura 2000 network, in particular in relation to the national and regional Prioritised Action Frameworks (PAFs); on the development and dissemination of best practices in relation to the nature directives; and the wider challenges identified by the EU Biodiversity Strategy to 2020.

Projects that target the protection of biodiversity may come from either of the two sub-programmes. Applicants should determine whether their proposal is geared, from its initial conception and design, towards climate change or towards

nature conservation, and apply for the relevant strand of the Programme. More information on the priorities for LIFE funding is given in the multiannual work programme for 2014-2017^{vi}.

The LIFE programme continues to support a wide range of thematic areas but projects should be relevant to EU policy, for example integrated projects addressing Natura 2000 should also be supported by national or regional PAFs.

In May 2014 LIFE projects from across Europe met in North Norfolk to exchange experiences in relation to climate change adaptation^{vii}. The meeting was hosted by RSPB through its Futurescapes programme and by Natural England through the Improvement Programme for England's Natura 2000 sites (IPENS). Both projects address climate change. Other current LIFE projects in the UK that have a strong element of climate change adaptation are the RSPB projects for stone-curlew *Burhinus oediconemus* and little tern *Sternula albifrons*, the MoorLIFE project (Moors for the Future Partnership) and the recently completed Alde-Ore Future for Wildlife project (National Trust).

Titchwell Marsh

An example of the type of climate support that can be provided through LIFE funding is Titchwell Marsh Reserve where the new 'Parrinder Wall' successfully protected the freshwater marshes from tidal inundation during the December 2013 storm surge. The Titchwell Marsh Coastal Change project completed a managed realignment to allow a brackish marsh to revert to saltmarsh whilst providing mitigation and compensation for the loss of breeding avocet *Recurvirostra avosetta* habitat in accordance with Article 6(4) of the Habitats Directive.

Securing the future of the stone-curlew in the UK

Although the UK holds only a small proportion of the European stone-curlew population, it is the only country in Europe where numbers are increasing. It is expected that the UK will become ever more important for the stone-curlew if the more southerly parts of its range become hotter and drier. Therefore, work to protect the stone-curlew in the UK, can be seen as a climate change adaptation project.



A key element of the RSPB's stone-curlew LIFE project is to create patches of open semi-natural habitat on grass heaths in the Brecks to provide breeding sites.

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- vi The multi-annual work programme 2014-2017 is available at <http://ec.europa.eu/environment/life/about/>
- vii <http://ec.europa.eu/environment/life/news/newsarchive2014/may/index.htm#platform>

About the Author



John Houston is an independent environmental consultant employed as a monitoring expert for the EU LIFE+ programme through HTSPE/Astrale. He has been involved with the LIFE programme for more than 20 years, as project manager, evaluator and monitor, and has contributed to several European Commission publications.

Contact John at: jh@psammos.co.uk

How the approach to biodiversity offsetting in Victoria, Australia, is changing and its potential relevance to England

Andrew Cross MCIEEM
Ecological Planning & Research Ltd

Justin Sullivan
Brett Lane & Associates

Karen Colebourn MCIEEM
Ecological Planning & Research Ltd

The proposals for biodiversity offsetting in England have drawn upon a now obsolete system used for more than 10 years in Victoria, Australia. Ecologists from the UK and Victoria have reviewed some of the recent changes to the Victorian system, the reasons behind them and whether these issues may be relevant to what is being proposed for England.

Background

As part of an exchange programme between Ecological Planning & Research Ltd, an ecological consultancy based in the south of England, and Brett Lane & Associates, a similar ecological consultancy based in Melbourne, Victoria, two of the authors of this article spent a month at each other's consultancy in 2013. During this time, systems set up to conserve biodiversity in both Victoria and England were compared and contrasted.

The State of Victoria has had legislation in place to control broad-scale clearance of native vegetation since 1989. From 2002, detailed guidance for controlling what vegetation can be cleared and the methods for mitigation, including providing compensation by way of biodiversity offsets, were set out in the *Native Vegetation Management Framework for Action* (NVMF) and its supporting documents. Following 10 years of biodiversity offsetting and a consultation process in 2012, Victoria has substantially revised its approach to how it offsets. The approach set out in the NVMF has been withdrawn and replaced by a new system set out in the 2013 *Permitted clearing of native vegetation – Biodiversity Assessment Guidelines* (see Further Reading).

Victoria's 2002-2013 Native Vegetation Management Framework for Action (NVMF)

The NVMF was in place between 2002 and 2013 and was written in the context of Victoria's State policies addressing, amongst others, sustainable development, economic growth and biodiversity. It was intended to cover all aspects of the

Plains grassland with blue devil *Eryngium ovinum* and kangaroo grass *Themeda triandra*. An important habitat occurring in areas threatened by expansion of the western suburbs of Melbourne. The way in which this vegetation is protected or cleared is the subject of the revised protocols. © Andy Cross

management of native vegetation '... from a whole of catchment perspective', taking into account all relevant land management and land use activities including forestry, agriculture, nature conservation and development.

The NVMF established '... the strategic direction for the protection, enhancement and revegetation of native vegetation across the State.' The primary goal for native vegetation management was 'A reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a Net Gain'.

Included in the NVMF were provisions and a methodology for compensating, in the form of offsetting, for the loss of native vegetation should its clearance be necessary, whether it be for forestry,

agriculture or development. In considering the balance between the need to conserve native vegetation *in situ* and taking a decision to permit its clearance, the following three-step process was applied:

1. Avoid adverse impacts, particularly through vegetation clearance;
2. If impacts cannot be avoided, minimise impacts through expert input to project design or management; and
3. Identify appropriate offset options.

The NVMF set out criteria for offsetting decisions and established a market-place concept – the ‘BushBroker’ – to facilitate the offset system. The unit of trade in the market place was the ‘*habitat hectare*’, which was a ‘*site-based measure of quality and quantity of native vegetation that is assessed in the context of the relevant native vegetation type*’.

Reasons for Changing the NVMF

In the course of applying and developing the NVMF, it became clear that whilst there were undoubted successes in conserving native vegetation, via both impact avoidance and biodiversity offsetting, there were also problems. Policies relating to the NVMF were subjected to a number of reviews that identified these issues. In September 2012, the Government of Victoria issued a consultation paper – *Future Directions for Native Vegetation in Victoria – Review of Victoria’s native vegetation permitted clearing regulations*.

This document highlighted the following areas of concern:

- the objective of the permitted clearing regulations was unclear and not well understood;
- the permitted clearing regulations did not adequately focus on biodiversity outcomes;
- the permitted clearing regulations had not been designed to adequately address risk and proportionality;
- the offset market was subject to high transaction costs, volatile prices and an inability to meet demand for some offsets;
- greater use of strategic planning was needed; and
- compliance and enforcement processes needed to be improved.

There were 202 responses to the Future

Directions consultation from both private and public organisations and from individuals, covering a wide range of issues. Whilst some wanted the regulations controlling the clearance of native vegetation maintained or strengthened, others raised concerns with regard to implementing the system, for example:

- a complex system to apply, leading to time and financial costs;
- lack of transparency in the system;
- inconsistent decisions;
- auditing of the offset system not comprehensive;
- protected/conserved areas of vegetation occurred as isolated patches with no strategic conservation or restoration aim;
- disconnection between the location of the development and the location of an offset; and
- the logistics of overseeing a scattered network of offset sites.

Victoria’s response: withdrawing the NVMF and replacing it with the Biodiversity Assessment Guidelines

New guidelines were published in May 2013 as the *Reforms to Victoria’s native vegetation permitted clearing regulations. Amendments to the Victoria Planning Provisions* and were implemented in December 2013. As part of the Reforms, the NVMF was withdrawn and replaced by the *Permitted clearing of native vegetation – Biodiversity Assessment Guidelines*. The supporting documents for these Guidelines are in various stages of preparation at this stage of the transition.

The following reforms are considered significant:

Clarification of the objective of the permitted clearing regulations: the relationship between Net Gain and No Net Loss



Temperate grassland on the Victoria Volcanic Plain. Species here include bluebell *Wahlenbergia sp.*, billy buttons *Craspedia sp.*, pink bindweed *Convolvulus angustissimus*, blue devil *Eryngium ovinum*, and wallaby grass *Austrodanthonia sp.* Also present are non-native species such as perennial rye-grass *Lolium perenne* and brome *Bromus sp.* This grassland, well-managed though unfortunately somewhat isolated from other areas of native grassland, is on a registered offset site on farmland west of Melbourne. © Andy Cross

Feature Article: How the approach to biodiversity offsetting in Victoria, Australia, is changing and its potential relevance to England (contd)

The new objective underpinning the guidance for clearance of native vegetation is that there should be 'no net loss in the contribution made by native vegetation to Victoria's biodiversity'. It is explained as follows: 'This ensures that while individual landholders are required to compensate for their impacts, the community as a whole bears the cost of achieving 'net gains'. Further, 'This change seeks to address the confusion between 'net gain' and 'no net loss' and confirms the role permitted clearing plays in achieving biodiversity objectives.'

Cutting the costs of defining and valuing native vegetation

The aims here were to:

- reduce costs (and improve accuracy in measuring the biodiversity value of native vegetation) through improvements in mapping and modelling approaches;
- make the site assessment method more transparent; and
- provide greater certainty for landowners by improved information provision upfront.

The key outcome of this reform has been an increased reliance on a 'master' map in the identification of potential impacts. This master map – the *Biodiversity Interactive Map* (available at Victoria's Department of Environment and Primary Industries website <http://www.dse.vic.gov.au/about-depi/interactive-maps>) is based on information largely drawn from remote sensing, interpretation and modelling. One consequence of this particular reform is that the need for site survey and professional assessment has been much reduced (see modelled maps and risk pathways below).

Ensuring offsets provide appropriate compensation

The aims here were to:

- provide protection for native vegetation of high biodiversity value by ensuring that offsets are appropriately tailored to mitigate the impacts of removal;
- create incentives for landowners to offset in areas that are strategically more likely to deliver biodiversity value; and
- reduce costs to landowners by providing simplified and more flexible offset arrangements for low impact clearance, which makes up the majority of permit applications.

Some concerns about the reformed offsetting process in Victoria

The reforms present a new direction and one that is only just beginning to be applied. However, some immediate concerns are:

- No Net Loss as an aspiration;
- reliance on modelling for decision making; and
- the consequences of the low-risk pathway for ecological impact assessment.

No net loss vs net gain

Whilst the reforms have clarified and amended the objectives, the shift in emphasis from *net gain* to *no net loss* seems to mark a lowering of aspirations for the future of native vegetation in Victoria.

Modelled maps

Following four months of implementation of the reforms in Victoria, concern has arisen over the use of modelled data to predict the likely consequences for threatened species habitats. The Biodiversity Interactive Map is at the core of processes related to the conservation of biodiversity in Victoria. There are serious concerns about the accuracy and resolution of the map and the data on which it is based.

There have already been several cases where there have been reliable records of a threatened species at a site, but which the modelled map fails to identify as high risk. These instances bring into question the accuracy and reliability of the map as a key tool for assessment.

The introduction of risk-pathways as part of the decision-making process

A risk-based approach has been introduced to the decision-making process for permitting the clearance of native

vegetation. There are three risk-based pathways for assessing an application: low, moderate or high. The pathway is determined by two factors, outlined below and shown in Table 1.

Extent – the area in hectares proposed to be removed, or the number of scattered trees.

Location – the modelled likelihood that removing native vegetation in a location will have an impact on a rare or threatened species. The vegetation in Victoria is allocated to risk level A, B or C, with location A considered to present the lowest risk of potential harm to rare or threatened species and C the highest. 90% of Victoria has been modelled as 'Location A'.

The risk-based pathway is determined by combining the two factors as set out in the *Permitted clearing of native vegetation – Biodiversity Assessment Guidelines* (see Further Reading).

The *Biodiversity Assessment Guidelines* set out the type of assessment needed for each risk pathway to support an application to remove native vegetation or scattered trees. The key split occurs between the Low and the Moderate/High pathways.

For a Low-risk pathway, no field verification of the map is needed and compensation may be provided by applying a standard offset process. What this means in practice is that for applications to remove up to 1 ha of native vegetation and/or scattered trees, there is now, in more than 90% of Victoria, no requirement for an appropriately qualified ecologist to visit the site or even take part in the impact assessment process.

A serious cause for concern (although it is too early to provide evidence) is that, given the relatively low resolution of the model,

Table 1. Matrix showing risk-based pathways for remnant patches of native vegetation and scattered trees in Victoria (see Tables 3 and 4 in the *Victoria Biodiversity Assessment Guidelines*)

Extent (remnant patches)	Location A	Location B	Location C
< 0.5 hectare	Low	Low	High
≥ 0.5 hectare and < 1 hectare	Low	Moderate	High
≥ 1 hectare	Moderate	High	High
Extent (scattered trees)			
< 15 scattered trees	Low	Moderate	High
≥ 15 scattered trees	Moderate	High	High



At the settlement's edge. If the town expands into the adjacent farmland, the risk-pathway could determine whether an ecologist need visit the site as part of an ecological impact assessment. © Andy Cross

impact predicted to be of greater than local significance (per CIEEM's Guidelines for Ecological Impact Assessment) could be considered inappropriate for offsetting unless there were no alternatives and the proposal was desirable for imperative reasons of over-riding public interest.

Delay in identification of appropriate offsets

In the original market-based system in Victoria, there was no strategy behind the offset system that could deliver appropriate biodiversity objectives. In practice, trying to find and secure offsets in the market place often led to extensive delays to applications as well as added costs.

Large old river red-gum with active wedge-tailed eagle nest. Large old gum trees (several hundred years old) are irreplaceable in the landscape and provide important habitat for rare and important fauna species. © Justin Sullivan

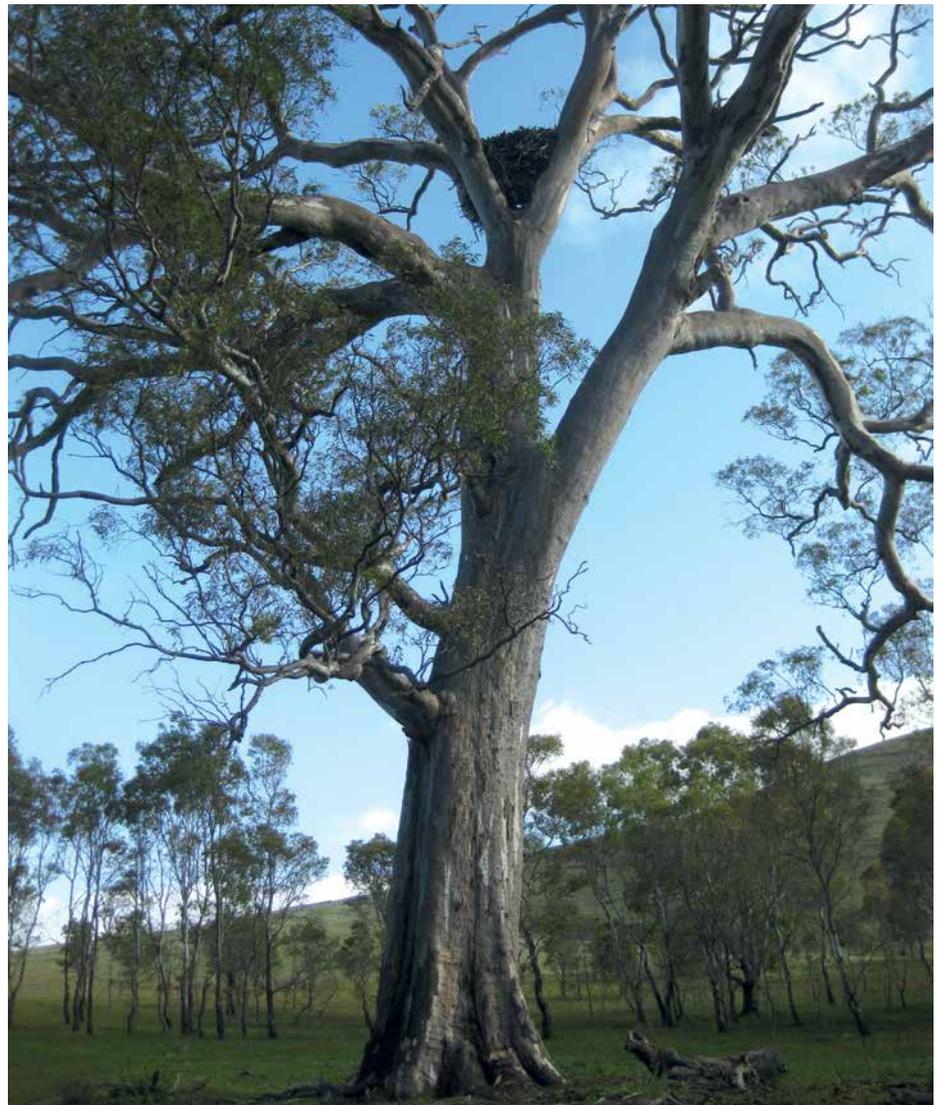
and doubts about the data underpinning the model, small (but possibly important) areas of native vegetation with high potential for rare or threatened species could now be missed in the application process.

Lessons to be learnt from Victoria's experience and the relevance to Defra's Green Paper on Biodiversity Offsetting

An expectation to offset

The original NVMF offset system proved difficult to apply in many instances. Whilst there will have been a myriad of reasons for these difficulties, the situation was exacerbated by the applicants' expectation that ecological constraints could always be dealt with by offsetting. As with the Green Paper proposal for England, the process in Victoria required applicants to avoid and minimise impacts prior to considering offsetting. Due, however, to the lack of direction about when it was appropriate, offsetting became the default option, even in situations in which an offset was unlikely to be able to provide a suitable alternative habitat, such as the loss of veteran gum trees.

An English biodiversity offsetting system could avoid this problem by setting a residual impact level above which offsetting would not normally be appropriate. For example, a post-mitigation



Feature Article: How the approach to biodiversity offsetting in Victoria, Australia, is changing and its potential relevance to England (contd)



Spiny rice-flower *Pimelea spinescens* a threatened grassland species that is endemic to the Plains grasslands of Victoria. It is possible under the current system in Victoria that if removal of a small area of native vegetation (i.e. <1 ha) is proposed, impacts to such threatened species may not be considered. © Andy Cross

This could be avoided in England by requiring the strategic planning of biodiversity offsets based on Local Nature Maps or similar.

Failure of offsets to deliver anticipated biodiversity benefits

Due to the difficulty of finding appropriate offset sites in Victoria, those selected are often scattered, with no connection to other similar sites. This limits their biodiversity potential. Again, the utilisation of Local Nature Maps to plan effective offsets in England could overcome this issue.

Distance between impact and compensation

Under the old offset system in Victoria, offsets to compensate for the removal of Plains Grassland (a native grassland community) on Melbourne's fringe were often only readily achievable in far western Victoria, possibly several hundred kilometres from the clearance site. In such cases, neither the developer who had funded the offset, nor the local community, experienced or recognised any benefit from the offset.

Currently, the proposals for England do not require offsets to be located close to the area affected.

The difficult logistics of monitoring the effectiveness of a scattered network of offset sites

In the absence of a strategic plan for offsets across Victoria under the NVMF, the offsets are often scattered and monitoring them is costly and time-consuming. In some cases, offset sites have been neglected and the biodiversity objectives have been missed.

If offsetting is to succeed in delivering biodiversity objectives in England, competent authorities must be clear about those objectives and the system must facilitate adequate monitoring and review.

Further Reading

There are undoubtedly many other lessons that we can learn from Victoria's experience of offsetting. If you wish to investigate further, a good place to start would be the Department of Environment and Primary Industries *Permitted clearing of native vegetation – Biodiversity assessment guidelines* available at:

http://www.depi.vic.gov.au/__data/assets/pdf_file/0011/198758/Permitted-clearing-of-native-vegetation-Biodiversity-assessment-guidelines.pdf

About the Authors



Andy Cross is a senior ecologist and botanist at Ecological Planning & Research (EPR) and has 15 years' experience in botanical surveys and impact assessments.

Contact Andy at:

andycross@epr.uk.com



Justin Sullivan is a senior ecologist and project manager at Brett Lane & Associates (BL&A) based in Melbourne, Victoria. Justin has been at BL&A since 2008 and has

undertaken numerous impact assessments across Victoria, many of which included biodiversity offsetting, under the NVMF. Since the start of 2014, Justin has been advising on applications to clear native vegetation in accordance with the native vegetation clearing reforms.

Contact Justin at:

JSullivan@ecologicalresearch.com.au



Karen Colebourn is Managing Director at EPR and an Independent Member of CIEEM's Advisory Forum.

Contact Karen at:

karencolebourn@epr.uk.com



Meet the Author – Julian Wright

What do you do?

I'm currently a Senior Advisor at the Environment Agency with responsibility for climate change adaptation across the natural environment. This involves working both within the Environment Agency and with other conservation organisations to ensure that we understand the risks climate change poses to biodiversity and ecosystems, and that we put in place sensible solutions to deal with these risks.

What or who first inspired you to get into ecology?

I was very interested in wildlife as a youngster, and was a member of the youth wings of several wildlife clubs, but it was participating in a citizen science acid rain project when I was about ten that really got me inspired. We lived in the shadow of Didcot power station, and the clarity of the results of my "research" made me seriously think about the impact humans could have on the environment and the need for its protection.

How did you get to where you are today?

I cycled?... To answer seriously however, I studied natural sciences at university and then gained experience in several roles and parts of the country - I've worked in the North West, South West, Anglian and National Offices of the Environment Agency and have found this very useful to gain understanding of how the organisation works.

What have been the most important steps along the way?

I was lucky to get involved in climate change just as it was beginning to be recognised as an issue needing attention. It's been

gratifying to have played a small part in getting UK policy and legislation on climate change up and running. The challenge now is converting this framework into practical action on the ground.

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

For me it has been really helpful to have studied science, including my PhD in environmental chemistry, especially to be able to work effectively on the more quantitative side of climate change. However I wouldn't say that it's essential, and my colleagues working on climate change have diverse backgrounds, which really helps with the broad range of sectors we support on climate change (for example health, business, local government, and agriculture).

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

Go for what interests you and you'll enjoy your work a lot. Notwithstanding that, be prepared to be flexible, especially at early stages in your career, in order to get a foot in the door of organisations. It's far easier to get your dream job once you're on the inside.

What's the best thing about your job?

It's a cliché, but the best thing is the colleagues I work with. It's great working with other environmentalists both within and outside the Environment Agency and having a sense of shared purpose, especially when that purpose involves protecting and enhancing the natural environment.

What's the downside?

It was pretty tough during the winter floods earlier in the year to see some of our politicians playing political football with the Environment Agency. I expect this kind of thing will become increasing common as climate impacts become more frequent.

What's next for you?

I'd like to have the opportunity to apply my experience from the UK to help implement adaptation, especially through the protection of ecosystems, in other parts of the world. Although the risks we face here from climate change are large, they are dramatically larger in countries which don't have the institutional or economic capacity to adapt.

What is your top tip for success?

It's a marathon not a sprint, so don't let short term setbacks get in the way of your long term journey.

For further information



Contact Julian at:
julian.wright
@environment
-agency.gov.uk



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2014 Autumn Conference

Progress in Effective Habitat Restoration, Translocation and Creation

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The programme draws on projects that have successfully achieved habitat restoration, translocation and creation in different settings. Talks will also highlight the role of effective policy making and latest research findings.



Example of a large scale restoration project - Cambridge Fens

Speakers to include:

- Paul Wheelhouse MSP, Minister for Environment and Climate Change
- John Box, CIEEM President
- Penny Anderson, Penny Anderson Associates
- Jenny Neff, Ecological Advisory & Consultancy Service (EACS)
- Eddie Bradbrook, Jacobs UK
- Lisa Kerslake, Swift Ecology
- Mike Oxford, Association of Local Government Ecologists (ALGE)
- Robin Field, River Nene Regional Park
- Derek Robeson, Tweed Forum
- Jonathan Cranfield, Herpetologic Ltd
- Derek Gow, Derek Gow Consultancy Ltd
- Pete Hollingsworth, Royal Botanic Gardens, Edinburgh

Prices* (student and concessionary rates available)

- CIEEM members: 1 day - £125.00 (+ VAT) / both days - £235.00 (+ VAT)
- Non-members: 1 day - £225.00 (+ VAT) / both days - £400.00 (+ VAT)
- Conference Dinner (with after dinner speaker, Dick Balharry) £55.00 (+ VAT)

* Prices include lunch and all other refreshments (except Dinner).

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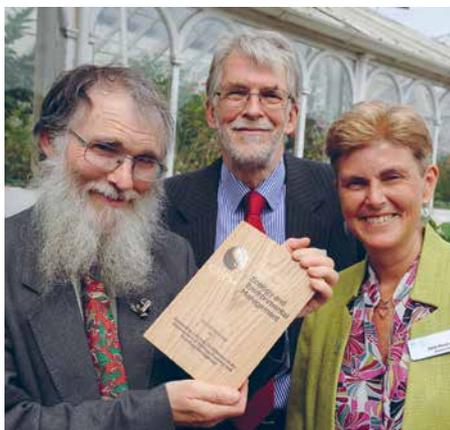
CIEEM Awards 2014

The successful CIEEM Awards 2014 were held on Thursday 26th June 2014 at the Birmingham Botanical Gardens. The Gardens provided a picturesque backdrop to our inaugural stand-alone awards event (Photo 1), to which over 140 guests attended to help us to celebrate the Winners and Highly Commended projects and professionals (Photo 2). Comedienne Helen Lederer hosted the day and internationally-renowned environmentalist Professor Chris Baines was our guest speaker.

Full details of all the Winners and Highly Commended projects and professionals can be found at <http://www.cieem.net/cieem-awards-2014>.

CIEEM Medal

Keith Kirby FCIEEM – Awarded for his outstanding, lifelong contribution to the advancement of ecology, forestry and woodland management.



Keith Kirby, John Box (CIEEM President), Sally Hayns (CIEEM CEO)



Guests at the Birmingham Botanical Gardens



Front row l-r: Jane Davidson (CIEEM Patron), Chris Baines, David Hill, David Tyldesley, Debbie Bartlett, Octavia Neeves, Keith Kirby, Sarah Cooper, Colin Maplesdon, Caroline Chapman, Helen Lederer, David Goode (CIEEM Patron). Back row l-r: Andrew Sells (Natural England chair), Adrian Thomas, Graham Scholey, Scott Mackenzie, Will Bond, Chris Parker, John Box (CIEEM President), Peter Matthews (Natural Resources Wales chair).

Best Practice Award for Practical Nature Conservation

Sponsored by **ARUP**

Joint Winners

Environment Agency with RSPB, Team Van Oord, Jacobs and EC Harris – Medmerry Managed Realignment (MMR) Scheme



Adrian Thomas (RSPB), Michael Bull (Arup), Colin Maplesden (Environment Agency)
Environment Agency and Earth Trust – River of Life



Chris Baines, Michael Bull (Arup), Graham Scholey (Environment Agency), Chris Parker (Earth Trust), Helen Lederer

Highly Commended

Stratford Athletes' Village for the London 2012 Olympic and Paralympic Games – Biodiversity by Design Ltd with Lend Lease, Vogt Landscape, Applied Landscape Design, Arup, Waterwise Solutions and Tim O'Hare Associates, for and with the Olympic Delivery Authority

Best Practice Award for Innovation

Sponsored by **ARUP**

Winner

DTA Publications Limited – The Habitats Regulations Assessment Handbook



Mike Barker (NIRAS Consulting), Rachel Hoskin (Natural England), David Tyldesley (DTA), Michael Bull (Arup), Caroline Chapman (DTA), Gill Nall (DTA), Graham Machin (Ropewalk Chambers)

Highly Commended

Environment Agency and Earth Trust – River of Life

Stratford Athletes' Village for the London 2012 Olympic and Paralympic Games – Biodiversity by Design Ltd with Lend Lease, Vogt Landscape, Applied Landscape Design, Arup, Waterwise Solutions and Tim O'Hare Associates, for and with the Olympic Delivery Authority

Best Practice Award for Knowledge Sharing

Sponsored by **ARUP**

Winner

DTA Publications Limited - The Habitats Regulations Assessment Handbook



David Tyldesley (DTA), Michael Bull (Arup), Caroline Chapman (DTA)

Highly Commended

Atkins Ltd – Queen Elizabeth Olympic Park Wetland Creation and River Edge Enhancement

Environment Agency and Earth Trust – River of Life

Best Practice Award for Stakeholder Engagement

Sponsored by **ARUP**

Winner

Environment Agency with RSPB, Team Van Oord, Jacobs and EC Harris – Medmerry Managed Realignment (MMR) Scheme



Chris Baines, Michael Bull (Arup), Adrian Thomas (RSPB), Colin Maplesden (Environment Agency), Helen Lederer

Highly Commended

Environment Agency and Earth Trust – River of Life

Stratford Athletes' Village for the London 2012 Olympic and Paralympic Games – Biodiversity by Design Ltd with Lend Lease, Vogt Landscape, Applied Landscape Design, Arup, Waterwise Solutions and Tim O'Hare Associates, for and with the Olympic Delivery Authority

Tony Bradshaw Best Practice Award

Winner

Medmerry Managed Realignment (MMR) Scheme – Environment Agency with RSPB, Team Van Oord, Jacobs and EC Harris



Adrian Thomas (RSPB), John Box (CIEEM President), Colin Maplesden (Environment Agency)

Outstanding Professional Award

Sponsored by **MFL McParland Finn Ltd**

Winner

Will Bond MCIEEM



Joe Aspinall (MFL), Will Bond, Martin Jackson (MFL)

Highly Commended

Dominic Ash MCIEEM

Promising Professional Award

Winner

Octavia Neeves ACIEEM



Chris Baines, Octavia Neeves, John Box (CIEEM President), Helen Lederer

Highly Commended

Richard Bull ACIEEM

Matt Collis Grad CIEEM

NGO Impact Award

Winner

RSPB - Great Bells Farm Habitat Creation



Sarah Cooper (RSPB), John Box (CIEEM President)

Highly Commended

Sussex Wildlife Trust – West Weald Landscape Project

Sustain - Sustainable Fish City

Corporate Achievement Award

Sponsored by **ATKINS**

Winner

University of Greenwich – Biodiversity Management Planning



Michael Unsworth (University of Greenwich), Debbie Bartlett (University of Greenwich), Karen Hills (Atkins)

Highly Commended

Longcliffe Quarries Ltd – Action for Wildlife in Derbyshire Quarries and Surrounding Landscape

Network Rail – The Thameslink Programme

Undergraduate Student Project Award

Sponsored by **TEP**
(The Environment Partnership)

Winner

Mr Scott Mackenzie Grad CIEEM – How aquatic macro-invertebrate taxa vary within upland streams, in response to three surrounding land uses within Northumberland National Park (Northumbria University)



Elizabeth Seal (TEP), Scott Mackenzie, Francis Hesketh (TEP)

Highly Commended

Miss Natalie Andersen – The homing instinct of the smooth snake (*Coronella austriaca*) and implications for translocations as a mitigation strategy (Plymouth University)

Mr Lewis York Grad CIEEM – Habitat Preferences and Population Dynamics of Marsh Tits (*Poecile palustris*) and Blue Tits (*Cyanistes caeruleus*) at Monks Wood National Nature Reserve (University of Northampton)

Postgraduate Student Project Award

Sponsored by **TEP**
(The Environment Partnership)

Winner

Jonathan Pearce Grad CIEEM – Biodiversity offsetting in Oxfordshire: an assessment of challenges and opportunities (Oxford Brookes University)



Jonathan Pearce

Highly Commended

Stephen Doso Jnr – Effects of loss of agricultural land due to large-scale gold mining on agriculture in Ghana: the case of the Western Region (University of Greenwich)

Atish Vadher Grad CIEEM – The effect of interstitial clogging by sedimentation on the use of subsurface sediments as a refuge by *Gammarus pulex* (Crustacea: Amphipoda) during surface water loss: an experimental approach (Loughborough University)

In Practice Award

Sponsored by **greenhouse**

Winner

Biodiversity Offsetting – by David Hill CEnv FCIEEM (September 2013 edition)



David Hill, Timi van Houten (Greenhouse Graphics)

Highly Commended

An Overview of Biodiversity Offsetting Within the Planning System – by David Pape MCIEEM and David Tyldesley FCIEEM (September 2013 edition)

Ecology Legal Update – by Penny Simpson (September 2013 edition)

What Building Your Technical NETWORK Can Do For You

Fiona Wren CEnv MCIEEM, Claire Vetori CEnv MCIEEM MIEMA, Tony Callaghan and Jeff Baldwin CEng MCIWEM
Environment Agency

This article shows how expanding your technical network can be done in a few simple steps, even if you're an introvert. Simply try thinking about it from a new perspective, using the NETWORK word association example below, or alternatively, make up your own.

Background – What's In It For Me?

Who is this for?

- You – if you've never really thought about your network.
- You – if you use your network, but you're not sure if you're really using it well.
- If you're an active networker – can you support others build up theirs?

Who benefits from networking?

- You do: it can help you improve your work, enjoy it more, find new opportunities, help others, and take control of your career. You'll feel better, perform better, and so will your colleagues.
- Your organisation benefits as well: networks can help with an easier transition when people change roles, and increase technical resilience across teams.

New, Engaging, Talking, Why...?

NETWORK

New

Engaging

Talking

Why?

Opportunity

Realise

Knowledge

Meeting **New** people and getting to know people better, or networking doesn't come naturally to everyone. As technical people, we often tend to focus on the technical aspects of our jobs and overlook the importance of **Engaging** with others and building rapport with the people we work with. It is not just about what some people perceive it to be either, such as building up your profile, which can feel distinctly uncomfortable for some of us. Instead, try thinking of it as **Talking** to someone **New** and using it as an **Opportunity** to find out something **New** and interesting about the people you work with whilst increasing your **Knowledge** (both technical and people) at the same time. In this article, we're here to encourage you to take that first step by giving you some simple activities you can do to develop and improve your technical network. You may also discover or **Realise** that you already network with lots of people all the time without even knowing it!

Some of us may feel more uncomfortable than others at the prospect of approaching people they don't know, whether it be over a phone call, or a dinner, or group situation, such as attending a workshop or training event. But expanding your network doesn't need to involve cheesy sidling up to 'important' and 'popular-looking' people at CIEEM conferences!

Approaching New peers on a one-to-one basis as **Opportunities** arise can be just as effective. For example, sit down next to someone you don't know or want to speak to (instead of your friends) at CIEEM dinners, and offer to share a bottle of wine. Give yourself a goal that feels comfortable to you, and go for it! How about incorporating a goal in your personal development plan? We have. It helps us to focus on what we can do to meet that goal, and check in over the year to see how we have been doing (see below for more information).

Why Network? What Are Some of the Benefits?

- Most of us are networking already, but just haven't **Realised** that we are doing it. It's not all about 'bigging yourself up', or 'working the room' (perish the thought!). Consciously expanding your network can help to **increase resilience** within an evolving organisation, especially during times of change.
- Knowing who to speak to for help and advice gives us the ability to **spread peak workloads** and also **feel more supported**. It can **enable effective delegation** to trusted colleagues, without feeling the need to check in all the time (think of all the dull meetings you could avoid!).



Networking at a conference

- During times of change, having a wide and varied network can be supportive and help reduce the impact of change (i.e. **help manage change**) at a personal level (if your job is moved to another part of the organisation, for example).

This is precisely why we have written a simple networking objective and promoted its use in other parts of the business:

Demonstrate you understand your technical network, identify gaps and take steps to fill them. Show how this helps you to be more effective in your role and how it supports the team in achieving more for less. This objective is now being used in some Directorates within the Environment Agency through our Individual Performance Plans (i.e. reviews).

Verb: “Communicate, intercommunicate, interact”

Noun: “Group or system of interconnected people or things”

Source: Oxford English Dictionary

How to Own Your Network and Boost your CPD and Competencies

Interestingly, in a poll we found that senior managers are much more likely to ‘actively’ manage their networks (i.e. putting time aside to maintain contact with colleagues) than the rest of us. We have also discovered that there are two main ways of **Engaging** with **New** people: structured and non-structured.

1. **Structured** (defined by CIEEM as technical): setting about recording and using your network in an organised and purposeful way.
2. **Non-structured** (defined by CIEEM as transferable): identifying and using opportunities as they arise, with an overall aim of expanding your network.

Further details about the CIEEM Competency Framework can be found at: <http://www.cieem.net/competency-framework>. We have chosen one of the structured/technical competency themes and a few of the non-structured/transferable competency themes to provide some ideas.

Structured (Technical) Competency

Examples linked to the competency: facilitation, consultation, engagement and partnering

Write out your network (as an individual or a team) on a sheet of paper (or with a tool such as MindManager), identify gaps, and come up with a plan to fill them over a set timescale. Simply start by writing down who you Talk to and which department/ area/part of the business or organisation they are in and what they do. This can make a potentially massive task more manageable, and less daunting.

Example 1 – The Team Approach

Fiona manages a relatively new team of Geomorphologists, and wanted to provide added geomorphological input to previously unsighted parts of the Environment Agency. Her team had an open discussion about their customer blind spots (or gaps) during a team meeting, and laid these out clearly in a spider diagram.

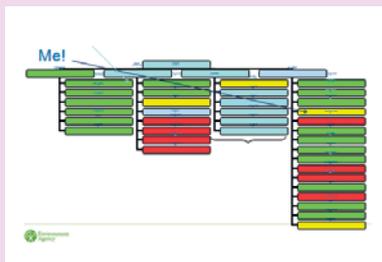
In order to expand their presence and impact, each member of the team was tasked with making contact with each of the agreed priority gaps – Incidents, Permitting, Navigation & Recreation, Enforcement and Area Managers.

This was done through a variety of routes: i) asking to attend team meetings to learn more about what they do (and vice versa), ii) offering to run workshops or site visits (office staff always love the chance to escape for the day!), or iii) finding a friend of a friend to explore synergies with over a coffee in the canteen.

Example 2 – The Individual Approach

The approach Jeff chose to use was to ask the question: How do you see yourself in your organisation? Are you a cog in a wheel, or the hub of your own wheel?

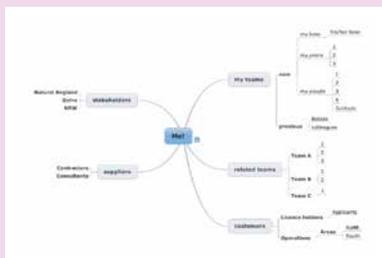
From this...



I'm in here somewhere, so I know where I belong, but it doesn't help me see the world around me. And I don't own this!

What we're promoting is to complement this by... putting myself at the centre of my own world, by recording my network.

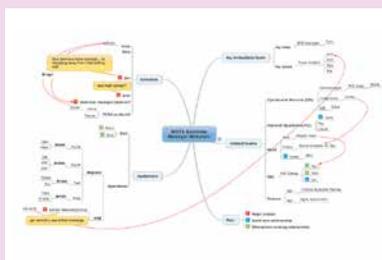
To This...



I can see who's around me, where I need to explore more, and where I'm going next!

Not in place of, but complementing organisational (top down) structures. We own our own network, and can take it with us when we change roles.

Then This...



The red lines show how I'm linking people together. I use it actively to identify gaps and fill them.

Non-Structured (Transferable) Competency

Examples linked to the competencies of: Project management, Information management, People management and Self management

Most of us tend to focus on increasing our **Knowledge** through reading or self-learning. However, attending a conference, large event or exhibition where no participation is required can provide the perfect **Opportunity** to speak to **New** people and improve on your **Knowledge**. How many times have you attended an event and looked down the delegate list to see if there is anyone you know to catch up with them? Next time you are at a conference, try challenging yourself to pick one person who is also on the delegate list that you have wanted to meet or get in touch with or who is a particular expert in a field that interests you. Think about an interesting open question you could ask them before setting off on a mission to find them and ask away! Some of us may dislike wearing name badges at these events but it is a great way to help you find someone without having to ask!

If you are unsure about what to ask, simply start a conversation by making a general comment about the venue you are in, the topics on the agenda, the speakers or the food provided at lunch (often a topic of conversation!).

Example: Take advantage of being in a large queue for the food at lunch by turning to the person next to you and jokingly guess how long it will take you both to get to the front of the queue or try and work out what is on offer and go from there!

An alternative approach is to think about a particular issue or challenge on a project you are working on and use that driver as an **Opportunity** to ask the opinion or advice of someone else outside your organisation. We can be a very opinionated bunch so before you know it, you could have been **Talking** for some time discussing possible solutions or options for a way forward and lunch is already over!



Networking at a field event

Example: At a recent CIEEM East of England evening event, Claire took the opportunity to thank one of the ecologists who had provided some further information required on a project they were working on. This led on to a more general discussion about our interests and also how we could help speed things up next time.

Top Tip – Use existing networks available to you

At the Environment Agency, we are very lucky to have a well established Women's Network to help and inspire us to be the best we can be. The Women's Network mission statement is to '*encourage, enable and equip women to achieve their full potential in the workplace*'. The community has been set up to share information easily, regardless of location and also provides valuable advice and support. Is there a company based or local network available to you that you could join giving you access to articles and information on industry best practice and/or developments that are relevant to you? All Women's Network events and resources are open to women and men.

To Recap the Key Points

The network is not the end – it is a means to the end. Good working relationships help us deliver more effectively and efficiently and enjoy the process more. Start by trying to think of networking as a way of:

- Meeting **New**, interesting and inspiring people.
- **Engaging** with peers to help find solutions to issues or options for a way forward.
- **Talking** about the points the speakers have raised at a conference or why you are there.
- Remind yourself **Why** you should set aside time to network, what you learnt and how easy it was to Talk to someone New.
- Taking advantage of **Opportunities** to find out more about the people you currently work with, want to work with or will be asking to consult on a project you are working on to build rapport.
- **Realise** that you can do it, or are already doing it, and the benefits that networking can bring.
- Use the **Knowledge** you have gained to help other colleagues.

It's not as bad as you may think, and can actually be quite interesting to **Talk** to **New** people. So, try writing out your network, by hand, or by new-fangled gadgetry, and slowly try to expand, or reinforce, your network. You never know what you can learn or when you may need a friendly face, or a helping hand. It really is up to you as to how much time and effort you want to put into **Talking** to **New** people or regularly catching up with people you already know but we would encourage you to set some time aside each month to do so.

So What Does All This Mean For Me?

Put yourself at the centre of your own network:

- Write it down
- Discuss it
- Keep using it
- Use opportunities as they arise to widen your network

The benefits to your organisation include faster familiarisation with changed or new roles, increased technical resilience across teams, and a more flexible workforce.

The benefits to you include improving and enjoying your work more, finding new opportunities, taking control of your career.

The concept is simple but the benefits are huge. It is specific to the individual, but relevant across the whole organisation.

You'll feel better, perform better, and so will your colleagues.

Note

The authors of this article have been working together on a technical leadership project team entitled 'Better ways of working across National Operations – Developing and using your Technical Network'.

About the Authors

Fiona Wren CEnv MCIEEM (Geomorphology Technical Service Manager, Conservation Ecology Technical Services). Fiona is a freshwater ecologist by training, with 20 years of experience in a multitude of different roles in the Environment Agency. She is an introvert, but has now seen the light in terms of the benefits that networking can bring!

Contact Fiona at:

fiona.wren@environment-agency.gov.uk

Claire Vetori CEnv MCIEEM MIEMA (Principal Environmental Project Manager in the National Environmental Assessment Service). Claire is an ecologist by training and provides technical/legislative/strategic in-project advice, training, mentoring and leadership to colleagues at the Environment Agency. Claire has worked in the environmental industry for over 20 years, in both the private and public sectors.

Contact Claire at:

claire.vetori@environment-agency.gov.uk

Tony Callaghan (Project Manager, Northern Ambition). Tony is an engineer, working on delivering environmental projects throughout the north of England.

Contact Tony at:

tony.callaghan@environment-agency.gov.uk

Jeff Baldwin CEng MCIWEM (Water Resources Business Manager, Environment & Business). Jeff is a civil engineer, a project manager and a team manager with the Environment Agency. He isn't a natural networker, but has come to see the benefits, not just for himself, but for his team members and other colleagues as well. Jeff has worked most of his career in the water industry, for water companies, consultants, and the Environment Agency.

Contact Jeff at:

jeff.baldwin@environment-agency.gov.uk

Report on the APPGB Meeting on MPAs and the Overseas Territories – May 2014

Mike Barker CEnv FCIEEM

Technical Director, NIRAS Consulting Ltd, and Chair, CIEEM Overseas Territories Special Interest Group

The All Party Parliamentary Group on Biodiversity (APPGB) met on 12th May 2014 to discuss recent events relating to the UK's Overseas Territories (OTs). CIEEM is a member organisation of the APPGB and I attended to represent both the Institute and also CIEEM's Overseas Territories Special Interest Group (OT-SIG).

The focus of the meeting ranged from the 2012 Overseas Territories White Paper which raised the profile of these small and isolated places, as well as the more recent Environmental Audit Committee report on Sustainability in the UK Overseas Territories (EAC, January 2014). There were also representatives who were trailing the anticipated 5th National Report to the United Nations Convention on Biological Diversity (UN CBD) due by the end of May and the RSPB's stocktake of nature within the OTs which was due to be published on 20th May.

In the 2012 Overseas Territories White Paper, the Prime Minister and Foreign Secretary laid out their vision for the protection of natural environments of

the Territories and the implementation of effective management to the highest international standards. The 2012 White Paper was broad ranging, focused on the security of the Territories, their economic development and their natural environment. It emphasised a partnering and collaborative approach and supporting efforts to foster high standards of governance and build strong communities.

Two years further on the Environmental Audit Committee reviewed the UK Government's position in relation to the OTs, with a report that is described in the APPGB meeting as being hard hitting. The Committee bluntly set out the requirements to the UN CBD and the UK's international responsibilities and these were repeated during the APPGB discussion. They noted that while the UK Government expressed general but unspecified aspirations to 'cherish' the environment in the Overseas Territories, it was unwilling to acknowledge or to address its responsibilities under UN treaties. This was disappointing, because the environment in the Overseas Territories is globally significant and comprises 90% of the biodiversity for which the UK Government has responsibility.

Mark Simmonds, the Parliamentary Under Secretary of State at the Foreign & Commonwealth Office, was clear though

in the meeting that the Government view is that the environment is a devolved issue and therefore for the individual OT governments who are responsible and for the UK to support and persuade rather than direct. This particular debate is still resounding through the corridors of power, but almost certainly the constitutional arrangements do require a nuanced and balance approach.

Another of the key findings of the Environmental Audit Committee was that the Government has failed to negotiate the extension of the Convention on Biological Diversity – the flagship UN policy on biodiversity protection – to the Overseas Territories. In addition, the Government has not ensured the accurate monitoring of biodiversity in the Overseas Territories.

This position was confirmed once the 5th National UN CBD report was published. Within the individual territory reports only six of the OTs were covered (namely: British Virgin Islands, Cayman Islands, Gibraltar, St Helena, Ascension and Tristan da Cunha), together with two Crown Dependencies. The remaining OTs and Crown Dependencies (Anguilla, Bermuda, British Antarctic Territory, British Indian Ocean Territory, Falkland Islands, Montserrat, Pitcairn, South Georgia and South Sandwich Islands, Sovereign Base

Area Cyprus, Turks and Caicos Islands; and the Crown Dependency of Guernsey) are not covered by the UN Convention and there is no formal monitoring or reporting. The APPGB meeting did not unfortunately have time to discuss in any detail the findings of the RSPB report (now published). The RSPB analysis of current environmental governance within the OTs revealed that there are important areas of good practice, but that many OTs still have significant gaps in their governance which urgently need to be filled. I've summarised the key findings from the report below:

Good Practice:

- Gibraltar is the OT that best demonstrates good practice across the board.
- The British Virgin Islands has notable good practice in its site protections.
- St Helena has notable good practice in its development control mechanisms.

Priorities for Improvement:

- 9 UK OTs don't have strong networks of terrestrial protected areas.
- 4 OTs don't have any marine protected areas.
- 5 OTs have no requirements for Environmental Impact Assessments (EIAs) before permitting major developments.
- At least 5 major environment bills, which would fill in many of the most pressing gaps in their environmental governance, have stalled in OT legislatures.

The RSPB identified a need for increased input and strategically-focussed support from the UK Government as essential if the White Paper's aims are to be met and the UK's most exotic wildlife saved for future generations.

However, the APPGB meeting highlighted that there have also been recent successes and notably in relation to the protection of marine resources. Marine Protection Areas (MPAs) have been established for the British India Ocean Territory (and then doubled in size), as well another covering South Georgia and South Sandwich Islands. Further work is ongoing on other MPAs with the designation of an MPA for Pitcairn currently awaiting consideration of the long-term sustainability of the 51-person community living on the islands. Further designation of MPAs seems likely and is a real opportunity for UK to make a global difference in the conservation of biodiversity and marine resources.

It was a well-informed if rather formal meeting, and unfortunately discussion was cut short by the division bell at which all the parliamentarians had to leave. The four key documents for the OTs that were referred to in the meeting or were being eagerly awaited are now all available:

- Churchyard, T., Eaton, M., Hall, J., Millett, J., Farr, A., Cuthbert, R. and Stringer, C. (2014) *The UK's wildlife overseas: a stocktake of nature in our Overseas Territories*. RSPB, Sandy, UK. https://www.rspb.org.uk/Images/ukots-stocktake_tcm9-369597.pdf
- JNCC (2014) *Fifth National Report to the United Nations Convention on Biological Diversity: United Kingdom*. Peterborough: JNCC. April 2014. <http://www.cbd.int/doc/world/gb/gb-nr-05-en.pdf>

- House of Commons Environmental Audit Committee. *Sustainability in the UK Overseas Territories. Tenth Report of Session 2013–14: Volume I*. Ordered by the House of Commons to be printed 8th January 2014. <http://www.publications.parliament.uk/pa/cm201314/cmselect/cmenvaud/332/332.pdf>
- *The Overseas Territories: Security, Success and Sustainability White Paper*. Presented to Parliament by the Secretary of State for Foreign and Commonwealth Affairs by Command of Her Majesty, June 2012. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/12249/ot-wp-0612.pdf

About the Author



Mike Barker is an ecologist with more than 20 years of ecological and environmental management experience. Mike's experience has been focussed on

the strategic planning and delivery of infrastructure and utilities assets; he joined NIRAS as Technical Director in July 2013.

Contact Mike at:
MBAR@niras.com

Why Academics Should Apply for Chartered Ecologist – Or Why I Did

Throughout my career I have been constantly moaning about the way “ecologists” are viewed and this translates into how much their work is valued. The traditional professions – medicine, veterinary science, law, accountancy, engineering and architecture – all have professional accreditation which commands both a premium and a responsibility. The former translates into higher fees and income and the latter means that an individual can be stripped of his/her licence to operate. Twenty to thirty years ago anyone with a qualification, or indeed without, could set themselves up as a “Consultant Ecologist”; actually you can still do this, but the world has moved on somewhat and hopefully under these circumstances such individuals would find it difficult to gain employment. Because of these views, I have been arguing for chartered status for ecologists for at least 30 years and am very pleased that it has finally come about. That is why I was one of the first to apply for Chartered Ecologist status and indeed to be examined for it. Essentially ecologists should have the same status as other professions.

But this is a personal view. Why should other academics go through the rigours of the examination process and become chartered? Some musings:

All ecologists must be taught by someone and for the most part this occurs within our higher education institutes. The lecturers are not required to have chartered status at the moment because for the most part they are employed for their skills in teaching and research. But times are a changing: the latest REF (Research Excellence Framework) assessment bowled Universities a googly by requiring each unit put in for assessment to provide case studies showing evidence of research impact. These impact statements were worth ca. 20% of the final assessment

scoring, but on top of this, 60% of the scoring was based on the contributions of all staff submitted. However, the number of staff that could be submitted was proportional to the number of impact case studies: 1 case study = ca. 8 staff; 2 = ca. 16 and 3 = ca. 24 etc., so ca. 80% of the overall submission was reliant on these impact case studies either directly or indirectly. Producing such impact evidence was very difficult for most departments. We will not know the results of the REF until the end of the year, and we certainly don't know what any future assessment exercise will look like. But having included the impact agenda this time round, it is inconceivable that it will not feature in future. The Marris view #1 on this is that unless a scientist has chartered status he/she should not be providing advice or services to external customers; this is not the case at the moment but if you are an academic, do yourself a favour and think long-term – this is inevitable.

My second reason is one of leadership to students. Surely academics when teaching students should be of a status and standard that demonstrates professional competence. Bluntly, would you want future brain surgeons to be trained in surgery by lecturers who were great on the theory but did not have the professional accreditation to do it themselves? Of course not! As ecologists, we academics routinely teach both the theory and practice of managing complex ecosystems – I don't see any difference – doctors and surgeons treat humans, ecologists treat our environment. Therefore, it is incumbent on academics to show leadership, and to do so by example, demonstrating good practice to our students and encouraging them to have the aspirations to become properly qualified professionals.

My third reason is one of blatant self-interest. I alluded to the fact that I believe that

Rob Marris CEcol CEnv FCIEM
University of Liverpool

For those members considering applying or currently completing your application, please note the final Stage One deadline of the year is 17th October 2014, with interviews, for applicants successful at Stage One, scheduled to take place the week commencing 9th December 2014.

chartered status should provide a premium. The Marris view #2 is that eventually only chartered professionals will be allowed to sign off work done on contracts that involve ecological/environmental issues as in other professions. OK, I accept this is extreme but I am prepared to wager that within 10 years that the lead principal will need to have chartered status for many contract tenders and it will be an accepted minimum standard for providing advice to public inquiries etc. All academics age and most ecologists age slowly. As retirement beckons there is the prospect of doing at least some consultancy work. Academic pensions are not that great – for pure self-interest, therefore, it is worth obtaining chartered status. My second wager is that the entry requirements for Chartered Ecologist will get tougher. So again long-term thinking is needed, best get in quick.

About the Author



Professor Rob Marris works in the School of Environmental Sciences at the University of Liverpool. In his teaching he attempts to enthuse students in the study of ecosystems

and their management. His research interests include: restoration ecology and *in situ* conservation; development of management techniques and theoretical approaches to study vegetation dynamics for plant community conservation; predicting impact of management on multi-species interactions; study of heathland and moorland habitats and their interactions with weed species (bracken and *Molinia*); and effects of soils on heath and moorland development.

Contact Rob at: calluna@liv.ac.uk

Featured CIEEM Training

Freshwater Fish Monitoring

(2 October, Wilton, Wiltshire)

Trainers: Adam Ellis MCIEEM and Dr Chris Gardner

Level: Beginner to Intermediate

Gain understanding of different freshwater fish communities in the UK, with the local Hampshire Avon presented as a case study. The morning will cover regulation and a variety of survey techniques including remote monitoring. Survey equipment will be available for inspection. The afternoon will consist of a site visit to observe an electric fishing survey and to practise basic fish identification.

European Protected Species for Consultants

(9 October, Oxford)

Trainer: Penny Simpson, Environmental Lawyer (English & Welsh Qualified)

Level: Intermediate to Advanced

This masterclass looks in detail at the current law on European Protected Species (EPS) and the implications of this legislation on providing robust EPS consultancy services to clients. Practical examples will be provided along with ample opportunity to discuss specific case studies, issues or problems experienced by attendees.

Understanding Wildlife Law

(23 October, Oxford)

Trainer: Penny Simpson, Environmental Lawyer (English & Welsh Qualified)

Level: Beginner to Intermediate

Providing an introduction to both the criminal and administrative parts of English and Welsh law in relation to wildlife, with a focus on Protected Species and Protected Sites. Throughout the day there will be case study scenarios for small groups to consider and discuss.

Introduction to Ecological Impact Assessment (EiA)

(4 November, Birmingham & 19 November, Bristol)

Trainer: Mike Dean CEnv MCIEEM

Level: Beginner

The course gives an initial understanding of EclA for those new to the subject and for practitioners only requiring an overview of the

process. It will provide knowledge of the key stages, when EclA is required and the policy and legal context. Teaching will be delivered through a combination of presentations and case studies discussed in small groups.

Survey and Assessment of Hedgerows in Winter months

(20 November, Salisbury)

Trainer: Dominic Price

Level: Beginner to Intermediate

Get to grips with the survey and evaluation of hedgerows using the Hedgerow Regs 1997, UK Hedgerows Biodiversity Action Plan and identification of key woody species in winter.

Ecological Clerk of Works & Environmental Advisor for Construction Sites

(24 & 25 November, Inverness)

Trainer: Rob Tyrrell

Level: Beginner to Intermediate

The two separate courses are designed to help delegates gain an understanding of these different roles and how to discharge them effectively. They include monitoring, auditing and incident reporting, the identification of construction site constraints, survey methods and general mitigation measures, each tailored to the needs of the particular role. There will also be sessions on communication skills including on-site behaviour, site induction, client and stakeholder liaison and record-keeping.

Conflict Resolution

(26 November, Edinburgh)

Trainer: Liza Booth

Level: Beginner to Intermediate

From time to time conflict in the workplace is unavoidable. This workshop will help participants to be rational conflict managers. The course will identify seven categories of difficult types of person, develop communication skills needed in disagreements and design creative solutions to problems.

Water Environment – the Legal Framework

(28 November, Oxford)

Trainer: Penny Simpson, Environmental Lawyer (English & Welsh Qualified)

Level: Beginner to Intermediate

This seminar is designed for professionals requiring knowledge of key aspects of European and national Water Law. It touches on aspects of the Water White Paper, the implications of the Water Framework Directive, abstraction and impoundment, pollution of controlled waters and permits and consents.

Presentation Skills

(2 December, Edinburgh)

Trainer: Liza Booth

Level: Beginner to Intermediate

This new workshop is a step by step guide to the writing and delivery of presentations. Participants will discover the essential ingredients of a great presentation, how to make presentations creative and memorable and how to overcome communication anxiety.

Communication Skills

(3 December, Edinburgh)

Trainer: Liza Booth

Level: Beginner to Intermediate

Communication is not just about what you say, but more especially about how you say it. This new workshop will instil confidence that the message being received is exactly what is intended. Participants will explore two communication models, discuss different aspects of communication, assess appropriate methods for particular situations and examine rapport building, questioning and listening skills.

Habitat Regulations Assessment (HRA of Plans)

(4 December, Newark)

Trainers: David Tyldesley FCIEEM and Caroline Chapman MCIEEM

Level: Beginner to Intermediate

Gain an improved understanding of how HRA should influence the plan making process in England and Wales and how plan assessments should be made and recorded. The course will cover the overall purpose, process and methodology of the HRA of plans with professional tips and hints on compliance and best practice.

Details of all CIEEM's courses and on-line booking can be accessed at:

<http://www.cieem.net/training-events>

Collateral Warranties Advice

Some CIEEM members have recently raised the issue of requests for collateral warranties and how they should be dealt with. We asked CIEEM Insurance Services for advice on this important legal issue.

Collateral warranties are the main method of granting protection to parties who have an interest in a project but are not parties to the contract or professional appointments. They are unlikely to disappear anytime soon; indeed the requirement to provide warranties is now more extensive than it ever has been.

Put simply, a warranty (which may be in the format of a reliance letter) creates a contract between two parties where otherwise there would be none; it confirms that the party providing the warranty, such as an ecologist, has complied with their obligations under some other contract or appointment. But that is not their only function. Many members will be aware that clients are now seeking warranties to allow other third parties, such as purchasers of land and lenders, to rely on the reports produced, typically including a requirement that the consultant maintain professional indemnity insurance (PII) for as long as 12 years.

While such warranties may appear alarming, especially with the constantly changing nature of ecology, they are not always wholly unacceptable. It is true that some employers and funders will insist on the use of bespoke warranties or reliance letters, which usually afford them greater protection by imposing more onerous obligations on you as the consultant, but the wording may be negotiable. It is vital to ensure that demands are not placed upon you that go beyond the cover provided by your PII. This is where CIEEM Insurance Services can help you.



If you have a PII policy arranged via CIEEM Insurance Services you will have access to the Appointment & Collateral Warranty Vetting Service. This is a free advice service to assist you to determine whether appointment agreements, reliance letters or warranties impose obligations that may not be covered by your insurance. It is important to review such documents and not simply accept the suggested wording as certain obligations, if agreed to, may leave you uninsured in the event of a claim.

If you have any concerns or queries we ask that you provide us with the relevant documentation before it is signed. We encourage the early submission of documentation as it is always more difficult to negotiate the terms when signature is imminent, and even more so after the works have been completed. Once a query is received we aim to respond with our comments, and a 'tracked changes' copy of the document where possible, within five working days, but the service is flexible and we will always endeavour to assist you in shorter timescales where necessary.

Don't forget our advice is free and we are more than happy to help as a benefit of your membership of CIEEM Insurance Services.

Gabrielle Rawlings
GabrielleR@m-f-l.co.uk

Darren Hewitt
DarrenH@m-f-l.co.uk

Tel: 0161 236 2532
CIEEM Insurance Services
Barlow House
Minshull Street
Manchester
M1 3DZ

www.cieem-insurance.co.uk



North East England Section News

Christopher Bell MCIEEM

North East England Section
Committee member

The spring and early summer of 2014 proved to be an active one for the North East England Section Field Club, with visits to places of interest scattered widely across the region. Midsummer's day saw the club convene in Teesdale for an eight mile ramble through hay-meadows, juniper woods and across open moorland to look at archaeological features that tell the story of how geology, climate and human activities combined to shape the ecology of this unique area. Two weeks before we had also been delving into history, with a visit to one of the world's longest running ecological experiments at Palace Leas Meadow on Newcastle University's Cockle Park experimental farm in Northumberland. CIEEM Honorary Treasurer Steve Pullan explained how plots within the meadow have received varying fertiliser treatments continuously since 1897, and we were able to see the resulting variation in sward height and species composition.

The field club was inaugurated in April 2013 as a way of enabling members to share knowledge and expertise, with particular emphasis on botanical identification skills. Early spring has tended to focus on woodland botany, with visits to ancient woodland sites at Crimdon and Castle Eden Denes on the County Durham coast, and to the Wallington Estate in Northumberland. Uplands have also featured prominently, with two visits to Northumberland's Simonside Hills, the first of which focused on peatland restoration. On this we were joined by former CIEEM President Penny Anderson, following a talk she gave on the subject at our 2012 AGM, and we learned about the detrimental effects of drainage and burning on blanket bogs, but also some of the positive outcomes of a grip-blocking programme. The field club has also recruited local ecologists to provide expertise, notably on a visit to Coatham Stob in the lower Tees valley, where Martin Allen of Wildflower Ark and the Industry Nature Conservation Association's Robert Woods provided a wealth of botanical and entomological knowledge. At the opposite end of the region we were guided on an 'Intertidal

Safari' by marine biologist Jane Lancaster, taking advantage of mid-September equinoctial tides to explore the rocky foreshore at Alnmouth in Northumberland. With Jane's help we managed to identify a wide range of green, brown and red algae, as well as a variety of annelids, molluscs, crustaceans and anemones, and even a few echinoderms, sponges and bryozoans.

The Section's 2013-14 indoor programme featured an eclectic mix of talks and workshops, beginning with the AGM where CIEEM Vice President (England) Stephanie Wray updated members on the current situation regarding TB in Badgers. Workshops were held on Ecosystem Services (jointly with IEMA), and on Habitat Regulations Assessments, with presentations providing contrasting perspectives from the viewpoints of a local authority and a consultancy. The winter programme also featured a variety of talks, including one from Martin Kerby of Natural England on Marine Protected Areas. Martin gave us an overview of marine conservation, from the OSPAR convention through the Marine Strategy Framework Directive, to Marine SACs and SPAs and their role in regulating commercial fisheries.

The indoor season was rounded off by Peter Glaves who gave a talk on identification, survey and assessment of ancient woodland. This was well attended by students on the CIEEM-accredited programme at Northumbria University, and set the scene nicely for the first two field club events of the year. A visit to Castle Eden Dene was ably led by Natural England's local education officer Steve Metcalfe who described the history and management of the dene, as well as pointing out some of the distinctive geological features and woodland flora. Natural England were equally obliging for our visit to Derwent Gorge and Muggleswick woods on the Durham/Northumberland border, providing a permit for a rare opportunity to wander off-track in the site's classic upland oakwoods and meadows.

By the time of publication there will have been further visits to the Greatham North managed realignment scheme at Teesmouth and to Maze Park nature reserve in the centre of urban Teesside to look at brownfield flora and fauna. Beyond that our objectives for the coming year include a drive

to broaden participation among our 200+ Section members, greater engagement with students on CIEEM-accredited programmes within the local university network, and a regional conference, tentatively pencilled in for April 2015.



1. Interpreting the remains of a Viking longhouse in Teesdale
2. Measuring peat depth, Caudhole Moss, Simonside Hills
3. Birch-Bilberry association at Derwent Gorge
4. Plant ID at Coatham Stob
5. Epiphytic Polypody Ferns at Derwent Gorge
6. A rare patch of English Bearberry, Simonside Hills



Scottish Section News

Brian Minshull CEnv MCIEEM

Scottish Section Committee Member

A CIEEM Scottish Section Best Practice Event was held at Castle Stuart Golf Links, near Inverness on 18 April 2014.

Castle Stuart Golf Links has been recently created on the shores of the Moray Firth outside Inverness. The golf industry has had a lot of bad publicity in recent years, but I was keen to demonstrate that it needn't be that way and the Castle Stuart Golf Links project was by far the best project I have ever worked on from an environmental management perspective.

Links golf courses are created in sand dune environments. Indeed, in one interpretation this relates to the origins of golf; bored shepherds tending flocks of sheep in sand dunes hitting stones down rabbit holes with their shepherds' crooks. Nowadays of course most sand dune environments in the UK are either already golf links or are designated for their nature conservation value. The most remarkable thing about the Castle Stuart Golf Links is that the site was not previously a sand dune environment, rather it was mixed agricultural land on very sandy glacial deposits. As such, the project involved winning sand from within the site and creating a very convincing 'pseudo' sand dune environment.

Environmental issues were very much to the fore at all stages and were properly addressed throughout. For these reasons I was keen to share Castle Stuart with other CIEEM members and to prove that world class golf developments do not have to involve adverse environmental impacts.

The event was held on Good Friday and 24 delegates booked to join us. The mix of delegates proved to be very diverse and involved several non-members from the golf industry. This made for a vibrant mix of people, all very willing to contribute to the day. The weather proved to be absolutely brilliant and the picturesque setting was stunning in the sunshine.

Stuart McColm, General Manager at Castle Stuart, welcomed everyone to the fantastic art deco clubhouse and the day event kicked off with an illustrated talk from me (which was 'wittily' sub-titled *The Creation of a Links Golf Course from Sand*), describing the implementation of the project from an environmental perspective. This was greatly improved by contributions from Tom Dargie and Kathy Dale, who were involved during the planning and construction stages of the Menie Estates golf course respectively, and provided an interesting counterpoint.

After a lovely buffet lunch we were finally free to explore and the second part of the



1. Castle Stuart aerial. The setting of the Castle Stuart Golf Links showing the course soon after completion. (Photograph courtesy of Castle Stuart Golf Links)

2. Chris Haspell telling delegates about the construction and management of hole 12

day involved a guided walk around the site, accompanied by Chris Haspell, the Golf Course Manager at Castle Stuart.

The day finished with an impromptu close-out session to capture the many ideas and recommendations that delegates came up with throughout the day and this will form the basis of a more detailed report to follow. I'm very grateful to all those who contributed to the day.



Ireland Section News

All-Ireland Annual Conference –

Wetlands: Managing Biodiversity and Ecosystem Function

Monday 24th November 2014

Holiday Inn, Ormeau Avenue, Belfast, Northern Ireland

This year's CIEEM Irish Section Conference will be looking at current management

and assessment tools used for a range of wetland habitats.

Bookings for the conference can be made at www.cieem.net/irish-section-conference-and-agm-2014.

Train the Trainer

The CIEEM Irish Section is holding a 2-day Train the Trainer Course on 7-8 October 2014 in Dublin. The course is being delivered by an ecological consultancy

certified to deliver Train the Trainer courses and will be tailored to address legislation pertinent to an Irish participant, both North and South of the border. It will be specifically tailored to ecologists and environmental managers. The Irish Section would encourage all of its members who are interested in passing on their skills to others to attend this course.

Booking is now open at www.cieem.net/training-events



West Midlands Section News

Jess Batchelor ACIEEM

West Midlands Section
Committee Member

June saw a fantastic event on Farmland Birds and Habitat Management in Environmental Stewardship. This was hosted by the WM Section and run by Land Management Advisors at Natural England, Matt Willmott, Katey Stephen and Rob Havard, in conjunction with Rob Allan, the Estate Manager of Upton Estate, Warwickshire.

The morning session included discussion about Environmental Stewardship options, farmland bird declines and remedies and how these relate to the Upton Estate, as well as habitat management of the local Malvern Hills SSSI.

In the afternoon, attendees enjoyed a tour of the Upton Estate by tractor, to see some of the very successful Environmental Stewardship options in practice, across

a whole 10% of the estate. The lower yielding areas of the estate, or areas of land difficult to farm have been given over to habitats such as flower-rich strips, areas of rough tussocky grass, legume mixes, bare ground and 'live bird tables'. These provide valuable nesting opportunities and food sources for a large variety of birds, insects and small mammals.

This oversubscribed event was a thorough success made even more enjoyable by blazing sunshine and a delicious lunch.

1. Matt Willmott explains how skylark nesting plots have been created in the middle of arable fields, away from predators and the tractor's tram-lines.
2. Matt Willmott explains how areas planted with a variety of high-yielding seed producing plants provide 'living bird tables', particularly important for bird species overwintering in the area that may otherwise starve during the winter months.



To find out more about your local Geographic Section and how you can get involved please visit www.cieem.net/geographic-sections

Overseas Territories Special Interest Group

Conference 2014: Lessons to be Learnt from Invasive Species Mitigation and Management in the British Overseas Territories

16 December 2014

Royal Astronomical Society,
Piccadilly

This conference will look at the practical lessons that can be learnt about mitigation and management of invasive species, drawing on experiences in the UK Overseas Territories (www.cieem.net/uk-overseas-territories).

The event is aimed at providing an overview of the current situation in relation to the status of alien species on these islands and how they are being managed. It will provide a platform for dissemination of experiences with speakers working in the Overseas Territories or working with partners there.

There will be an opportunity to hear from practitioners and research teams on current programmes running in both the marine and terrestrial environments of the Overseas Territories. A series of presentations and case studies will be combined with the opportunity for some lively discussion.

There will also be a presentation on the Darwin Initiative and a Q&A session on the current priorities and how to apply. For further details and to book please visit: www.cieem.net/overseas-territories-group-conference



Delegates network during the coffee break at the January 2013 Overseas Territories Conference



East Midlands Section News

Diana Clark MCIEEM

East Midlands Section Treasurer

Like a Phoenix from the Ashes: our inaugural AGM and biodiversity off-setting event

On 6 March 2014 six intrepid ecology folk were voted in to form a shiny new East Midlands Section Committee. Thus, rising like phoenixes from the ashes, Oliver Ramm (Convenor), Matt Oakley (Vice Convenor), Diana Clark (Treasurer) and Committee members James Whiteford, Mark Webb and Andrew Morris are now ready and willing to deliver an array of exciting events over the coming months for your delectation.

Our AGM was held at Nottingham Trent University (NTU) and featured two splendid presentations, one from Penny Anderson CEcol CEnv FCIEEM(rtd) on 'Carbon, Climate Change and Blanket Peat

Restoration' and the other from Lisa Kerslake CEcol CEnv MCIEEM entitled 'Professionalism In Practice'. Penny Anderson also made presentations to university representatives following the recent formal CIEEM accreditation of two NTU courses.

On 6 May 2014 we were privileged to be visited by CIEEM's current President, John Box CEcol CEnv FCIEEM, who delivered a fantastic presentation on habitat translocation. This was followed by a lively Q&A session and some considerable debate about the ongoing development of biodiversity offsetting protocols.

In between the newt and bat surveys that have plagued all our social lives during the last few months, the Committee recently met and put together a schedule of events for the coming months. We will publish further details on the CIEEM website and via email as these events become more formalised.

Don't forget, if you have an idea for an event you'd like to see in the East Midlands, or would like to help out, please do get in touch. We look forward to meeting you at an event very soon.

To contact the East Midlands Section committee please visit www.cieem.net/geographic-sections



Penny Anderson at the East Midlands AGM



South East England Section News

Debbie Bartlett FCIEEM

Vice Convenor, South East England Section Committee

Despite the uncertain weather, there was a good turnout for the 'Springtime in the New Forest' event, held on Saturday 10 May 2014 and led by Ian Barker from the New Forest National Park Authority. We began with an overview of site management, learning about the origins of the grazing system and the way it works today, seeing ponies and the tail cuts showing that their owner had paid the annual fee for turning them out. The next stop was one of the many ponds for which the New Forest is renowned; there are estimated to be over 1,000 in the area and they support 75% of England's Red Data Book pond species. There was a lively discussion about the importance of veteran trees and of dead wood before members of the group linked hands to estimate the girth of an impressive oak. Other highlights

were the plants – for many it was their first sight of petty whin *Genista anglica*, and some demonstrated their skill at differentiating sedges. We also saw pearl bordered fritillary *Boloria Euphrosyne* on the edge of the forest track. A thoroughly enjoyable day out!

For further information see:
http://www.newforestnpa.gov.uk/downloads/file/499/water_environment_improvement_plan
<http://www.freshwaterhabitats.org.uk/wordpress/wp-content/uploads/2013/09/SE-IAP-Report-FINAL.pdf>
<http://www.verderers.org.uk/education.html>
<http://www.newforestvrs.org.uk/forest-information/new-forest-butterflies-2/>

1. Photographing the pearl-bordered fritillary
2. The group hear about management of the famous New Forest ponies



Applicants and Admissions

The decision on admission is usually taken by the Membership Admissions Committee under delegated authority from the Governing Board but may be taken by the Governing Board itself. If any existing member or non-member has any good reason to object to someone being admitted to the Chartered Institute as a Full or Associate Member, based on compliance with the Code of Professional Conduct, they should fill in the membership objection form and return it to the Deputy Chief Executive Officer before 13th October 2014. The objection would be referred to the Professional Standards Committee to be considered according to the Disciplinary Regulations. CIEEM is pleased to welcome applications for Membership from the following:

APPLICANTS

Applications For Full Membership

Dr Kathryn Turner, Dr Marcus Malley

Applications For Associate Membership

Miss Emma Grubb

Applications to Upgrade to Full Membership

Associate members applying to upgrade to Full Membership are not listed here as they have been listed previously for their Associate membership application.

Applications to Upgrade to

Associate Membership

Miss Caroline Airson

ADMISSIONS

Chartered Ecologists

Mr Michael Dean, Dr Jonathan Denton,
Mr Richard Dodd, Mr Richard Grogan,
Dr Giles Groome, Ms Paula Kearney,
Mr Nigel Smith, Dr Mark Webb,
Miss Joanne Wilson

Chartered Environmentalists

Dr Niamh Burke, Mr Gavin Eaton,
Miss Lucy Emery, Mr James Gilbert,
Mr David Hodd, Miss Kathy Hughes,
Dr Anthony Juniper, Mr Garry King,
Mr Muhammad Majeed

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Mr Mark Ambrose, Mr David Blake,
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Mr Stephen Marshall, Mrs Christine Mason,
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Dr Charlotte Packman, Mr Steven Peters,
Mr Nick Pfeiffer, Mr Duncan Revell,
Mr Kris Roberts, Mrs Anne Roberts,
Mr David Rogerson, Ms Tereza Rush,
Dr Benjamin Rushbrook, Mrs Y.Decie Sako,
Mrs Elizabeth Sanders, Mr Oliver Saunders,
Dr Louise Scally, Mr John Simper,
Mrs Sarah Slater, Mr Paul Smith,
Mr Chrispian Snell, Mrs Petra Sovic Davies,
Dr Philip Sterling, Miss Clare Sterling,
Mr Christopher Strachan, Mr Nick Thomas,
Mr John Thompson, Mr Darren Whitaker,
Mr Ross Wilkie, Mrs Rebecca Wilson,
Mr Keith Wilson, Mr Simon Wiltshire,
Dr Simon Zisman

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Mr Grant Brown, Miss Leanne Butt,
Mrs Valerie Choiseul Darwall,
Mr Matthew Cooke, Mr Pdraig Cregg,
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Miss Jia Lim, Mrs Rebecca Long,
Dr Miles Newman, Mrs Catherine Poate,
Mr Michael Proteriotis, Ms Jessica Quinn,
Miss Jeanette Richardson, Mr George Siskos,
Ms Nikki Taylor, Miss Rachel Taylor,
Miss Alexandra Turner, Mr Jonathon Woodcock

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Mr Paul Barnes, Miss Charlotte Bellamy,
Mr Gavin Bennett, Mr Piran Borlase-Hendry,
Mr Steven Coyne, Mr Tom Davies,
Miss Anna Davies, Mrs Lucy Day, Mr Adam Earl,
Mr Seumus Eaves, Mrs Lucy Elliff,
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Miss Annabelle Phillips, Miss Michelle Phillips,
Mrs Jennifer Pollard, Mr Thomas Rothero,
Mr Lee Rudd, Miss Justine Saelens,
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Mrs Rebecca Yeo

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Mr Christopher Dennis, Mr Mike Dyke,
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Mrs Eleanor Atkins, Mr Christopher Beynon,
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Miss Emily Clark, Mr Thomas Clemence,
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Ms Molly Dailide, Mr John Deasy,
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Miss Joanne Southgate, Mr Alan Sumnall,
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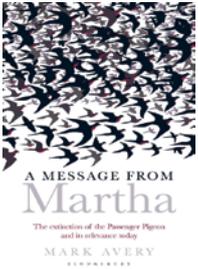
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Mr Graham Hinton, Ms Helen Holford,
Mr Steven Roebuck, Mr Clive Walton

Supporter Members

Miss Victoria Hodson, Mr Ross Langley,
Mr Martin Measures

Recent Publications



A Message from Martha: The Extinction of the Passenger Pigeon and Its Relevance Today

Authors: Mark Avery
ISBN: 9781472906250
Price: £15.29

Available from: www.bloomsbury.com

September 1st, 2014 marked the centenary of one of the best-documented extinctions in history – that of the Passenger Pigeon. From being the commonest bird on the planet 50 years earlier, the species became extinct on that fateful day, with the death in Cincinnati Zoo of Martha – the last of her kind. This book tells the tale of the Passenger Pigeon, and of Martha, and of author Mark Avery's journey in search of them. It looks at how the species was a cornerstone of the now much-diminished ecology of the eastern United States, and how the species went from a population that numbered in the billions to nil in a terrifyingly brief period of time. It also explores the largely untold story of the ecological annihilation of this part of America in the latter half of the 19th century. Despite the underlying theme of loss, this book is more than another depressing tale of human greed and ecological stupidity. It contains an underlying message – that we need to re-forge our relationship with the natural world on which we depend, and plan a more sustainable future.

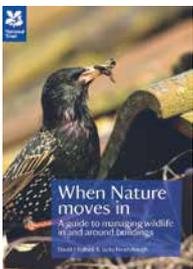


Ecological Restoration and Environmental Change: Renewing Damaged Ecosystems

Authors: Stuart K. Allison
ISBN: 9781138804562
Price: £25.99

Available from: www.nhbs.com

This book addresses and challenges some of the issues which question the core values of the science and practice of restoration ecology. It analyses the paradox arising from the desire to produce ecological restorations that fit within an historical ecological context, produce positive environmental benefits and also result in landscapes with social meaning. Traditionally, restorationists often felt that by producing restorations that matched historic ecosystems they were following nature's plans and human agency played only a small part in restoration. But the author shows that in reality the process of restoration has always been defined by human choices. The book debates in detail how coming global climate change and the development of novel ecosystems will force us to ask new questions about what we mean by good ecological restoration.

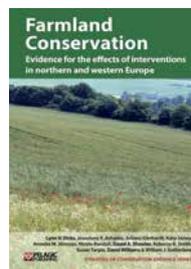


When Nature Moves In

Authors: David J. Bullock
and Jacky Ferneyhough
ISBN: 9780707804255
Price: £9.99

Available from:
<http://shop.nationaltrust.org.uk/>

For the first time, this guide shares the National Trust's decades of nature conservation and building expertise. It covers how to: plan work on buildings, including the relevant statutory requirements, what you can do and when to call in the professionals; identify signs and effects of habitation by common mammals, birds, amphibians and reptiles, insects and spiders, plants, lichens and fungi; and reconcile, wherever possible, the needs of wildlife, the building or the human inhabitants without detriment to the others. Intended for everyone from house owners or those doing DIY to architects, builders and construction professionals, this book is a perfect introduction to building maintenance and repair without harming wildlife. This publication uniquely assists and advises on the essentials for all forms of wildlife, in addition to directing readers to specialised sources of expertise.



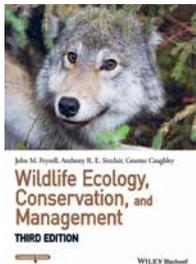
Farmland Conservation: Evidence for the Effects of Interventions in Northern and Western Europe

Authors: L.V. Dicks, J.E. Ashpole, J.
Dänhardt, K. James, A.M. Jönsson, N.
Randall, D.A. Showler, R.K. Smith, S.
Turpie, D. Williams and W.J. Sutherland
ISBN: 9781907807169

Price: £34.99

Available from: www.nhbs.com

This synopsis covers evidence for the effects of conservation interventions for native farmland wildlife. It is restricted to evidence captured on the website www.conservationevidence.com. It includes papers published in the journal *Conservation Evidence*, evidence summarised on our database and systematic reviews collated by the Collaboration for Environmental Evidence. A list of interventions to conserve wildlife on farmland was developed collaboratively by a team of 13 experts. A number of interventions that are not currently agri-environment options were added during this process, such as 'Provide nest boxes for bees (solitary or bumblebees)' and 'Implement food labelling schemes relating to biodiversity-friendly farming'. Interventions relating to the creation or management of habitats not considered commercial farmland (such as lowland heath, salt marsh and farm woodland) were removed.



Wildlife Ecology, Conservation, and Management (3rd Ed.)

Authors: John M. Fryxell, Anthony R.E. Sinclair and Graeme Caughley
ISBN: 9781118291078

Price: £39.95

Available from: www.nhbs.com

There are several important areas of wildlife research and management that are inadequately covered in the second edition of *Wildlife Ecology, Conservation, and Management*. As a result, the authors have chosen to add four brand new chapters to this new edition, as well as updating several of the other chapters with more recent developments and examples. In current research there has been rapid acceptance of the non-commercial statistical software known as 'R'. The four new chapters cover: habitat use and selection; habitat fragmentation, movement and corridors; climate change, and; evolutionary response to disturbance.

Large-scale movements in European badgers: has the tail of the movement kernel been underestimated?

Byrne, A.W. *et al.*

Journal of Animal Ecology 2014, 83: 991–1001

European badgers (*Meles meles*) are classically viewed as exhibiting limited dispersal, and yet their movements bring them into conflict with farmers due to their potential to spread bovine tuberculosis in parts of their range. Considerable uncertainty surrounds the movement potential of badgers, and this may be related to the spatial scale of previous empirical studies. The authors conducted a large-scale mark–recapture study to investigate movement patterns in badgers, and undertook a comparative meta-analysis using published data from 15 European populations. The dispersal movement (>1 km) kernel followed an inverse power-law function, with a substantial 'tail' indicating the occurrence of rare long-distance dispersal attempts during the study period. The mean recorded distance from this distribution was 2.6km, the 95 percentile was 7.3km and the longest recorded was 22.1km. Dispersal frequency distributions were significantly different between genders; males dispersed more frequently than females, but females made proportionally more long-distance dispersal attempts than males. The authors used a subsampling approach to demonstrate that the appropriate minimum spatial scale to characterise badger movements in this study population was 80km², substantially larger than many previous badger studies. Furthermore, the meta-analysis indicated a significant association between maximum movement distance and study area size, while controlling for population density. Maximum long-distance movements were often only recorded by chance beyond the boundaries of study areas. These findings suggest that the tail of the badger movement distribution is currently underestimated. The implications of this for understanding the spatial ecology of badger populations and for the design of disease intervention strategies are potentially significant.

Correspondence: andrew.byrne@ucd.ie

Shifting protected areas: scheduling spatial priorities under climate change

Alagador, D., Cerdeira, J.O. and Araújo, M.B.

Journal of Applied Ecology 2014, 51: 703–713

The authors propose a methodological framework for the dynamic spatial prioritisation of conservation areas that optimises long-term conservation goals under climate change. This approach involves a sequential scheduling of conservation areas designation, followed by the release of some areas when they stop contributing to the specified long-term conservation goals. The usefulness of the proposed approach is demonstrated with a case study involving ten species in the Iberian Peninsula under severe scenarios of climate change, but the framework could be applied more broadly. Species persistence under climate change is enhanced by the dynamic spatial prioritisation strategy that assumes area release. With such a strategy, the long-term persistence of species is consistently higher than expected with no release of redundant areas, particularly when the budgets to acquire and manage conservation areas are small. When budgets are small, long-term persistence of species might only be achieved when the release of previously selected areas is considered alongside the selection of new areas. Given that conservation budgets are typically small, conservation strategies involving the release of some underperforming areas might be required to achieve long-term persistence of species. This should be the case when climate change forces species to move out of current protected areas with other areas becoming important to meet conservation objectives. Implementing such a dynamic prioritisation approach would require a paradigm shift in conservation planning because conservation areas, once selected, are rarely released. Dynamic selection of areas also involves risks that should be considered in a case-by-case situation.

Correspondence: alagador@uevora.pt

Individual-based measurements of light intensity provide new insights into the effects of artificial light at night on daily rhythms of urban-dwelling songbirds

Dominoni, D.M. *et al.*

Journal of Animal Ecology 2014, 83: 681–692

Organisms have naturally evolved daily rhythms to adapt to the 24-hour cycle of day and night, thus, it is important to investigate the potential shifts in daily cycles due to global anthropogenic processes such as urbanisation. The authors captured adult male European blackbirds (*Turdus merula*) in one rural forest and two urban sites differing in the degree of anthropogenic disturbance. They tagged these birds with light loggers and simultaneously recorded changes in activity status (active/non-active) through an automated telemetry system. The authors found that onset of daily activity was significantly advanced in both urban sites compared to the rural population, while end of daily activity did not vary either among sites. Birds exposed to higher amounts of light in the late night showed earlier onset of activity in the morning, but light at night did not influence end of daily activity. The results point at artificial light at night as a major driver of change in timing of daily activity.

Correspondence: ddominoni@orn.mpg.de

Defining ecologically relevant water quality targets for lakes in Europe

Poikane, S. *et al.*

Journal of Applied Ecology 2014, 51: 592–602

The implementation of the Water Framework Directive requires EU member states to establish and harmonise ecological status class boundaries for biological quality elements. In this paper, the authors describe an approach for defining ecological class boundaries that delineates shifts in lake ecosystem functioning and, therefore, provides ecologically meaningful targets for water policy in Europe. The study provides class boundaries for determining the ecological status of lakes, which have robust ecological consequences for lake functioning and which, therefore, provide strong and objective targets for sustainable water management in Europe. The results have been endorsed by all participant member states and adopted in the European Commission legislation, marking the first attempt in international water policy to move from physico-chemical quality standards to harmonised ecologically based quality targets.

Correspondence: sandra.poikane@jrc.ec.europa.eu

European water voles in a reconnected lowland river floodplain: habitat preferences and distribution patterns following the restoration of flooding

Richards, D.R. *et al.*

Wetlands Ecology and Management 2014, DOI 10.1007/s11273-014-9350-x

Water voles have suffered large population declines in the United Kingdom due to habitat degradation and predation by invasive American mink. Habitat restoration of floodplain wetlands could help to reverse this decline, but the detailed habitat preferences of water voles in these environments have not been well studied, and the impacts of restoration practices on water vole populations are not known. This study investigated the habitat preferences of water voles in a reconnected lowland river floodplain. The results show that water voles preferred wider water bodies, and taller and more diverse vegetation. The impact of flooding on water voles was also investigated by comparing their occurrence between two survey periods which were separated by large flood events, and by comparing distribution patterns before and after restoration. Contrary to previous reports, there was no observed negative impact of flood events on water vole distribution, which has slightly expanded since the floodplain was reconnected to the river in 2009. Overall this study demonstrates that restored wetlands can provide suitable habitat for water voles, and provides guidance on some of the factors which should be considered when designing floodplains for water vole conservation.

Correspondence: d.r.richards@sheffield.ac.uk

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Forthcoming Events 2014

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

Conferences

Date	Title	Location
11-12 November	Autumn Conference 2014 – Progress in Effective Habitat Restoration, Translocation and Creation	Edinburgh
24 November	Irish Section Conference – Wetlands: Managing Biodiversity and Ecosystem Function	Belfast
16 December	Overseas Territories Special Interest Group Conference – Lessons to be Learnt from Invasive Species Mitigation and Management in the British Overseas Territories	London

Training Courses

2 October	Freshwater Fish Monitoring	Wilton
7-8 October	Train the Trainer	Dublin
14 October	Water Vole Ecology	Lifton, Devon
15 October	Water Vole Mitigation – Options for Development	Lifton, Devon
23 October	Hazel Dormouse – Introduction to Survey Techniques	Forest of Dean/Wye Valley
31 October	BALI/ROLO Health and Safety Awareness	Skelmersdale
6 November	Introduction to Biodiversity Offsetting	London
14 November	Professionalism and Environmental Ethics	Birmingham
26 November	Conflict Resolution	Birmingham
27 November	Bat Surveys in Professional Practice	London
2 December	Presentation Skills	Birmingham
3 December	Communication Skills	Birmingham

Geographic Section Events

20 August	West Midlands: eDNA testing for great crested newts, and new guidance on water vole mitigation/licensing	Hindlip
31 August	Yorkshire and Humber: Small Mammal Identification and Live Trapping	York
12 September	East of England: Water, Ducks and Dumper Trucks	Colchester
18 September	East of England: Hilgay and Methwold Wetland Creation	Norfolk
27 September	South East England: Wolf Viewing and Bat Walk	Reading
2 October	Scotland: Scottish Biodiversity Science Conference 2014	Edinburgh

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FBA is seeking tenants: Office and laboratory space available at the FBA River Laboratory



The FBA is seeking additional tenants for its River Laboratory site in Dorset. Located just outside the village of East Stoke, near Wareham, the River Lab is a purpose built freshwater biology research laboratory. Superb office and laboratory space is available to rent now. Now celebrating its 50th year, this FBA owned site is part-leased to a range of university, consultancy and charity organizations, with communal facilities shared with the FBA, including canteen, conference room, meeting room and library.



Designed to maximize natural light, the River Laboratory Main Building is built on one floor, and has laboratories and offices in approximately equal number. The Farmhouse, on two levels, has a further eight rooms available. All offices are served by telephone and high speed internet, while laboratories also have telephone and network ports as well as various configurations of laboratory benching, sinks, and extraction units.

The site is served by ample car parking and there are also various external store rooms available depending on requirements.

All services including electricity, water, heating, cleaning, business rates and telephone/internet connection are included in the rent. The FBA also provide reception cover for the site. Arrangements to view can be made by appointment only. Please contact Stephanie Smith RiverLab@fba.org.uk.