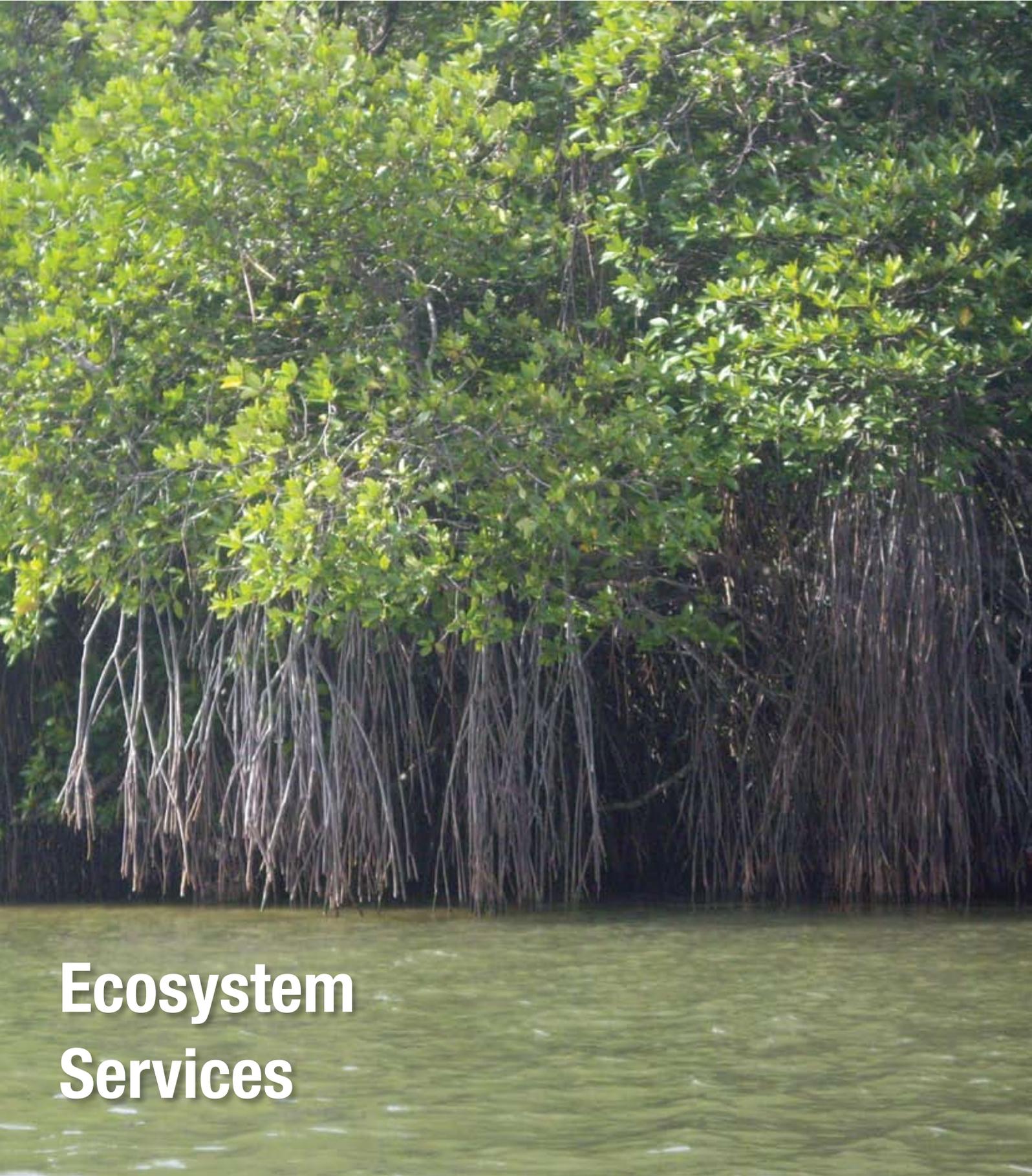




In Practice

Bulletin of the Institute of Ecology and Environmental Management



**Ecosystem
Services**

In Practice No. 68, Jun 2010. ISSN 1754-4882

Editor: Jason Reeves (jasonreeves@ieem.net)

In Practice is published quarterly by the Institute of Ecology and Environmental Management. It is supplied to all members of IEEM and is also available by subscription (£30 per year in UK, £40 overseas).

In Practice will publish news, comments, technical papers, letters, Institute news, reviews and listings of meetings, events and courses. *In Practice* invites contributions on any aspect of ecology and environmental management but not scientific papers presenting the results of original research. Contributions should be sent to the Editor at the IEEM office (address below).

Opinions expressed by contributors to *In Practice* are not necessarily supported by the Institute. Readers should seek appropriate professional guidance relevant to their individual circumstances before following any advice provided herein.

Advertising

Full page: £500, half-page: £250, quarter-page: £125, eighth-page: £65, inserts: £400. The Institute does not accept responsibility for advertising content or policy of advertisers, nor does the placement of advertisements in *In Practice* imply support for companies, individuals or their products or services advertised herein.

Membership

Full £130 (outside UK: £80)

Associate £95 (outside UK: £55)

Retired £50

Affiliate £50

Graduate £50

Student £20

Full membership is open to those with four years experience, and Associate membership to those with two years experience. Appropriate qualifications are usually required. Details are given in the Membership eligibility criteria.

The membership year is 1 October – 30 September.



In Practice is printed on Revive Silk, a 100% recycled paper (100% post consumer waste).

© Institute of Ecology and Environmental Management

Institute of Ecology and Environmental Management

IEEM aims to raise the profile of the profession of ecology and environmental management, to establish, maintain and enhance professional standards, and to promote an ethic of environmental care within the profession and to clients and employers of the members.

Patrons

Prof Charles Gimingham
Mr John Humphrys
The Earl of Selborne

Prof David Goode
Mr Chris Packham
Baroness Barbara Young

Office Bearers

President
President-Elect
Vice-President
Secretary
Treasurer

Prof Steve Ormerod
Prof Penny Anderson
Dr Robin Buxton
Mr Mike Barker
Mr Richard Graves

Secretariat

Executive Director
Dr Jim Thompson

Deputy Executive Director
Mrs Linda Yost

Membership Officer
Ms Anna Thompson

Education and Professional Development Officer
Mr Nick Jackson

External Relations Officer
Mr Jason Reeves

Finance and Office Administrator
Ms Carol Best

Assistant Membership and Administrative Officer
Mrs Zacynta Dunhill-Rice

Operations Assistant
Mr George Knights

IEEM Office

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

Tel: 01962 868626 | Fax: 01962 868625

E-mail: enquiries@ieem.net | Website: www.ieem.net

IEEM is a Company limited by guarantee, no. 2639067.

IEEM is a member of:



The Institute is immensely grateful to those organisations below which have made financial contributions or provided substantial 'help in kind' to support its activities during 2010.

McParland Finn
British Ecological Society

Editorial

Ecosystem Services

The April edition of *National Geographic* magazine was devoted entirely to the subject of 'Water', providing some interesting facts – we can only access less than 1% of the Earth's water, Americans use about 100 gallons of water at home each day whereas millions of the world's poorest subsist on fewer than five gallons, and 16 billion gallons of water are produced daily by the world's desalination plants. In the latest James Bond movie the villain is not a drugs dealer, a fanatic band of terrorists, a gold or diamond smuggler, but someone who controls water! We live under the threat of having too little or too much of it. And even though it is our basic need and the most fundamental of our 'ecosystem services', most of the developed world takes it for granted. This is important because it gives us an insight into the behavioural change that is needed to get us all to fully appreciate the importance of our natural resources. The quote 'we have been slow to give up on the myth of Earth's infinite generosity - rather grandly, we have overdrawn our accounts', is as applicable to all the resources we use as it is to water.

'Ecosystem services' refers to a range of things that nature provides for us such as provisioning services (food, water, timber, biodiversity, etc.), regulating services (climate and rainfall, waste), cultural services (landscape beauty, recreation, spiritual welfare, etc.) and supporting services (soil formation, photosynthesis and nutrient recycling). But as soon as the term 'ecosystem services' is mentioned there are often groans about appealing to the general public. I'm actually happy with the term – I don't think it needs dumbing down; we now use megabyte, gigabyte, PS3, MP3, Green Infrastructure, etc. as though they have always been part of our vocabulary. Let's use the term and spend the time getting people behind the overriding need to understand, appreciate, value and ultimately realise the need to pay for the ecosystem services on which we all depend.

We have become detached and disengaged from our environment and we need to reverse this situation urgently. For millennia, the global human population trundled along, reaching a peak of about 300 million people, until the 1800s when the population took off as we found ways of exploiting resources and increasing longevity. This population explosion, over such a short timeframe, provides a startling image and for me captures un-sustainability, environmental degradation on an unprecedented scale, potential conflict and strife. With 83 million more people on the planet each year, demand for resources will keep going up unless we change how we use them. The problems will become acute relatively quickly – for example, in 15 years 1.8 billion people will live in regions of acute water scarcity.

A whole industry has emerged in the past two years, concerned with measuring man-induced environmental change, seeking alternative sources of energy, evaluating and monetizing the benefits provided to us by ecosystem services. We have historically used land whereby ecosystem services such as clean water, flood risk management, soils, carbon storage, biodiversity and landscape quality, have been zero-costed, and this has resulted in large-scale landscape and habitat fragmentation and huge declines in biodiversity, as evidenced in the recent book *Silent Summer*. The idea that the protection and management of resources, taking an ecosystems approach to future land use, and based on developing ecological networks linking protected areas and the wider countryside with high quality habitats, has great potential for 'stitching back the fabric of the British countryside'. It is essential that we promote the importance of the environment to our everyday lives.

But we have a lot of work to do to enable us to take an ecosystems approach to land use. We need to know how to spatially plan where ecosystem services are best delivered, which areas of land and types of services provide the best return on investment, how different ecosystem services can be provided on the same area of land and how services should be valued and then costed. Our research institutes should be undertaking work in these areas but there is also scope for IEEM members to contribute to the evidence base. We need a programme of work that is of a similar quality and quantity to the agricultural research that supported increased food production from the 1960s (which ironically resulted in agricultural intensification that has fragmented landscapes and reduced biodiversity in the wider countryside) and the vital importance of ecosystem services to our future warrants that we instigate this investment now.

So who will pay for ecosystem services? Clearly, the true cost of the use of land must be part of the balance sheet in future. This will mean higher prices for development land with the uplift used to buy ecocredits that purchase investment into new habitats and the enhancement of existing ones. Food prices are likely to need to rise. Water pricing already factors-in protection for the natural environment and is starting to deliver benefits. We need a domestic carbon market so that land managers are paid for storing carbon and maintaining soils, especially ones high in peat. And we need tax incentives that make it attractive to manage land for their ecosystem service benefits. An understanding of cost leads to an understanding of value. Only when we value something will we achieve its protection.

David Hill CEnv FIEEM
The Environment Bank

CONTENTS

Information	2
Editorial and Contents	3
Ecosystem Services: From Theory to Application Stewart Clarke	4 - 7
The Economic Value of Natural Capital and Ecosystem Services John Box CEnv FIEEM	8 - 9
Valuing Ecosystem Services Bruce Howard	10
Valuing and Using Ecosystem Services in Practice: Findings from the East of England Pilot Studies Peter Glaves MIEEM and Dave Egan	12 - 15
Invertebrates and Ecosystem Services: The Oil in the Ecological Machine Chris Cathrine MIEEM	16 - 19
The Value of Nature and the Nature of Value: A Personal View Nigel Cooper CEnv MIEEM	20
Unleashing the 'Undead'? - The Relationship between Biotic and Abiotic Features and Processes in Ecosystem Services Kate Jeffreys CEnv MIEEM, Teresa Fenn and Andy King MIEEM	21 - 23
A Functional Wetland Typology for Scotland Lorna Harris MIEEM and Helen Simcox AIEEM	24 - 26
Standing Advice and Protected Species – Natural England's New National Approach Helen Lancaster MIEEM	27
How Minerals Site Restoration Can Help Deliver the UK Pond HAP Madeleine Ryan MIEEM and Pascale Nicolet	28 - 31
Letter from Member - A Year On: Observations on the 2009 Cheshire Habitats Regulations Judgement Greg Carson CEnv MIEEM	32 - 33
Ecology Legal Update: Further Important Caselaw for European Protected Species; and the New Conservation of Habitats and Species Regulations 2010 Penny Simpson	34 - 35
IEEM Spring Conference 2010: Ecosystem Services Nick Jackson AIEEM	37 - 38
Greetings from the New CEO Sally Hayns	38
New Horizons for IEEM Jim Thompson HonFSE CEnv FIEEM	39 - 41
Institute News	42 - 43
Geographic Section News	44 - 45
Partnership News	46
Recent Publications	47
In the Journals	48 - 51
News in Brief	52 - 53
Tauro-Scatology	54
Advertisements	55 - 58
New and Prospective Members	59
Diary	60

Cover image: Mangroves (shown here in Koggala Lagoon, Sri Lanka) provide a wide range of ecosystem services

Photography: Jim Thompson HonFSE CEnv FIEEM

Artwork on the cover will normally illustrate an article in, or the theme of, the current issue. The Editor would be pleased to consider any such material from authors.

Ecosystem Services: From Theory to Application

Stewart Clarke

Senior Project Manager: Ecosystem Services Pilots, Natural England

Introduction

The UK conservation movement recently celebrated the 60th anniversary of the passing of the 1949 National Parks and Access to the Countryside Act. The 1949 Act laid many of the foundations for modern conservation, in particular creating National Parks and Sites of Special Scientific Interest. Appropriately, this landmark anniversary inspired many to reflect on both the successes of the past 60 years and also to think about whether those foundations were still adequate for a UK of 60 million people and in the face of future threats, such as climate change. Certainly there are many reasons to celebrate but it is also clear that this is no time for complacency. For example, 19 of the UK's bumblebee species are in decline, we are losing at least 100 hectares of salt marsh (a UK Biodiversity Action Plan priority habitat) each year and we continue to degrade soil and water resources (Natural England 2008).

Why, with stronger environmental legislation and far better scientific understanding of many of the pressures affecting our environment, are we continuing to lose ground in terms of biodiversity and our environment? One argument for this is that we continue to degrade the natural environment because, as society, we don't understand or recognise the value of a healthy and rich natural environment. And because we don't fully understand this, we place insufficient value on the natural environment. As a direct result, the natural environment fares poorly in decision-making, where economic value holds sway. Increasingly, scientists, environmental economists and policy-makers are arguing that we need to recognise and value the range of benefits that the environment delivers. These *ecosystem goods and services* (food and fuel, clean air and water, protection from the elements, wildlife rich spaces and places to walk, cycle or just sit and reflect) are important for our economic and social wellbeing and it is therefore appropriate that we find ways to value and safeguard them. The Millennium Ecosystem Assessment published in 2005 will no doubt be seen as a landmark for this new approach. In the UK, both statutory and non-statutory bodies have recently called for a greater recognition of the value of nature and the environment (Natural England 2009, RSPB 2009).

Although the two terms are increasingly being used synonymously, ecosystem services are part of the wider 'ecosystem approach', a *strategy for sustainable management of land, water and sea for the benefit of people*. The ecosystem approach comprises 12 principles but the most significant elements of the approach are that: it puts people and sustainability at the heart of

environmental management; it expresses the benefits of a healthy environment as ecosystem goods and services; and it encourages the valuation of these services, either in monetary terms or in proxy values, to help inform decisions on land and sea use change. In 2007, Defra published a document seeking to embed the ecosystem approach into policy-making and decision-making and committing government agencies such as Natural England to do the same.

Demonstrating the Ecosystems Approach

Many thousands of pages have been written on the ecosystems approach and ecosystem services but the challenge we face is turning this theory into practice. Natural England believes that by trialling and demonstrating the approach in real places, we can show both the value of investing in the natural environment for human wellbeing and that appropriate management can be funded in new ways. We believe that land managers delivering multiple benefits should receive appropriate reward and that this reward can be offered through both traditional and novel markets

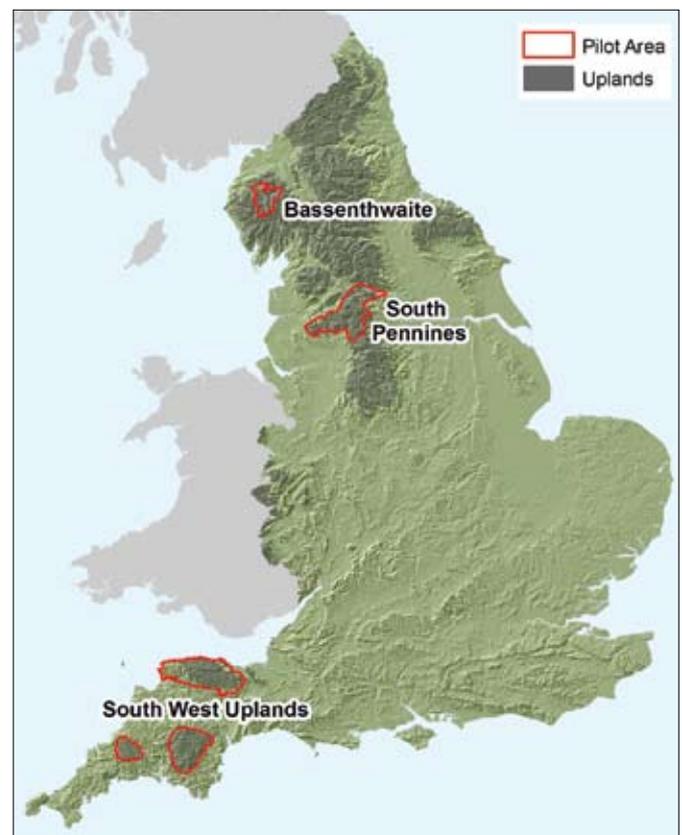


Figure 1. Map showing the location of the three Natural England pilots

(e.g. for food or carbon) and through institutional frameworks (e.g. agri-environment schemes). If successful, this would mean securing greater ecosystem service benefits for society and greater reward for those managing land and water appropriately. By valuing the benefits we get from the environment, we can find new ways of paying for them and ultimately spread the cost of managing the environment across public and private sectors.

Natural England recently launched three pilot projects under the umbrella of 'Delivering Nature's Services'. In three upland areas (Figure 1) we are working with a range of partner organisations to develop a bottom-up, consensus view about how land and water management should look in the future. By using ecosystem services as a unifying concept, the pilots will demonstrate that investment in the natural environment can result in multiple benefits for society. Natural England will act as a catalyst to encourage innovation from land managers and to foster links between land managers, as suppliers of services, and those who benefit.

Although there are now numerous ecosystem service projects in the UK and beyond, we believe that Delivering Nature's Services is unique in designing the delivery of ecosystem services in from the outset, rather than undertaking a post-hoc assessment of services provided by a particular initiative. The project also sets out to tackle multiple services in each of the three areas and change land and water management; this is a practical experiment in land management rather than a desk exercise. Figure 2 outlines the main project steps. We are still in the early phases of the project but hope to be implementing our plan for each area from early 2011 onwards.

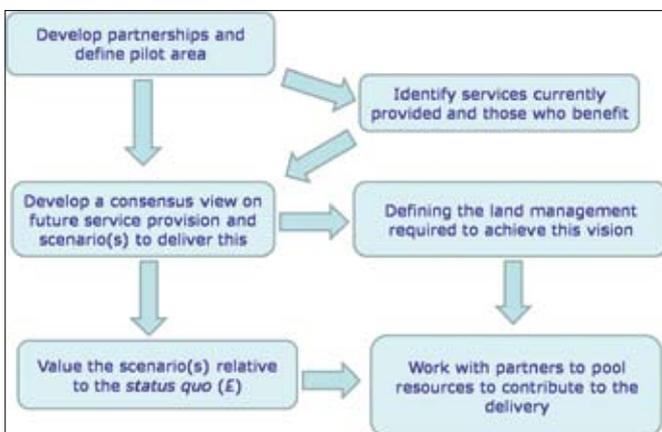


Figure 2. The main project steps in the Natural England ecosystem services pilots

Design Principles

Developing a framework for implementing the ecosystem approach and taking an ecosystem services centred view of land and water management raises a number of challenges. It is clear that in spite of a large and growing body of literature on ecosystem services there is little in the way of guidance on how to do things in real life. Discussions within and beyond Natural England have highlighted questions for fundamental research as well as more practical considerations that we will need to address to make the pilots a success. In this article I will discuss four broad areas or considerations, which we need to take account of in implementing the ecosystem approach and targeting ecosystem services. These are not the only areas of contention or challenge but are, I believe, some of the most important to the 'design' stages.

Geography (or a Sense of Place)

It might be argued that ecosystem services is as much the realm of the geographer as the ecologist, economist or environmental scientist. This is because many of the decisions have a spatial context and so a detailed understanding of not just the 'what' but also the 'where' is required. Many ecosystem services are context and site specific and so can only be delivered in certain places or in a certain spatial pattern. For example, managing water flows for flood mitigation or to secure supply will require actions in those places where run-off is generated and along flow pathways. Not only does this require an understanding of soils, topography and vegetation but also an understanding of what is happening upslope and downstream. Although some services are not necessarily site specific, it is likely that they are provided optimally in some places either because of the inherent nature of the place (right soil, aspect, etc.) or because of the location of those who benefit – a lake miles from any people provides little benefit as a water supply without expensive infrastructure to transfer the water. There is also a question of scale that we need to address if we are to make decisions about land management. To take the example of water regulation again, over what area of the catchment do we need to increase infiltration rates to deliver a reduced flood risk? Would a 30% increase in woodland in the right places have the same effect as an 80% increase which was untargeted? Such decisions need knowledge of ecosystem processes and a degree of spatial understanding. We have begun to collate existing information on the location of particular features and assets in each pilot and use this to show actual or potential ecosystem service provision.

Multiple Service Provision

Many debates about ecosystem services centre upon the level of scientific certainty we have about particular actions. One area of discussion surrounds the extent to which active blanket bog in the uplands captures and stores carbon relative to methane emissions (a more potent greenhouse gas than CO₂). Another area of uncertainty surrounds the extent to which land management changes can help reduce flood risk, see, for example, work arising from the Pitt Review into the 2007 floods. Whilst it is important that we make decisions about land management and investment using the very best evidence, it is also important that we do not allow this uncertainty to lead to paralysis. As in all areas of environmental management we need to develop a way of dealing with these uncertainties; taking 'no regrets' actions where we have sufficient confidence and filling evidence gaps where we have insufficient knowledge.

An integrated approach which is targeted at multiple ecosystem services may help us to deal with some of these uncertainties. If we have some confidence in the direction of change likely to result from a given management intervention and know that the change is of benefit for a number of services, we may decide to pursue that management. An example of this multiple service justification is provided by a number of upland blanket bog restoration projects in northern England, e.g. the United Utilities SCAMP project. These projects are blocking drainage grips to re-wet the peat surface, changing vegetation and altering hydrology. This work is justified on the basis that it will improve blanket bog habitat and biodiversity, secure the peat as an effective carbon store, reduce erosion and resultant water quality problems and (potentially) reduce flood risk through slowing hydrological pathways. Such work is clearly good value for money if one considers the range of benefits but might not be justified on the basis of one service alone. A major challenge for embedding an ecosystem approach is in getting people

and systems to consider options in this integrated way. At present many environmental decision-making processes are dealt with in a one-dimensional way because of the way that land and water management are compartmentalised. A more integrated approach also forces decision-makers to confront the inevitable trade-offs between different services and benefits from a given action.

Managing Assets

The novelty of the ecosystem services concept must not allow us to forget some of the fundamentals of good environmental management. We have a legacy of tools, policies and legislation from traditional conservation that will play an important part in realising this approach. Although the ecosystem approach and ecosystem services shift our emphasis to the services and benefits derived from the environment, most management interventions will still be targeted at the 'assets' of the natural system. For example, many regulating and supporting services are underpinned by biophysical characteristics (soils, catchments and vegetation communities) and as such these provide an important framework on which to build the approach. Safeguarding these fundamental components of the ecosystem is integral to securing future services.

It is also important that we do not neglect the other assets that are important in shaping our environment. In addition to the natural environment or *natural capital*, we need to recognise, protect and enhance *social capital*. The knowledge, relationships and potential for innovation held within local communities will be a critical part of making our pilots a success and in embedding the ecosystems approach in the longer term. Developing a scheme to pay for ecosystem services (PES) is not just about establishing markets and the right financial incentives, and we ignore the human element at our peril. For example, we need to understand how land managers perceive themselves and how they wish to be rewarded in future. Farmers are used to producing food and fibre for the market but can they see themselves as providers of clean water, recreation, etc.?

A better understanding and awareness of people's attitudes and relationship to their local environment can only help in making the right decisions about future management. Involving people in making decisions is a worthy ambition of social policy but is difficult to achieve in practice. We hope to raise awareness of what the natural environment provides and expose some of the links between the local environment and wellbeing of local people.

Financial and Non-Financial Mechanisms

The most innovative element of our three ecosystem services pilots is that we aim to make changes on the ground to enhance ecosystem service provision and pay for these changes using a range of funding sources. Traditionally, land and water management in the UK has been funded through a combination of public and private funds (e.g. for sporting interests or via subscriptions to conservation organisations). Developing an ecosystem services focused approach to land and water management requires a more direct link between investment and resulting benefits via PES schemes. There are now a number of examples around the world of PES in action but few in countries with well-established conservation legislation and existing subsidy arrangements. Developing PES in the UK may require new markets or institutional arrangements to link providers of services to those who benefit. Using a mix of public and private funds to pay for environmental improvements may be difficult because these markets do not generally exist (except perhaps for carbon) and there are constraints about how public funds can be allocated. It is hoped that through the pilots we can



Photograph 1. Blocking drainage grips to restore upland peat. Many initiatives are restoring blanket bog to deliver biodiversity, carbon storage and water regulation. Photo: Natural England

investigate options, identify constraints and therefore feed into future policy development.

Closing Remarks

There is considerable momentum behind ecosystem services at present both in the UK and beyond. If we are to capitalise on this enthusiasm and develop a new, more integrated approach to environmental management we will need to demonstrate how the concept will work in practice. The three pilots have the potential to test different approaches, demonstrate the potential of an ecosystem services focused approach and expose current constraints to its implementation. If we are to learn from these pilots it is important that we put in place adequate monitoring. Natural England has been in discussion with the research community to develop a number of proposals for projects within the pilot areas and we have looked at existing data and monitoring initiatives that might tell us about our progress and success. It is important that as well as outcomes we consider the process itself and we believe it is important to look at environmental, social and economic aspects.

We are trying to build the pilots from the bottom up, in accordance with the ecosystem approach, but are providing guidance from a national perspective to structure this local dialogue. We believe that some guidance and a framework is necessary because the approach is novel



Photograph 2. Walkers enjoying Dartmoor. A challenge in realising an ecosystem services focused approach is in helping people make the links between the benefits they get from the natural environment and those responsible for land management.

Photo: Natural England

and the terminology is often difficult for people to grapple with. The brief discussion above has highlighted some of the major issues that have arisen during discussions and which are being built into our framework. The Natural England pilots are just one way in which the ecosystem approach is being embedded in the UK but we believe that this experiment in land management is truly unique in being driven by ecosystem services from the outset and not purely theoretical. It is only through practical application (and not being afraid to fail) that we will be able to tell whether ecosystem services offer a solution to managing our environment.

No discussion of ecosystem services is complete it seems, without the claim or speculation that this is a 'paradigm shift' – a change in thinking which alters the way we view the world to the extent that previous world views seem impossible. It is of course too early to say, and paradigm shifts can probably only be identified with hindsight, but one thing is certain: we have an opportunity to try something different, something that shows explicitly that the environment is important to everyone. Only time will tell whether society is ready to make this step.

Acknowledgements

I am indebted to colleagues in Natural England with whom many of the ideas and issues above have been discussed: Ruth Waters, John Hopkins, Mark Felton, Julian Harlow and Tom Tew.

References

- Defra (2007) *Securing a healthy natural environment: an action plan for embedding an ecosystems approach*. Defra, London.
- Natural England (2008) *State of the Natural Environment*. Natural England, Sheffield.
- Natural England (2009) *No charge? Valuing the natural environment*. Natural England, Sheffield.
- Pitt M (2008) *Learning lessons from the 2007 floods*. London, Cabinet Office.
- RSPB (2009) *Naturally at your service: why it pays to invest in nature*. RSPB, Sandy.

Correspondence: stewart.clarke@naturalengland.org.uk

The Economic Value of Natural Capital and Ecosystem Services

John Box CEnv FIEEM
Atkins Ltd

The environmental services provided by ecosystems contribute to human well-being through the generation of wealth in the broadest sense and through reducing environmental impacts that result in costs to society (Millennium Ecosystem Assessment 2005). Clean air and water, soil formation, climate regulation, sinks for waste, good health and aesthetic benefits depend on ecosystem services provided by properly functioning ecosystems. Land use changes often result in a simplification of ecosystems (for example, agriculture and urban development) thus reducing the ability of the ecosystems to provide a range of services. Environmental damage (such as habitat degradation or pollution) reduces the effectiveness of ecosystem services.

Commercial and financial markets do not yet recognise the full economic value of ecosystem services, nor the biodiversity (or natural capital) from which ecosystem services are derived (see text box below for explanation of the terms). Therefore, the benefits to society of ecosystem services are not reflected in the prices set by the markets for land and for land use changes. As a result, the value of this natural capital and the ecosystem services it supports is inevitably downgraded in decisions about policies, plans and projects. In other words, biodiversity has no economic value and the market value of land with natural habitats and ecosystems is generally very low compared with other land uses. But the real economic contribution of natural

capital and ecosystem services to wealth generation and to reducing damaging impacts to society (for example, pollution or flooding) can be great and needs to be fully taken into account in all situations.

Because biodiversity, natural capital and ecosystem services have not been assigned economic values by financial markets, the costs of the loss of ecosystem services are born by society in general whereas the benefits from their exploitation are accrued privately. Environmental costs to society can be corrected by price changes which are usually the result of a combination of resource scarcity, taxes or regulation. For example, the introduction of the landfill tax, the requirement for all new buildings to be modelled to assess their likely CO₂ emissions per unit area, or the vehicle excise duty banding that is dependent on CO₂ emissions. The way forward is for the economic value of natural capital and biodiversity to be accounted for in balance sheets and through financial markets which deal with economic services and manufactured capital. Losses and gains from policies, plans and projects can then be costed. Realistic cost-benefit analyses should inform the introduction of new planning policies and fiscal regimes which could have beneficial or adverse effects on biodiversity and ecosystem services.

Ecosystem services are starting to be costed. The initial results indicate that the economic benefits from the environmental services provided by ecosystems and habitats are very significant (Costanza *et al.* 1997, Balmford *et al.* 2002, Millennium Ecosystem Assessment 2005). The overview of the global value of ecosystem services provided by Costanza *et al.* (1997) estimated that their average value was US\$33 trillion (10¹²) per year

Biodiversity: The 1992 United Nations Earth Summit in Rio de Janeiro defined 'biological diversity' as the variability among living organisms, and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems.

Natural capital: Economic capital refers to the resources employed to produce goods or services that are not themselves significantly consumed (though they may depreciate) in the production process. Natural capital is generally considered to comprise three principal categories: natural resource stocks, land and ecosystems. All are considered essential to the long-term sustainability of development.

Ecosystem services: Biodiversity and ecosystems are closely related concepts. Products of biodiversity include many of the services produced by ecosystems (such as food and genetic resources). An ecosystem is a dynamic complex of plant, animal and microorganism communities as well as the non-living environment interacting as a functional unit. Examples of ecosystems include coral reef, rainforest, steppe and urban ecosystems. Ecosystem services are benefits people obtain from ecosystems, which are often undervalued. Examples include pollination, timber, erosion prevention, climate moderation, nutrient cycles and flood alleviation as well as aesthetic and recreational benefits.



Photo A. A surface water balancing lake used by anglers with footpaths around it which has nature conservation and landscape value, and which is likely to offer a premium price for the adjacent houses
Photo: John Box

(1994 prices) within a range of US\$16-54 trillion which compared to global gross national product of US\$18 trillion per year. This was acknowledged as being a first approximation of the relative magnitude of global ecosystem services.

Balmford *et al.* (2002) took this work further by looking at the economic benefits provided by natural ecosystems and by commercially exploited versions of these ecosystems (using case-studies of logging, aquaculture, drainage for agriculture and blast fishing on reefs). They found that the loss of non-marketed services accruing to society outweighed the marketed marginal benefits of conversion. Put simply, commercial exploitation yields private benefits but the social benefits from unexploited ecosystems are not fully recognised because they are not costed – and the social benefits may be greater than the private benefits. Balmford *et al.* (2002) concluded that the development of market instruments would enable the social and global values of natural ecosystems to be captured through mechanisms such as carbon or biodiversity credits or through premium pricing for ecosystems goods such as fish or timber.

An excellent example is the economic value that the city of Philadelphia (USA) derives from its 10,000 acres (4,000 ha) of park and recreation system including woodlands, rivers and streams, trails, golf courses, picnic areas and playgrounds (Trust for Public Land 2008). The direct income received annually by the city in tax receipts derived from increased property values and

tourism was estimated at US\$23.3 million. Cost savings of US\$16.1 million were due to the open spaces providing storm water management and air pollution mitigation together with reduced anti-social problems through improved community cohesion. In addition, there are estimated savings to the citizens of US\$1.1 billion annually from free use of the parks and recreation system combined with savings in medical costs. Finally, the collective wealth of the citizens was estimated to increase by US\$729.1 million annually due to increased property values from proximity to parks and profits from tourism. The next step is for these economic values to be translated into the planning policies that Philadelphia will require to maintain and improve these ecosystem services.

Another example is the current open space and environmental services plans for Durban in South Africa which have been developed from pioneering work undertaken in the 1990s (eThekweni Municipality and Local Action for Biodiversity 2007). The open space system covers some 63,000 ha and the estimated value of the environmental goods and services (for example, flood control, water supply) provided by this open space system in 2003 was R3.1 billion (US\$ 300 million) which could be compared to the operating budget for the Municipality in 2001/02 of R6.5 billion and the capital budget of R2.8 billion. These plans are being translated into land use policies and a climate change strategy.

The UK Government has determined that the value of services provided by the natural environment needs to be reflected in decision-making and has established a Public Service Agreement (PSA 28) for achieving a healthy natural environment through the delivery of public services (HM Government 2007). The five key indicators for measuring progress on PSA 28 are water quality, biodiversity (wild breeding bird populations), air quality, marine health and agricultural land management which are supported by a broader set of indicators. Evidence that such work on complex issues is being taken seriously is set out in the action plan to deliver PSA 28 (Defra 2007a) and in the clearly expressed arguments in the accompanying guide to



Photo B. A translocated hedge provides maturity and structure to a created landscape, as well as shelter, biodiversity value and a wildlife corridor

Photo: John Box

valuing ecosystem services (Defra 2007b).

Ecological resources and biodiversity need to be conserved for their ecosystem functions and this will require new and radical actions. Land use planning and projects from individual developments to major infrastructure projects should not compromise ecosystem services. If ecosystem services are adversely affected, local planning authorities and other regulators giving consents should be able to require developers, whether public or private, to provide for any loss of ecosystem services through appropriate mitigation and/or compensation.

Key ecological resources should always be retained on a site and losses of habitats and ecological features minimised by taking ecosystem services fully into account during project planning and design. Where there is no alternative, habitats and features should be moved to new locations in preference to their loss and subsequent compensation by habitat creation. Ecosystem services provides a powerful argument over and above biodiversity value for retaining ecological resources albeit in a different location. Habitat translocation is a method of last resort, but the technique allows the retention and use of complex and mature ecological resources which can grow and regenerate more quickly than newly planted habitats. Habitats which cannot be retained or translocated should be recreated including the use of innovative techniques such as green bridges to link habitats and green roofs and green walls on buildings.

Compensation for a loss of specific ecosystem services in a location resulting from a particular project could take the form of enhancing ecosystem services elsewhere. For example, increasing or enhancing an existing site of nature conservation value, or aggregating the compensation for a number of developments into one location which is larger and more complex than the sum of on-site mitigation for the developments involved.

In conclusion, economic systems can derive good measures of manufactured capital (machines, buildings) and human capital that are used in sustaining human populations. Economic values need to be assigned to the natural capital that underpins ecosystem services during policy-making, planning or project implementation. In practice, it is the project stage where the real economic costs are crystallised out as part of the pricing, cost-saving and value-engineering processes. Notional costs for loss of ecosystem services should be assigned during project appraisal – and indeed the costed benefits of any ecosystem enhancements that may be derived from a project. The challenge for ecologists and environmental managers is to work with economists to derive the appropriate data for the cost-benefit models.

John Box works for Atkins based in their Telford office. The views expressed in this article are his personal views. The assistance of his colleagues Veronica Lawrie MIEEM and Jules Wynn MIEEM is gratefully acknowledged.

Background Reading

British Ecological Society (2010) Ecosystem services and the ecosystem approach. *The Bulletin*, March 2010, pp. 3-31.

Defra (2007) *An Introductory Guide to Valuing Ecosystem Services*. PB12852. Defra, London. www.defra.gov.uk/environment/policy/natural-environ/documents/eco-valuing.pdf (accessed 10 April 2010).

Parliamentary Office of Science and Technology (2007) *Ecosystem services*. POSTnote 281, March 2007. www.parliament.uk/documents/upload/postpn281.pdf (accessed 10 April 2010).

References

Balmford A *et al.* (2002) Economic reasons for conserving wild nature. *Science* **297**: 950-953.

Costanza R *et al.* (1997) The value of the world's ecosystem services and natural capital. *Nature* **387**: 253-260.

Defra (2007a) *Securing a Healthy Natural Environment: an action plan for embedding an ecosystems approach*. PB12853. Defra, London. www.defra.gov.uk/environment/policy/natural-environ/documents/eco-actionplan.pdf (accessed 10 April 2010).

Defra (2007b) *An Introductory Guide to Valuing Ecosystem Services*. PB12852. Defra, London. www.defra.gov.uk/environment/policy/natural-environ/documents/eco-valuing.pdf (accessed 10 April 2010).

eThekweni Municipality and Local Action for Biodiversity (2007) *eThekweni Municipality Biodiversity Report 2007*. eThekweni Municipality, Durban and Local Action for Biodiversity, Vlaeberg, South Africa. www.iclei.org/index.php?id=9236 (accessed 10 April 2010).

HM Government (2007) *PSA Delivery Agreement 28: secure a healthy natural environment for today and the future*. HM Government, London. www.hm-treasury.gov.uk/pbr_csr07_psaenvironment.htm (accessed 10 April 2010).

Millennium Ecosystem Assessment (2005) *Ecosystems and Human Well-being: synthesis*. Island Press, Washington, DC. www.maweb.org/en/index.aspx (accessed 10 April 2010).

Trust for Public Land (2008) *How Much Value Does the City of Philadelphia Receive from its Park and Recreation System? A Report by The Trust for Public Land's Center for City Park Excellence for the Philadelphia Parks Alliance*.

Correspondence: john.box@atkinsglobal.com

Valuing Ecosystem Services



Bruce Howard
Science Policy Liaison, Natural Capital Initiative

Healthy ecosystems provide many vital, life-supporting, services to humans. Yet the 2005 Millennium Ecosystem Assessment¹ showed that 60% of the world's ecosystems are being degraded or used unsustainably. By considering the value of 'ecosystem services', their importance can be recognised in policy and planning decisions. This may help to halt the current degradation of ecosystems. The Natural Capital Initiative² helps to inform the development of policy and practice to support the implementation of the ecosystem approach.

Ecosystem Approach

The 'ecosystem approach' is defined by the Convention on Biological Diversity as the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way³. While conservation policy has focussed on the *impacts* of human activity, the ecosystem approach is now gaining acceptance amongst policy-makers because it focuses on the *benefits* provided to humans by the environment. The Millennium Ecosystem Assessment divided these 'ecosystem services' into four categories (see figure): provisioning (e.g. food, water and fuel), regulating (e.g. climate), cultural (e.g. recreation) and supporting (e.g. nutrient cycling).

Valuing Ecosystem Services

The value of ecosystems to humans is currently unacknowledged, which allows them to be degraded and destroyed. By measuring ecosystem services it is possible to assign economic or non-economic values, which can be taken into account in policy and planning decisions. This could be what is required to halt the current decline in biodiversity. The Millennium Ecosystem Assessment and *The Economics of Ecosystems and Biodiversity* (TEEB) study⁴ represent the first realistic attempts to assign economic value to ecosystem services. According to the TEEB study, the annual loss of ecosystem services under a business as usual scenario is estimated to be equivalent to around €50 billion.

Ecosystem Approach and the Natural Capital Initiative

For the ecosystem approach to succeed, natural and social scientists, economists, land managers, the public and private sectors, NGOs and planners must be brought together to tackle the challenge of valuing nature's resources. The Natural Capital Initiative (NCI) is an innovative partnership linking experts from different sectors to examine gaps in knowledge and policy which act as barriers to implementing an ecosystem approach.

The NCI aims to identify practical ways to improve decision-making and account for ecosystem benefits, as well as review supporting evidence and highlight knowledge gaps.

Challenges

The NCI was launched in April 2009, with the 'Valuing our Life Support Systems' Symposium, which brought together leading experts to identify barriers and opportunities in the implementation of the ecosystem approach.

A particular challenge is accurately measuring the cultural services (spiritual and social values) provided by ecosystems, which are especially important in urban areas. In addition, we need to understand the interdependence of ecosystems, considering multiple ecosystem services in decision-making. Importantly, we need to find common terminology to ensure effective communication between sectors.

The NCI is organising a dynamic programme of events over the coming year, to aim to tackle these and other key challenges identified through conversation with our stakeholders. A series of three workshops, in June, September and December 2010, will explore biodiversity offsetting and potential market creation for biodiversity and ecosystem services. In addition, a one-day seminar in September will explore the complex links between ecosystems and human health, somewhat overlooked until now.

We would be delighted to hear from IEEM members keen to get involved with any of the activities we are planning. For more information on the NCI, and a programme of events, see www.naturalcapitalinitiative.org.uk.

Notes

¹ www.millenniumassessment.org

² The Natural Capital Initiative (NCI), formed in 2009, is a partnership between the Society of Biology, Centre for Ecology and Hydrology and the British Ecological Society.

³ www.cbd.int/ecosystem/

⁴ http://ec.europa.eu/environment/nature/biodiversity/economics/pdf/teeb_report.pdf

Correspondence: brwa@ceh.ac.uk





BIODIVERSITY BEYOND 2010: Missed Opportunities, New Targets

IEEM Autumn Conference 2010
2-4 November 2010, Dublin



More information will be
available shortly at
www.ieem.net/conferences.asp



Photos: Alan Bell, P Edwards, Gordon Howe, Gavin Parsons, Gerard Stewart, Pascal Sweeny

Valuing and Using Ecosystem Services in Practice: Findings from the East of England Pilot Studies

Peter Glaves MIEEM* and Dave Egan**

*Division of Environmental Management, Northumbria University

**Sheffield Business School, Sheffield Hallam University

Over the last 15 months a series of ecosystem services pilot studies have been run in the East of England by a consortium from Northumbria University, Sheffield Hallam University, Hallam Environmental Consultants Ltd, Manchester Metropolitan University and Scott Wilson Ltd. The studies have been looking at 'how to translate ecosystem services from a broad policy commitment into a practical decision making tool.'

These are the first studies of this type in the UK applying an ecosystem services valuation and an ecosystem services approach at sub-regional and local scale and using demonstration pilots to determine how these approaches and their results can input into planning and other decision-making. The emphasis has been on developing practical tools for applying ecosystem services in a range of planning and other decision-making situations and demonstrating the practical relevance of this approach.

The level of interest in the approach is demonstrated by the number of organisations who have funded the work (i.e. Defra, East of England Development Agency, Environment Agency, Forestry Commission and Natural England) and supported by a wide range of agencies (including Campaign for the Protection of Rural England, East of England Environment Forum, East of England Regional Assembly, and Government Office for the East of England).

There has been a realisation that the environment is not fully recognised in decision making, e.g. 'the value of the natural environment is not adequately recognised by society and it is crucial that people understand the links between their own well-being and the value of services provided by the natural environment' (Natural England 2009). Defra stated their objective as ensuring that 'the value of

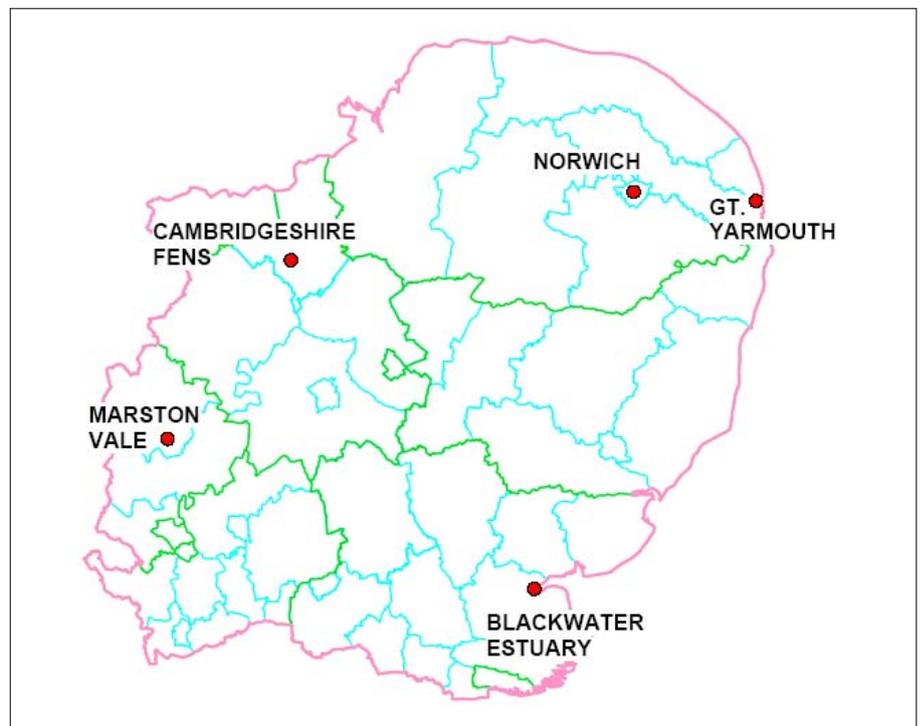


Figure 1. Completed Ecosystem Services Pilots

ecosystem services is fully reflected in decision-making'. These demonstration pilots have sought to see if and how such an objective can be realised.

The value of some ecosystem services has been recognized. For example, in the East of England, farming and food processing in the region supports at least 50,000 jobs and generates £3 billion income (NFU 2008). O'Gorman and Bann (2008) estimated the value to the region of coastal and floodplain habitats in terms of flood control and storm buffering at being over £241 million (in 2007 prices) and the benefits of woodlands in terms of air quality regulation and human health being worth between £2,998 and £106,864 million. Many other ecosystem services are, however, not valued or only implicitly considered in current decision-making. To date there has been no holistic approach to valuing the range of ecosystem services and many services have not been explicitly recognised in decision-making.

In this paper we report on the findings of the first five Demonstration Pilots. The pilots and their key foci were:

- Marston Vale (use of ecosystem services approach in landscape connectivity, restoration and environmentally based regeneration).
- Cambridgeshire Fens (ecosystem services and soil and land use management over large rural areas, as well as river catchment management).
- Blackwater Estuary (the input of ecosystem services to shoreline management planning).
- Norwich (the application of ecosystem services in an urban context, in particular in relation to Green Infrastructure, open space planning and Environmental Impact Assessments).

- Great Yarmouth (the application of ecosystem services to the tackling of socio-economic problems in particular health-related problems).

We are currently undertaking further research on the ecosystem services approach, one project is looking at how an ecosystems services approach can input into strategic planning, specifically the Revised East of England Regional Spatial Strategy (to 2031) and the Integrated Sustainable Appraisal. This study is looking at how the ecosystem services approach can input into regional strategic decision-making. A number of other pilots are proposed to further refine the application of ecosystem services approach at the local level.

The pilots were chosen to trial the ecosystem services approach and test its applicability to a range of situations and spatial scales. Further details can be found in the Phase One Pilot Reports which are accessible at the GOEast website, see web link at the end of this article.

The following findings are of particular relevance to organisations who are considering using an ecosystem services approach in their decision-making and advisors to such organisations.

The Application of Ecosystem Services to Local Decision-Making

The key finding of the Demonstration Pilots has been that the economic valuation of ecosystem services is not always necessary and indeed is not currently practical. A more qualitative approach can add considerable value to decision-making.

From our research we suggest that an ecosystem services approach can be applied at three levels:

- Level 1 – Qualitative approach – where all is needed is to identify significant ecosystem services, for example as part of screening and scoping.
- Level 2 – Semi-quantitative - where use of existing site data and transfer of indicative values from other sites is sufficient.
- Level 3 – Quantitative and verified approach – where there is a need for the generation of site data and/or values and therefore a need for new targeted surveys.

A suggested framework for applying an ecosystem services approach is shown in Figure 2.

Core to all levels of approaches is the identification of the current ecosystem services present in the study area.

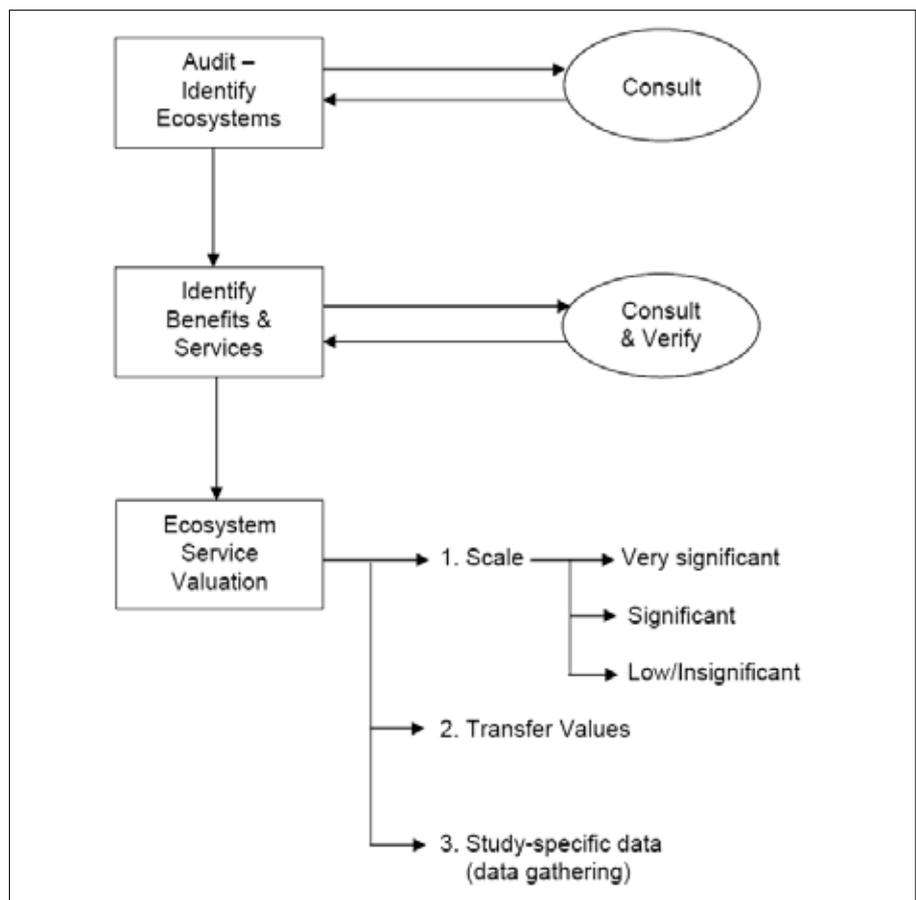


Figure 2. Approach to ecosystem services approach

In addition, it is recommended that where possible an assessment of the current trends in services is undertaken. Identification of ecosystem services works best when this follows an iterative approach involving consultation with a wide range of stakeholders. If such an audit is just a desk-based exercise and/or is based on consultation with only ecologists and environmentalists it may fail to identify services which are important to local communities, for example, small blocks of trees may be of low biodiversity value but important landscape features to a village, *i.e.* sense of place.

Such an ecosystem services audit can play an important role in screening/ scoping out services at an early stage in decision-making and can potentially save a lot of time and money on exploring options which are unsuitable for development because, for example, the proposed development sites currently play an important role in flood storage.

An ecosystem services audit can also help identify service types where there is disagreement over their significance, where there is a lack of information and where education and awareness raising is required. For example, winter flooding of land close to a settlement may reduce the risk of the houses being flooded and is therefore an important ecosystem services. Locals however, often see the

increased visibility of water as indicating a greater risk of flooding, *i.e.* a disservice.

An ecosystem services approach has also been applied to assessing the impact of future planning options. This includes applying an ecosystem services approach to reviewing site specific development options. An ecosystem services approach can potentially input into both Environmental Impact Assessments (EIAs) and Strategic Environmental Assessments (SEAs), in particular as part of scoping and consultation. An ecosystem services approach can identify the significant ecosystem services which may be lost to development, can be used in reviewing alternative land uses and development sites and can help identify what losses of services/benefits need to be mitigated or compensated.

Of particular note is that an ecosystem services approach can also be applied to wider policy and decision-making, for example, the pilots demonstrated how an ecosystem services approach can be applied to help in social deprivation policy and health-related decision-making. For example, one pilot has considered the impact on health deprivation of increasing and/or improving open space provision. In such situations, an ecosystem services approach which focusses on the services provided may be more useful than an approach which focusses on the types of ecosystems present.

Table 1. Barriers to the Adoption of an Ecosystem Services Approach

<p>Need for further national direction:</p> <ul style="list-style-type: none"> Using ecosystem services is not something planners and other decision-makers have to do and therefore it is not done. There is a lack of specific reference to ecosystem services in national guidance, for example in the draft PPS 'Healthy Environments'. There is as yet no standard national approach to ecosystem services.
<p>User friendliness of the current ecosystem services framework:</p> <ul style="list-style-type: none"> The current terminology is not user-friendly and does not link up to existing terminology and approaches (e.g. biodiversity, Landscape Convention, Green Infrastructure, planning policy, etc.). There is a need for a jargon-free, concise ecosystem service checklist. Ecosystem service categories did not fit well with practitioners' existing value types/categories and are wary of the framework and approach when first introduced to it.
<p>Need to relate ecosystem services to practitioners:</p> <ul style="list-style-type: none"> Many non-environmental specialists see ecosystem system services as being just a biodiversity tool and in many cases another constraint on development. The clear links between ecosystem services and relevant national policy have not been clearly made, e.g. use of ecosystem services in planning guidance. Most demonstration studies which use ecosystem services tend to focus on biodiversity projects and policy, not applying ecosystem services to wider local and regional planning, or engaging non-environmentalists in its use/benefits. A lack of specific, targeted guidance to key sectors has yet to be produced. Buy-in from local planners, countryside organisations, architects, ecologists, etc. is key to its successful development as a practical and accepted tool.
<p>Data, evidence and values:</p> <ul style="list-style-type: none"> There is a lack of current robust data for many service types. There is a reluctance amongst ecologists to value certain services. The acceptability of service values in development and planning for services which have previously not been valued is debatable. There is a clear double counting problem in that many services are cross linked. Many ecosystem service values have been produced by a black box approach, making the value of the findings and methods used to derive these uncertain and contestable. It is difficult to calculate support service values. If ecosystem services values are to be used in cost-benefit analysis is there a need to also consider ecosystem dis-services or dis-benefits? For example, in one pilot local consultees could see the ecological benefit of restored heathland near their homes but they were also concerned about the increased fire risk from the heath.

been found to be particularly effective; acceptance of the relevance of ecosystem services typically increased from 30-45% prior to engagement to over 80% after an engagement event.

Issues which need to be specifically overcome if buy-in and engagement are to be achieved include:

- fear that ecosystem services will be enforced on decision-makers from above;
- that it is just another tool-kit/set of criteria to apply without additional support, training, finance, etc.;
- the uncertainty regarding the acceptability of placing economic values on some types of services and fears particularly amongst environmental organisations that

this will lead to markets in services, compensation of loss of services, etc.;

- the uncertainty of how the ecosystem services concept can be translated into relevant practice; and
- the uncertainty as to the added value of using an ecosystem services approach.

Our recommendations to achieve buy-in and engagement are the development of a transparent, robust, simple, clear, holistic, nationally-led, standard and accepted 'kitemarked' ecosystem services approach, and the use of pilot studies to test and demonstrate the relevance of the approach. However, it also needs to be acknowledged that this tool is still in development.

Conclusions

The pilots have shown that an ecosystem services approach can have practical value to a wide range of decision making situations beyond biodiversity focused projects. These include:

- as part of EIAs;
- as part of SEAs and Sustainability Appraisal;
- as part of planning including Local Development Frameworks and Regional Strategies;
- in the evaluation of options and scenarios;
- as part of open space planning;
- as a tool for community engagement; and
- in linking together grey and green infrastructure.

An ecosystem services approach links together the concepts used by a range of professions including planners (costs and benefits) and environmental managers (ecosystems and ecosystem processes). As an approach it goes beyond just considering the environment as a constraint on development and decision-making, but actually brings to the forefront of decision-making the role that the environment plays in supporting people's quality of life, etc.

References

- Glaves P, Egan D, Harrison K and Robinson R (2009) *Valuing Ecosystem Services in the East of England, Volume 1: Technical Report*, Report for the East of England Regional Assembly, GOEast, Defra, Environment Agency, Natural England, East of England Development Agency, Forestry Commission, East of England Environment Forum. Available online at: http://www.go-east.gov.uk/goeast/environment_and_rural/environment_issues/881141/
- Natural England (2009) *The True Value of Nature: Natural England's Draft Policy on Ecosystems Approach*.
- NFU (2008) *Why Farming Matters in the Fens*. NFU.
- O'Gorman S and Bann C (2008) *Valuing England's Terrestrial Ecosystem Services*. Defra.

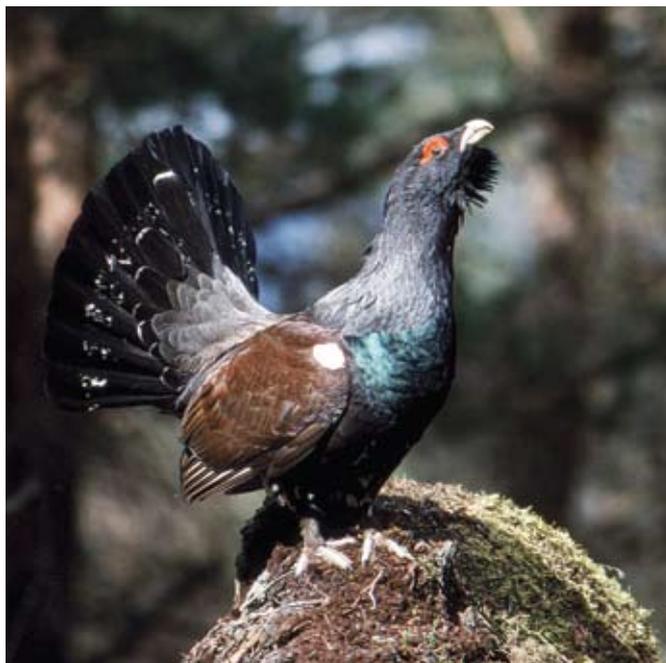
Correspondence:
 peter.glaves@northumbria.ac.uk
 d.j.egan@shu.ac.uk

Invertebrates and Ecosystem Services: The Oil in the Ecological Machine

Chris Cathrine MIEEM

Conservation Assistant (Scotland), Buglife – The Invertebrate Conservation Trust

Invertebrates are a massive component of terrestrial, freshwater and marine ecosystems. To put this into perspective, 98% of all animal species in Scotland are invertebrates (Ward 1997). Invertebrates provide services essential to ecosystem function, human society and economy. Services provided by invertebrates range from pollination of crops and wildflowers to soil creation and maintenance to habitat creation itself. They also control pests, while themselves providing a food source for other animals. Many ecosystems and other species of conservation concern are dependent upon invertebrates – for example, wood ants (*Formica rufa* group) are essential to the maintenance of native semi-natural woodlands, and the continued survival of species such as the capercaillie *Tetrao urogallus*. Despite this, invertebrates tend to be poorly considered in Ecological Impact Assessments (EIA), if at all. This article aims to provide an introduction and overview of the practical importance of invertebrates to ecosystem function, the economy and therefore why they should be considered as integral to any EIA.



The capercaillie *Tetrao urogallus* depends upon wood ants for habitat and food
Photo: Michael Callan



Wood ant nest

Photo: Jane Bowman

Introduction

Increasing emphasis is being placed on assigning value to biodiversity and not just conserving species for their own sake. The term 'ecosystem services' has become an important new buzzword as an accessible way of placing value on biodiversity, and has aided greater consideration of biodiversity conservation within politics and economics. The Millennium Ecosystem Assessment defines ecosystem services as 'the benefits provided by ecosystems to humans, which contribute to making human life both possible and worth living' (Diaz et al. 2005). Boyd and Banzhaf developed the concept further with the definition: 'Final ecosystem services are components of nature, directly enjoyed, consumed, or used to yield human well-being' (Boyd and Banzhaf 2007). The latter, more precise definition allows ecosystem services – those services of benefit to humans – to be identified and defined as end products. These end product services are diverse, ranging from fresh water to flood defence, agriculture to energy (such as renewables or fossil fuels) or timber to recreation (such as birding or walking). Ecosystems also provide important services that regulate climate, such as carbon storage in peatland and woodland. Increasing emphasis is being placed on conserving ecosystem services.

Invertebrates are essential to the provision of many of the end product ecosystem services we now recognise as being so important to our society. Obvious examples include pollination and soil formation – both essential to providing the food supply that the human race depends upon. However, these two services also support other plants, animals and habitats that contribute towards further end product services that we rely upon – such as timber, flood defence, recreation, carbon storage and even the provision of atmospheric oxygen. However, invertebrates also provide or support a range of less obvious ecosystem services that are taken for granted.

Many ecosystems are built upon invertebrates, and could not exist without them. They support ecosystem services essential to humans and form the foundation of many vertebrate food chains. Despite this, invertebrates are poorly considered in EclA, if at all. The reason for this is often a lack of awareness and knowledge – indeed, invertebrates represent a major skills gap in professional ecology.

It is hoped that the examples provided below, coupled with the wood ant case study will help raise awareness of the integral role that invertebrates play in ecosystems, and why they must be considered appropriately in any EclA or habitat management project.

Ecosystem Services Provided by Invertebrates

The following sections provide examples of some of the ecosystem services provided by invertebrates. This list is by no means exhaustive, providing an overview of just a selection of the essential roles played by invertebrates required to maintain the ecosystems that humans depend upon.

Pollination

Pollination by honeybees and bumblebees is perhaps the most widely appreciated ecosystem service provided by invertebrates. These charismatic animals also attract keen enthusiasts and our knowledge base is growing through the work of a number of organisations. Although their key role in delivering this ecosystem service is less often considered, butterflies and moths are also important pollinators and also receive conservation action and monitoring through the efforts of various organisations and volunteers.

The importance of other invertebrate pollinators is often overlooked. However, hoverflies, thrips and beetles are all essential pollinators. These groups are rarely considered, and the knowledge base more limited. Only a small number of people and organisations are working to better understand the ecology of these animals, and to conserve them, despite their importance to our everyday lives.

Pollination services provide a direct economic benefit through agriculture, while there are less obvious benefits gained through the contribution to recreation, culture, sense of place and well-being. The majority of wildflowers rely upon insects for pollination in the UK, and so our terrestrial habitats and other animal species are also dependent upon these invertebrates.



Marmalade hoverfly *Episyrphus balteatus*
Photo: Ben Hamers



A symphylan

Photo: Matt Shardlow

It is therefore important to consider that many of these important species are currently threatened. For example, three of Britain's bumblebee species are now extinct, seven bumblebee species have declined by more than 50% in the last 25 years, 71% of butterflies and 66% of moths are in decline. Many other groups are information deficient, however it is thought that 38% of European bee and hoverfly species are in decline.

Soil Creation, Maintenance and Nutrient Cycling

Another ecosystem service provided by invertebrates is that of soil creation, maintenance and nutrient cycling. While earthworms are now more commonly known to be important for healthy productive soil, a vast number of invertebrates are involved in providing this essential ecosystem service. These include flatworms, nematodes, pauropods, symphylans, mites and springtails, as well as the myriad bacteria.

As with pollination, soil creation, maintenance and nutrient cycling have clear economic value – soil underpins all of our terrestrial ecosystems and food chains. Healthy soil is essential to agriculture, timber production, recreation and many other ecosystem services that we rely upon.

The recently published Countryside Survey Soil Report found that invertebrate biodiversity living in UK soil had decreased (Emmett *et al.* 2010). Further studies may reveal whether this decrease in soil invertebrate biodiversity is due to climate change (or changes to weather patterns), soil chemistry, land management or natural population fluctuations. While the causes and implications are not clear, different species are adapted to particular niches, and a loss of biodiversity is concerning.

Waste Management

The disposal of waste, such as faecal matter, animal carcasses, fallen wood and plant litter is a service perhaps taken for granted by most people. Others will immediately think of buzzards, red kites, golden eagles, corvids, foxes, badgers or other vertebrates. However, the bulk of waste management is provided by invertebrates such as flies, beetles, woodlice, millipedes, slugs and snails which specialise in this type of activity. This essential process ensures that our environment is not overburdened with waste.

The burying beetles *Nicrophorus* spp. provide an excellent example. These beetles bury small vertebrate carcasses as food for their young. The beetle removes all feathers and fur, which it rolls into a ball, before cleaning and then digging beneath the carcass. The carcass may be buried up to 60 cm underground, removing it from view before it is eaten by the beetle's larvae (Scott 1998).



Black sexton burying beetle *Nicrophorus humator*
Photo: Roger Labbett

While the value to society in terms of disease control and aesthetics is obvious, waste management also has economic value and is closely linked to nutrient cycling and soil maintenance.

Pest Control

Pest control by invertebrates is currently topical, with the recent carefully considered introduction of the Japanese psyllid *Aphalara itadori* to control Japanese knotweed. However, our native invertebrates also control pests. Ladybirds are commonly encouraged in gardens and allotments to help control aphids, while many would no doubt consider the predation of house spiders *Tegenaria* spp. by the less intimidating daddy long-legs spider *Pholcus phalangioides* a welcome 'ecosystem service'. Of course, the house spider also provides an essential pest control service by reducing the number of flies and other invertebrates in our homes.

An interesting example ties in with the burying beetles discussed earlier. These beetles often carry small red mites *Poecilochirus necrophori*. When the burying beetle finds a carcass, the mites jump off and predate blowfly larvae (Springett 1968). This provides nutrition for the mite, reduces competition for the burying beetle larvae and provides pest control service.

Invertebrates deliver pest control services throughout all ecosystems, and other examples are provided in the wood ant case study.

Food for Other Animals

Invertebrates provide an essential link in the majority of food chains, and support vertebrates – including birds, mammals and reptiles of conservation concern. For example, golden plovers appear to time their nesting with the availability of craneflies (Tipulidae) (Byrkjedal and Thompson 1998). Adult craneflies are a particularly important food source for young golden plover chicks in the UK, and there is a concern that climate change may result in asynchrony between nesting and emergence of this essential prey item (Pearce-Higgins *et al.* 2005). As growth and survival of golden plover chicks shows a correlation with the availability of craneflies, this is of conservation importance. Similarly, any development or habitat management project where golden plovers are a material consideration should clearly address the requirements of craneflies as their food source.

Similar relationships exist between invertebrates and many other vertebrates. Migrant birds such as swallows, swifts and martins travel long distances to feed up on insects in the British Isles. Mammals such as bats, badgers, voles and shrews also feed on invertebrates. It is estimated that a single pipistrelle bat

will consume over 3,000 small insects every night (Anon 2005). Therefore, invertebrates need to be considered where the conservation of their vertebrate dependents is a priority.

Case Study: Wood Ants

Wood ants provide a number of services that are essential to the maintenance of many woodland habitats. There are four species of wood ants in the UK: the Scottish *Formica aquilonia* and northern, or hairy, *F. lugubris* wood ants – both true wood ants (members of the *Formica rufa* group) and the closely related narrow-headed *F. exsecta* and the slave-making *F. sanguinea* ants. Each species occupies a different habitat niche within woodland. The individual species all provide essential services that support the ecosystem and its services, whilst providing end product ecosystem service in their own right. In combination, these four species support succession and maintain the structure of a semi-natural woodland habitat that many other species depend upon (Hughes 2006, Hughes and Broome 2007).

At the most intuitive level, wood ants help shape the invertebrate communities within their territories - both above and below ground. Invertebrate communities in the canopy are managed through predation and 'farming' of species beneficial to the ants. This results in a decrease in pest species, such as pine looper moth *Bupalus piniaria* caterpillars, *Neidiprion sertifer* (a sawfly) and other phytophagous insects, which is clearly beneficial to maintaining healthy trees, and of benefit to commercial forestry as well.

Wood ants also alter the invertebrate communities within the soil – for example, there is a significant increase in earthworms in the area surrounding wood ant nests. This is likely to be due to favourable changes to soil temperature, moisture, acidity and organic material directly affected by the ants.

Wood ant nests are masterworks of eco-architecture and sustainable design, taking maximum advantage of renewable energy and local resources. Wood ant nests are built around a tussock of grass, soil or another feature, which provides a source of heat through decay of vegetation as well as a foundation. Constructed so that the south facing side is larger and flatter to capture solar energy and allow workers to bask, before returning to brood chambers where they act as storage



Narrow-headed ant *Formica exsecta*
Photo: Gus Jones

heaters, radiating heat. Finally, the thatched roof made from pine needles, heather and grass provides excellent insulation. These nests also provide habitat for other animals, including the shining guest ant *Formicoxenus nitidulus* and the great-eyed whip-palp spider *Mastigusa macrophthalma*.

Many plants are reliant upon wood ants for seed dispersal services. Some of these, such as the rare small cow-wheat cannot germinate without aid from wood ants.

Through their management of woodlands, wood ants create the habitat for many more 'popular' species of conservation concern – such as the capercaillie, for which they are also an important food source.

Through management of these habitats, wood ants are also indirectly contributing towards carbon storage and atmospheric oxygen production – major climate regulation services.

Development frequently threatens wood ants. Wood ants hold large territories, which often border each other, with disputed no-ant's-land zones inbetween. While the locations of wood ant nests are occasionally considered as constraints when planning the layout of a new development, the huge size of the territory rarely is and any colony retained in this way is likely to become isolated in unsuitable habitat. Through impacts on wood ants, other species of conservation concern that may have been assessed individually may also be negatively impacted through this unconsidered, indirect effect.

Wood ants are the centre of semi-natural woodland ecosystems – they are truly keystone species and are the foundation of many ecosystem services. However, they provide just one example of how invertebrates are integral to the conservation of other species more routinely assessed as material considerations for potential developments.

Conclusions

Invertebrates provide or support many essential ecosystem services that underpin human economy, society, culture and well-being. Although few are afforded statutory protection, many support other species and habitats of conservation concern that are recognised in national and international wildlife and countryside legislation. Despite this, they are often overlooked or poorly considered in EclA and habitat management projects. The absence of or poor consideration of invertebrates in assessments and habitat management is often due to lack of knowledge and awareness, while their representation in legislation is also hampered by deficient baseline information.

The *European Strategy for the Conservation of Invertebrates* identified the issues and challenges surrounding terrestrial invertebrates in Europe. The strategy was adopted by the Council of Europe in 2006 and published in 2007 (Haslett 2007). It provides guidance to decision-makers, land managers, scientists and teachers to help raise awareness and promote invertebrate conservation throughout Europe. When the committee adopted the *European Strategy for the Conservation of Invertebrates* in 2006 they also made the recommendation that individual governments should be encouraged to 'draw up and implement national strategies and enhance invertebrate conservation'. The *Strategy for Scottish Invertebrate Conservation* was the first national strategy to be developed, and was published in 2009 (Macadam and Rotheray 2009 – available online from Buglife). The Scottish strategy identified the issues currently constraining effective conservation effort for invertebrates in Scotland, and provided a series of objectives to tackle these on a national scale. Buglife and the Initiative for Scottish Invertebrates (ISI) are working with numerous partner organisations and experts to implement the Scottish strategy – addressing the skills gap (species identification, survey techniques and habitat management),

baseline information deficiencies and raising awareness. Buglife and other organisations are tackling similar issues throughout the UK. Professional ecologists, those involved in planning, policy development and policy implementation all have a major role to play in the conservation of our native invertebrates.

While many invertebrate species deserve consideration in their own right for a variety of reasons, it is their role in the provision of ecosystem services that makes it critical that invertebrates are considered appropriately in any assessment. Invertebrates are the foundation of many ecosystems and ecosystem services – they are the oil in the ecological machine.

Acknowledgments

The author wishes to thank Craig Macadam, Enda McLoughlin, Andy Carroll, James Dale, Sarah Henshall, Andrew Whitehouse and Matt Shardlow for their valuable contributions.

References

- Anon (2005) *Species information leaflet: Pipistrelles*. Bat Conservation Trust, London.
- Boyd J and Banzhaf S (2007) What are ecosystem services? The need for standardized environmental accounting units. *Ecological Economics* **63**: 616-626.
- Byrkjedal I and Thompson DBA (1998) *Tundra Plovers. The Eurasian, Pacific and American Golden Plovers and Grey Plover*. Poyser, London.
- Díaz S, Timan D, Fargione J, Chapin III FS, Dirzo R, Kitzberger T, Gemmill B, Zobel M, Vilà M, Mitchell C, Wilby A, Daily GC, Galettie M, Laurance WF, Pretty J, Naylor R, Power A, Harvell D, Potts S, Kremen C, Griswold T, Eardley C, Ceballos G, Lavorel S, Orians G, Pacala S and Supriatna J (2005) Biodiversity regulation of ecosystem services. In Hassan R, Scholes R and Ash N (eds) *Millennium Ecosystem Assessment: Ecosystems and Human Well-being: Current State and Trends, Volume 1*. Island Press, Washington. Ch. 11.
- Emmett BA, Reynolds B, Chamberlain PM, Rowe E, Spurgeon D, Brittain SA, Frogbrook Z, Hughes S, Lawlor AJ, Poskitt J, Potter E, Robinson DA, Scott A, Wood C and Woods C (2010) *CS Technical Report No. 9/07. Soils Report from 2007*. Centre for Ecology and Hydrology (Natural Environment Research Council).
- Haslett JR (2007) *European Strategy for the conservation of invertebrates*. Nature and environment, No. 145. Council of Europe, Belgium.
- Hughes J (2006) *A review of wood ants (Hymenoptera: Formicidae) in Scotland*. Scottish Natural Heritage Commissioned Report No. 178 (ROAME No. F04AC319). Scottish Natural Heritage (SNH), Inverness.
- Hughes J and Broome A (2007) *Information Note: Forests and Wood Ants in Scotland*. Forestry Commission, Edinburgh.
- Macadam CR and Rotheray GE (eds) (2009) *A strategy for Scottish invertebrate conservation*. Prepared by the Initiative for Scottish Invertebrates. Published by Buglife – the Invertebrate Conservation Trust, Stirling.
- Pearce-Higgins JW, Yalden DW and Whittingham MJ (2005) Warmer springs advance the breeding phenology of golden plovers *Pluvialis apricaria* and their prey (Tipulidae). *Oecologia* **143**: 470-476.
- Scott MP (1998) The ecology and behaviour of burying beetles. *Annual Review of Entomology* **43**: 595-618.
- Springett BP (1968) Aspects of the relationship between burying beetles, *Necrophorus* spp. and the mite, *Poecilochirus necrophori* Vitz. *Journal of Animal Ecology* **37**: 417-424.
- Ward SD (1997) *The number of terrestrial and freshwater species in Scotland*. Scottish Natural Heritage Review No. 84. SNH, Battleby.

Correspondence: chris.cathrine@buglife.org.uk

The Value of Nature and the Nature of Value: A Personal View

Nigel Cooper CEnv MIEEM
Chaplain, Anglia Ruskin University

The current enthusiasm for the valuation of ecosystem services may be an astute political move on the part of the nature conservation community. It has some political dangers too, particularly if it turns out that biodiversity per se contributes relatively little to ecosystem services. Yet I suspect that many people are bothered by the move for 'philosophical' reasons; these valuations, however subtle, somehow just don't communicate what is felt to be important about the natural world.

Few people enter the world of ecology and environmental management to make a lot of money. Their main motivations lie elsewhere. And we know that many of our fellow humans also choose careers for reasons other than finance. And on the demand side of the economy, few people purchase things solely because they are value for money – they have to want them as well. In contrast, the underlying assumption of the valuation of ecosystem services is that collective decisions by governments and others are led by financial considerations, though non-monetary values may be granted a small part to play. This raises three issues I want to explore; the nature of the democratic deficit in cost-benefit analysis, the dominance of consequentialism in modern ethics, and the transcendent role of nature in human society.

In highly politicised decision-making, financial considerations play a minor role, although they may be appealed to as part of the rhetoric. Prison policy, for instance, appears to be led by a popular demand to put criminals behind bars, never mind the cost-effectiveness of this. But governments are making a myriad of decisions day by day and want a bureaucratic method for doing this to keep complicated political special-pleading to a minimum. Cost-benefit analysis (CBA) provides this. It has its origins in the USA of the 1930s when federal administrators wanted to keep politicians at arms length while they established a public water supply. The rhetoric of CBA appeals to a common interest in economic 'efficiency', while claiming a legitimacy based on a summation of the population's individual preferences derived from markets or their substitutes. However, CBA thereby cheats the public by, firstly, assuming without debate that 'economic efficiency' is the decisive factor and, secondly, treating individuals atomistically. This denies them the opportunity to debate amongst themselves, with all the shifts in outlook this brings in coming to a collective decision. In the case of ecosystem services, many of which have to be valued by asking people their willingness-to-pay for them, CBA denies the public the opportunity for the education and debate really necessary to understand what it is they are valuing. The great thing about the current interest in ecosystem services is the opportunity it provides to explain their value. The challenge for the conservation community is to extend that education beyond Whitehall to the public at large.

CBA attempts to evaluate the consequences of decisions. Its philosophical justification lies in preference utilitarianism. Ethicists are aware that this is just one theory amongst many. Ethical theories have diversified over two and a half millennia in

response to the recognition that no one theory can adequately account for all our moral insights. Alongside a weighing up of consequences we recognise some inalienable rights. Integrity and character too are sought in decision-makers, not least because the consequences of many decisions are far from clear and certain. Although there are attempts to register non-economic values alongside CBA in the current development of the valuation of ecosystem services, quite how these should be made commensurable with each other remains obscure. And, further, ethical factors such as rights and integrity, although 'valued', are not themselves values to put alongside other values, but belong to different categories of language. It makes little sense to say, "I value pure drinking water at £0.50 per litre, which is less than the right to property but more than the integrity of the manager of the local water board." All three may be factors in a decision, but their integration is not a computation but a social process, even a 'spiritual' one.

The Millennium Ecosystem Assessment makes reference to 'spiritual' value as part of the total economic value of an ecosystem; there are 348 occurrences of the word in the report. Doubt is sometimes expressed as to whether spiritual values should or can be included in a CBA. 'Fundamentally, there is the ethical question about the extent to which some life-supporting functions of biodiversity can be fully addressed by economic valuation and be considered as part of possible trade-offs instead of being dealt with as ecological constraints. Similarly, economic valuation may not be appropriate to address spiritual values' (*The Economics of Ecosystems and Biodiversity* first report). At one level these values certainly can be so addressed. For instance, just as one can calculate by 'travel-cost' methods the monetary value people put on visiting a cathedral or Stonehenge, so similarly one could calculate a value for those visiting a nature reserve for its inspirational qualities. The expressions of doubt are evidence that this is an inadequate method. The language of the spiritual, irrespective of religion, is used to talk about the transcendent: that which puts the human into perspective. The conceit that we humans can place a value on nature, that our designs and desires define the purposes of nature, is shown up by the power of a volcanic eruption, the beauty of an ice crystal, the resilience of bacteria, or the compassion of animals for one another. We may value aspects of nature as instrumental to our purposes, but our own lives are trivial and pointless without a wider framework that nature communicates. Unless all is valuable, how do we have value? Self-evaluation carries no weight, either psychological or moral. The spiritual value of nature is not an ill-defined figure to incorporate into a total economic value framework, it is the framework within which we humans and our plans are graciously assigned a significance. That may be the greatest value of nature.

Correspondence: nigel.cooper@anglia.ac.uk

Unleashing the 'Undead'? - The Relationship between Biotic and Abiotic Features and Processes in Ecosystem Services

Kate Jeffreys CEnv MIEEM*, Teresa Fenn** and Andy King MIEEM*

* Geckoella environmental consultants Pvt Ltd

** Risk and Policy Analysts Ltd

Introduction

The term 'ecosystem services' is very much en vogue and widely used. However, there remains a range of opinions and approaches concerning exactly what these services are and how they can be consistently used to help evaluate options for environmental management (Pound 2010). As part of this debate, an understanding of the importance, roles and inter-relationships between biotic (including biodiversity) and abiotic features and functions is becoming increasingly important for researchers and practitioners.

Relationships between the Living, Non-Living and Ecosystem Services

The Convention on Biological Diversity (CBD) and the Millennium Ecosystem Assessment (MEA) define an ecosystem as 'a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit' (MEA 2005). Definitions of ecosystem services are likewise based on the benefits that arise from both biotic and abiotic features and processes.

The living and non-living are often inextricably linked. The boundary at which biodiversity and geodiversity separate will often be 'fuzzy' in definition, and dynamic in character. For example, soils provide a classic demonstration of the interface between plants and rocks.

The Severn Estuary is an example of an ecosystem of exceptional nature conservation value, rich in geodiversity

and other abiotic characters and processes. Here abiotic features and processes are at the forefront of delivering services to communities (see Box 1). In comparison, biotic components make a stronger proportionate contribution to the delivery of erosion control by a mangrove lagoon system at Rekawa, Sri Lanka (Gunawardene 2005). An example of a 'three-way' relationship between geodiversity, biodiversity and ecosystem services includes the comparison of restoration options after marine aggregate extraction (Austen *et al.* 2009). When considering the benefits to the fishing industry that arise from different restoration options, the correlation between the final physical state of the seabed and biodiversity is important.

Box 1. The Severn Estuary

Physical processes dominate the Severn Estuary, with the sub-tidal and inter-tidal muddy substrates, saltmarsh and rocky shores including some distinctively species-poor communities within a high energy environment. The site is of international importance (Ramsar/SAC/SPA) for wintering birds and estuarine habitats; the geomorphological processes that influence these habitats are amongst the SSSI features for the site. The ecosystem services delivered include: fishing (over 100 species of fish are found), cultural values, pollution control (including heavy metals from industry in sediments) and watershed management (e.g. Langston *et al.* 2010). The valuation of services delivered by the Severn Estuary is likely to continue to receive considerable scrutiny due to the proposed Severn Barrage tidal energy scheme.

Splitting or Lumping?

As part of the wider debate concerning the definition of ecosystem services, a critical question seems to be regularly arising: at what point, and how, should services arising from abiotic factors be included, or excluded, in valuation studies? In some cases, recognising the discrete living and non-living components within ecosystems may be helpful in understanding the wider, integrated functions that ecosystems have, and how these elements contribute benefits to human communities.

Recently, over 30 values of geodiversity have been identified (classified into intrinsic, cultural, aesthetic, economic, functional, scientific and educational groups) and have been referred to as 'geosystem services, the geological equivalent of the ecosystem services' (Gray 2004, 2008). This approach is still actively developing, and Natural England is currently reviewing how geosystem services contribute and relate to ecosystem services (NE 2009a). The proper recognition of these abiotic (geological, geomorphological) components and their contribution to ecosystem services is essential; for example, in active coastal and fluvial environments. However, such an approach may also risk promulgating separate 'bio' and 'geo' divisions in the treatment of ecosystem services – immediately it raises the question of whether the term 'biosystem services' should now be used to describe the services arising from biodiversity?

*The Economics of Ecosystems and Biodiversity (TEEB) study (Sukhdev *et al.* 2008, Balmford *et al.* 2008) naturally has a focus on biodiversity whilst including abiotic features and processes that relate to and support biodiversity. Haines-Young *et al.* (2009) go further, suggesting that all ecosystem services assessments should only relate to those derived*



The Severn Estuary is a naturally extreme physical environment - excluding values arising from geodiversity (except where these relate to biodiversity) may risk under-valuing the ecosystem services provided
Photo: Geckoella

from biodiversity or directly related features and processes. The exclusion of geodiversity from valuation studies is suggested as part of an international classification standard for ecosystem services. Austen *et al.* (2009) agree that the valuation process should focus on the living components of the ecosystem, with the value of non-living included indirectly as 'inputs' that generate the living components.

An example of a holistic approach to the inclusion of both living and non-living elements comprises a study of the economic value of the natural environment in Scotland (RPA and CE 2008). The focus on assessing services provided, rather than habitats or features present, meant that the values arising from the geodiversity and biodiversity of the Cairngorms were assessed together (see Box 2). Within the study, there are some aspects that would be easier to separate than others. For example, skiing is an important activity and supports a number of businesses, these benefits may be considered to arise mainly from geosystem services. By comparison, biodiversity is more influential on those benefits arising from wildlife tourism. However, there would be challenges in attempting to make a distinction in the Cairngorms between benefits arising from abiotic and biotic elements when gathering and presenting economic valuation data. These challenges, both conceptual and practical, may lead to the under-valuation of sites or features.

Box 2. The Cairngorms

The Cairngorms National Park comprises 3,800 km² in area, within which four of Scotland's five highest mountains are found. The land over 600 metres is the largest area of arctic mountain wilderness in the British Isles, with 25% of the Park area designated as of European importance. The Cairngorms is home to 16,000 people, and is also the best place for the Scottish crossbill *Loxia scotica*. Significant benefits arising from the park include economic (tourism-related businesses account for about 80% of the economy), health, existence values (including of landscape and biodiversity) and carbon sequestration (RPA and CE 2008)

Elsewhere, Natural England included geodiversity as part of their economic valuation of upland ecosystem services (e.g. NE 2009b). On their website, the National Ecosystem Assessment appears to consider biodiversity as a part of ecosystems (UK NEA 2010).

We prefer the holistic 'whole, integrated ecosystem' approach as this identifies the full values arising from both biotic and abiotic components of ecosystems, and also the full values of their interactions.

What Next?

A 'place-based' and context aware approach has advantages in helping decide which ecosystem services to include or exclude for particular studies (Glaves *et al.* 2009, Haines-Young

and Potschin 2008, UK NEA 2010). Evaluations can be tailored to consider those services most relevant to the particular policy and management decisions under consideration, and can include those arising from biotic and/or abiotic elements as appropriate.

This is not to suggest a 'free-for-all'. In particular, standardised descriptions of the decisions made for each study would be helpful to increase transparency and enable scrutiny. As the evidence base for ecosystem services develops, in the future it should be possible to have guidance on when and how to include services arising from abiotic elements.

It is important that ecologists work with decision-makers, and contribute to academic debate, research and technical guidance relating to ecosystem services at all levels. Workstreams for biologists and geologists should be better integrated to help deliver ecosystem service studies. This integration may also link to and help with other current themes in biodiversity conservation that work at the larger scale, and require better understanding of the non-living elements of ecosystems. This includes landscape-scale conservation and climate change adaptation. Perhaps IEEM could add a bit more of the 'undead' to their mix in the future?

Conclusion

The ecosystem services approach offers an opportunity to highlight the wider benefits that arise from processes and interactions, as well as from the

individual biotic and abiotic components of habitats, sites and natural features. A holistic view may enable full recognition of the benefits arising from ecosystems, including biodiversity and geodiversity, and may help us to achieve the dynamic and adaptive landscape-scale conservation that will increasingly be required in the 21st century.

Acknowledgements

The authors are grateful to Colin Prosser (Principal Geologist, Natural England) for his valuable comments on a draft of this article. However, the views expressed in the final article are solely those of the authors and should not be attributed to any other person or organisation. The authors also acknowledge CURE - Citizens for Undead Rights and Equality, for inspiration regarding the title of this paper.

References

- Austen MC *et al.* (2009) *Quantifying and Valuing the Impacts of Marine Aggregate Extraction on Ecosystem Goods and Services*. MEPF 08-P77, Published September 2009
- Balmford A, Rodrigues ASL, Walpole M, ten Brink P, Kettunen M, Braat L and de Groot R (2008) *The Economics of Biodiversity and Ecosystems: Scoping the Science*. Cambridge, UK: European Commission.
- Glaves P, Egan D, Harrison K and Robinson R (2009) *Valuing Ecosystem Services in the East of England*. East of England Environment Forum, East of England Regional Assembly and Government Office East England.
- Gray M (2004) *Geodiversity: Valuing and Conserving Abiotic Nature*. Wiley, Chichester 434pp.
- Gray M (2008) A new paradigm for valuing and conserving geoheritage. *Geoscience Canada* **35**: 51-59.
- Gunawardena M and Rowan J S (2005) Economic Valuation of a Mangrove Ecosystem Threatened by Shrimp Aquaculture in Sri Lanka. *Environmental Management* **36**: 535-550.
- Haines-Young R and Potschin M (2008) *England's Terrestrial Ecosystem Services and the Rationale for an Ecosystem Approach*. Overview Report, 30 pp (Defra Project Code NR0107).
- Haines-Young R, Potschin M, de Groot RS, Kienmast F, Bolliger J (2009) *Towards a Common International Classification of Ecosystem services (CICES) for Integrated Environmental and Economic Accounting*. European Environment Agency Contract No EEA/BSS/07/007 Draft V1.
- Langston WJ, Jonas PJC and Millward GE (2010) *The Severn Estuary and Bristol Channel: A 25 year critical review*. Marine Pollution Bulletin, Volume 61, Issues 1-3, The Severn Estuary and Bristol Channel: A 25 year critical review, 2010, Pages 1-4 [and subsequent papers].
- Millennium Ecosystem Assessment (2005) *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC
- Natural England (2009a) *Draft Position on Geodiversity*. Natural England 12pp including annexes (Dec 2009).
- Natural England (2009b) *Economic valuation of upland ecosystem services*. NECR029.
- Pound D (2010) *The Eco... what approach?* Presentation at IEEM Spring Conference 2010: Ecosystem Services (Mar 2010).
- Risk and Policy Analysts and Cambridge Econometrics (2008) *The Economic Impact of Scotland's Natural Environment*. Prepared for Scottish Natural Heritage
- Sukhdev *et al.* (2008) *The Economics of Ecosystems and Biodiversity: An Interim Report*. European Commission, Brussels. Available at www.teebweb.org.
- UK NEA (2010) *UK National Ecosystem Assessment*. <http://ukneaunep.wcmcorp/Home/tabid/38/Default.aspx>. Accessed April 2010.

Correspondence: geckoella@gmail.com



The Cairngorms is an arctic wilderness with valuable geodiversity

Photo: Stewart Grant/CNPA

A Functional Wetland Typology for Scotland

Lorna Harris MIEEM* and Helen Simcox AIEEM**

*Wetland Ecologist, Scottish Environment Protection Agency

**Scotland and Northern Ireland Forum for Environmental Research

Introduction

There are many wetland types in Scotland, with different hydrological settings, habitat types and chemical/nutrient dynamics. Many are transitional habitats between freshwater and terrestrial environments and have varying characteristics even within the same wetland type. This variety means it can be difficult for non-specialists to accurately identify and define wetlands in the field, but a recently developed wetland typology will not only make identification easier, but faster and more convenient too.

The typology provides a simple yet functional classification for wetlands in Scotland and uses simple soil and vegetation indicators to assign wetland type. A guidance manual, including field sheets describing the wetland types and indicators, was produced to allow identification of wetlands whilst out on site. A survey form for completion in the field was also produced to ensure that all relevant information is recorded for each wetland site.

Background

This new typology has been developed to assist with the implementation in Scotland of the Water Framework Directive (WFD) and regulatory duties under the Water Environment and Water Services (Scotland) Act 2003 (WEWS), and Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR).

Under CAR, activities including abstractions, impoundments, engineering activities, point discharges and diffuse pollution now require licences. In order to assess whether a licence for a regulated activity should be awarded, Scottish Environment Protection Agency (SEPA) staff must be able to ascertain whether the proposed activity is likely to affect any nearby water bodies, including wetlands. At the simplest level, this involves identifying whether there are any wetlands nearby and then completing a basic risk assessment. This is required for wetlands in the wider countryside as well as those in statutory designated sites, e.g. Sites of Special Scientific Interest (SSSIs) and Natura 2000 (Special Areas of Conservation (SAC) and Special Protection Areas (SPA)).

A simple wetland typology was therefore required to assist non-ecologists in identifying wetlands for initial risk screening. Guidance on how to identify the defined wetland types in the field and training material was also required.

A project was initiated to develop a suitable typology and supporting material through the Scotland and Northern Ireland Forum for Environmental Research (SNIFFER). The project steering group included SEPA, Scottish Natural Heritage (SNH), and the Environment Agency of England and Wales. The work was funded by SEPA and completed by Entec UK Ltd.

Why Do We Need Another Wetland Classification?

The need for a new typology arises from the fact that existing forms of wetland classification and community/habitat description in the UK are either too general, too detailed or do not include all wetland types, to support effective delivery of WFD objectives.

General habitat classifications consider wetlands as part of a range of habitats found in the UK (e.g. Phase 1 Habitat Survey (JNCC 2007), and the National Vegetation Classification (Rodwell 1991a, 1991b, 1992, 1995, 2000)) and do not generally provide enough detail to allow an understanding of wetland function. For example, Phase 1 habitat survey is the accepted standard for baseline ecological survey in the UK. However, the scheme does not include all wetland types (e.g. wet woodland, which should be target noted instead) and the level of detail recorded for different habitat types varies; there are good descriptions of bog habitats for example, but limited descriptions of seepages or flushes. It also does not consider hydrological function. The National Vegetation Classification (NVC) is a more detailed system of plant community description and is an accepted standard at UK level. However, further study is required to determine the relationship between different NVC community types in Scotland and hydrology and hydrogeology, whilst also remembering that NVC is sensitive to factors such as climate and management. Also, the survey and analysis required to robustly identify NVC community types is too detailed for non-ecologists to use and is therefore not suitable for initial risk screening.

There are also classification schemes that exist specifically for wetlands. These wetland schemes go further than general habitat classification schemes by seeking to include a conceptual understanding of how different wetlands function hydrologically and hydrogeologically. For example, the Wetland Framework for Impact Assessment at Statutory Sites (Wheeler, Shaw and Tanner 2009) presents a series of 20 wetland water supply mechanisms (WETMECs), developed through analysis of detailed ecological and hydrogeological data from over 200 sites in England and Wales. WETMECs essentially define the hydrological regime supplying lowland wetlands. Using the WETMEC approach it is possible to define how different wetland types will respond to, or how tolerant they will be of external influences, such as changes in groundwater abstraction and water quality. Although WETMECS do provide the level of detail required to understand the sensitivity of wetland types to certain pressures, they are too complex to use in initial risk screening, and they require further work to ensure its applicability to the range of wetland types found in Scotland.

A wetland typology that defines simple wetland types whilst still allowing an understanding of function was therefore required. This typology needed to be simple enough for non-ecologists to identify a wetland type in the field but also provide enough separation between wetland types to be of benefit to ecologists.

Developing the Typology

Initial Development

Developing the typology required finding a balance between the simplicity required by non-ecologists and the level of differentiation required by specialists. It was considered that non-ecologists are likely to be able to identify landscape characteristics (see Figure 1) and some visual hydrological features. However, a purely landscape-based classification would not provide sufficient differentiation to help identify likely sensitivities, nor is it compatible with any habitat mapping that might be required. Thus a classification with general wetland terms (similar to Hughes and Heathwaite 1995) that included elements of landscape/hydrological schemes (such as SNIFFER 2007) and ecological schemes was proposed as the most suitable.

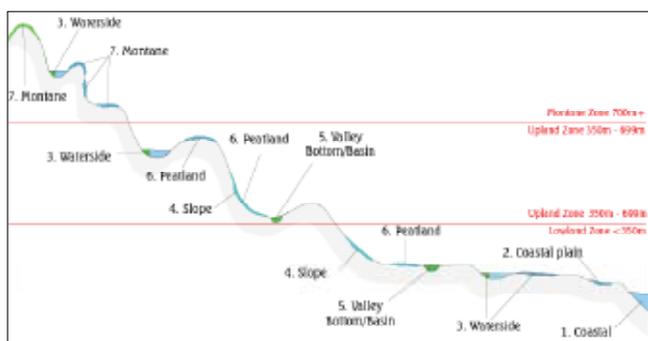


Figure 1. Likely setting of wetlands in the landscape

Field Testing

The draft wetland typology and project outputs (including the guidance manual, survey form, and presentation material) were reviewed during a field testing day in April 2009. Participants included staff from various disciplines in SEPA, SNH, SNIFFER and the Environment Agency. The day included a field visit to a known wetland complex for which crib sheets and survey information was developed. The group was asked to complete the survey form for the site and identify wetland types present. The results were then compared to existing information to test the accuracy and limitations of the new typology and field material. The group was also asked to complete a questionnaire and to highlight any suggestions for improvements to the typology and project material.

Feedback from the field testing was positive; participants understood the need for the typology and found the guidance and field materials easy to use. Suggested improvements included minor changes to the layout of the manual and increasing the size and quantity of photographs to help identification of field indicators.



Figure 2. Staff from partner organisations testing the typology and field material

Project Outputs

Eleven basic wetland types were identified (Table 1), established primarily through consideration of the broad Phase 1 and Habitats Directive Annex I habitats found in Scotland. Some of the wetland types have sub-types to distinguish further between habitats, hydrological features or landscape setting (e.g. distinguishing a floodplain fen from a basin fen). The wetland type can thus be described as '(Landscape) Habitat', based on the range of landscape settings shown in Figure 1. For example, the photograph below shows swamp and wet woodland in a lochside setting, so the wetland types can be described as (lochside) swamp and (lochside) wet woodland.



Table 1. Wetland types included in WFD95 typology

Wetland Type	Wetland sub-type
1 Wet woodland	1a Bog woodland
	1b Other wet woodland
2 Wet grassland	2a Marshy grassland
	2b Montane grassland
3 Seepage/flush/spring	3a Montane flushes
	3b Tufa-forming spring
	3c Other spring
	3d Seepage/flush
4 Fen	4 Fen
5 Swamp	5 Swamp
6 Reedbed	6 Reedbed
7 Wet heath	7 Wet heath
8 Bog	8a Peat bog
	8b Quaking bog
9 Saltmarsh	9 Saltmarsh
10 Dune slacks	10 Dune slacks
11 Machair	11 Machair

The different wetland types are defined so that distinguishing between types is as simple as possible, although there are some difficulties and overlaps. For example, wet heath vegetation is often found in an open upland setting but can also be found within dune slacks. However, dune slacks are defined as a separate wetland type in their own right to highlight the coastal location and distinct hydroecological function (groundwater supply from sand dunes). Machair is also defined as a separate wetland type even though it may contain a variety of wetland habitat types (such as fen). In these cases the landscape setting and hydrological processes are integral to the defined wetland type.

Field indicators are identified for each wetland type (Table 2). Indicators include vegetation, soil type, hydrological features, and landscape setting (the latter were illustrated in Figure 1).

Table 2. Indicators and features used to help identify wetland types

Hydrological features	Soil indicators	Vegetation indicators
River	Peat	Willow
Burn	Peat hags and peat gullies	Birch
Spring	Tufa	Scots pine
Standing water/puddles	Mineral soil	Alder
Freshwater loch	Sand dune	Rushes
Sea loch	Machair sands	Small sedges
Pond	Bare rock	Broad-leaved sedges
		Tussock sedges
		Reeds
		Cottongrass
		Heather
		Carpet-forming mosses and bog mosses (<i>Sphagnum</i>)
		Flowering plants

Field sheets and a guidance manual were produced with details of the wetland types and field indicators to allow identification in the field. A survey form was also produced to enable standardised recording of data. The project outputs also include material for training, including a training presentation and crib sheets.



The wetland typology has been cross-mapped to Phase 1 habitats, Habitats Directive Annex I habitats, CORINE biotopes (EU 1991) and NVC types (available in project report – SNIFFER 2009). This ensures that all Scottish wetland types have been included and allows comparison with existing survey data where necessary. It is recognised that some Phase 1 habitats and NVC communities can occur in more than one wetland type but the cross-mapping exercise represents the most typical relationships.

How the Wetland Typology Will Be Used

The typology will be used to support implementation of the WFD and a risk-based approach to regulation within Scotland. In addition to its use in regulation, it is also intended that the typology be used to classify all wetlands in Scotland for a national wetland inventory.

Identification and ecological appraisal of wetlands may be enhanced by linking the new typology with Phase 1 habitat survey.

Although the typology was developed for Scotland, most of the wetland habitats occur throughout the UK and Ireland. Discussions are currently ongoing to look at the possibility of expanding the Scottish typology to make it applicable to the rest of the UK and Ireland. There is also interest across Europe in the development of functional wetland typologies (Midgley 2009), and it is possible that the Scottish typology may provide a suitable framework for this.

The project report and project outputs are available for free download from the SNIFFER website (www.sniffer.org.uk). The outputs are also available on the SEPA website (www.sepa.org.uk).

Acknowledgements

- Project steering group members: Lorna Harris (SEPA; Project Manager), Johan Schutten (SEPA), Andrew McBride (Scottish Natural Heritage), Helen Simcox (SNIFFER), Kirsten Thorburn (SEPA), Mark Whiteman (Environment Agency)
- Entec UK Ltd – Heather Musgrave, Andy Brooks and Graham Morgan
- Staff from SEPA, SNH, the Environment Agency of England and Wales and SNIFFER who participated in the field testing

References

- European Union (1991) *CORINE Biotopes Manual – Habitats of the European Community*.
- Hughes JMR and Heathwaite AL (ed) (1995) *The hydrology and hydrochemistry of British Wetlands*. John Wiley and Sons, Chichester, UK.
- JNCC (2007) *Handbook for Phase 1 Habitat Survey – a technique for environmental audit*.
- Midgley S (ed) (2009) *Strategic Issues for European Wetlands - Priority research proposed by the European Wetlands Network* (unpublished report) SNIFFER & IWRM-Net. Accessed online (19 April 2010) www.iwrm-net.eu/IMG/doc/Priority_research_issues_on_wetlands_Gland09v3-1.doc.
- Rodwell JS (1991a) *British Plant Communities – Volume 1. Woodlands and Scrub*. Cambridge University Press.
- Rodwell JS (ed) (1991b) *British Plant Communities – Volume 2. Mires and Heaths*. Cambridge University Press.
- Rodwell JS (ed) (1992) *British Plant Communities – Volume 3. Grasslands and Montane Communities*. Cambridge University Press.
- Rodwell JS (ed) (1995) *British Plant Communities – Volume 4. Swamps and tall-herb fens*. Cambridge University Press.
- Rodwell JS (ed) (2000) *British Plant Communities – Volume 5. Maritime Communities and vegetation of open habitats*. Cambridge University Press.
- SNIFFER (2007) *WFD66: A Wetland Hydrogeomorphic Classification for Scotland*.
- SNIFFER (2009) *WFD95: A Functional Wetland Typology for Scotland – Project Report*. ISBN: 978-1-906934-21-7.
- Wheeler BD, Shaw SC and Tanner K (2009) *A Wetland Framework for Impact Assessment at Statutory Sites in England and Wales*. Environment Agency.

Correspondence:
lorna.harris@sepa.org.uk
helen@sniffer.org.uk

Standing Advice and Protected Species – Natural England's New National Approach

Helen Lancaster MIEEM

Senior Specialist Planning, Transport and Local Government, Natural England

Like many organisations, Natural England is looking to improve the efficiency of the services we provide to our customers, stakeholders and partners. For nearly two years we have been running a pilot project in the South East region, using web-based standing advice in response to planning applications that affect protected species. This is designed to be less cumbersome and time-consuming than the system used previously which has involved providing individual responses to each application.

A second pilot commenced in the East of England in September 2009 and, drawing from these projects, we are now developing a set of national standing advice that would apply to all local authorities outside the South East.

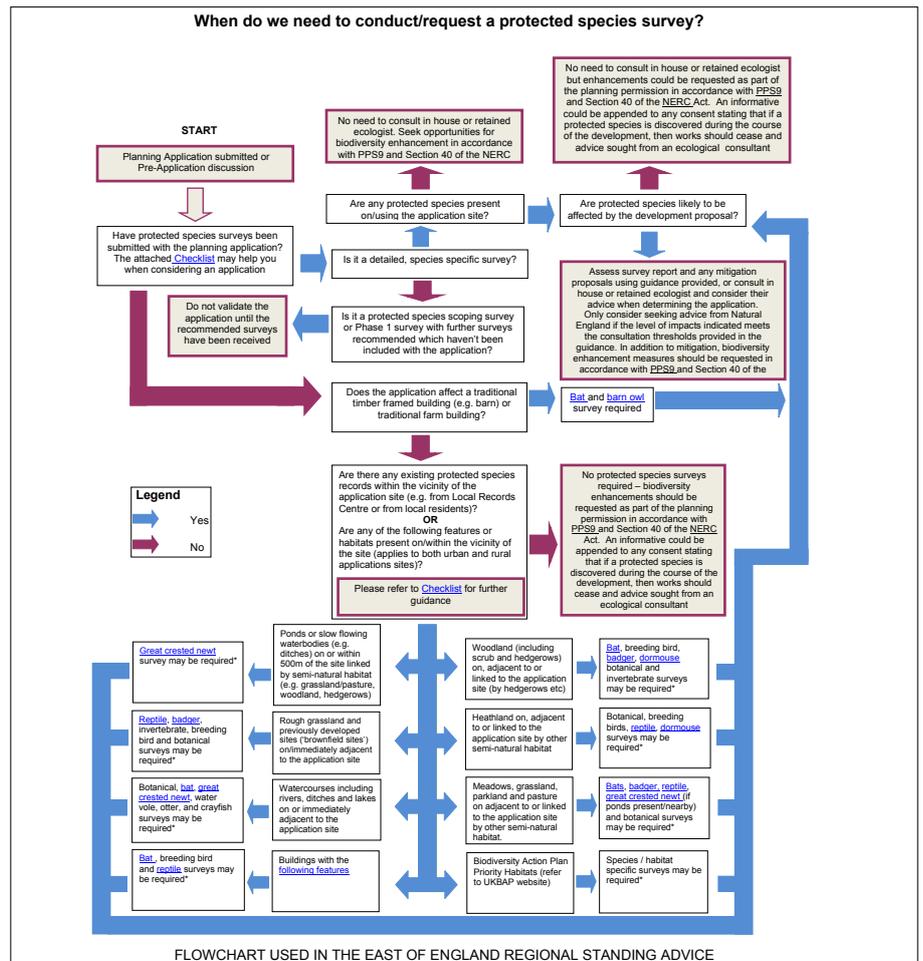
The advantage of using standing advice is that it can be provided instantly but remains a material consideration in the planning process in the same way that an individual response from Natural England would be. As with any other response from Natural England, the local authority decides what weight to attach to it.

The main components of the standing advice are:

- A flowchart and checklist to help local authorities decide when a protected species survey is likely to be required.
- Information pages on individual species.
- Frequently Asked Questions.
- Advice on legislation and policy that relates to protected species and a statement of Natural England's remit in relation to protected species.

Once the standing advice is in place, Natural England will still provide individual advice on those applications with a significant impact on protected species, as well as continuing to respond to all other applications where we are a statutory consultee or where we feel it is necessary for us to comment.

What we will no longer be doing is responding to planning applications that are submitted without the relevant protected species surveys or on scoping surveys that recommend further surveys which have not been carried out. Instead local authorities



will be expected to apply the standing advice. At the time of writing the aim is to make the draft advice available for external consultation for six weeks from mid-summer. The final version of the standing advice should be in place by the end of September 2010.

Moving to standing advice allows Natural England to offer a consistent set of basic advice that can be applied to all planning applications (and not just those that are sent to us by local authorities). It allows us to focus our efforts on the cases with the most significant impacts. We are also looking at other ways of improving the way legally protected species are handled in the planning process. Other approaches we are exploring are:

- Local protocols have been developed by the Dorset team which provide additional advice and tools for local authorities.

- The South East region is developing another pilot set of standing advice which will mean that they only provide individual responses to applications affecting protected species that form part of an Environmental Impact Assessment (they will still be providing comment on impacts on designated SSSIs and protected landscapes).

- The possibility of developing training packages for planners to improve their understanding of legally protected species issues.

Correspondence:

helen.lancaster@naturalengland.org.uk

More info: www.naturalengland.org.uk/regions/south_east/ourwork/default.aspx and www.naturalengland.org.uk/regions/east_of_england/ourwork/standingadvice/default.aspx

How Minerals Site Restoration Can Help Deliver the UK Pond HAP

Madeleine Ryan MIEEM* and Pascale Nicolet**

*Minerals Project Officer, Pond Conservation: The Water Habitats Trust

**Senior Freshwater Ecologist, Pond Conservation: The Water Habitats Trust

Introduction

Ponds play a vital role in protecting freshwater biodiversity in the UK. At the regional level, ponds contribute more to biodiversity than lakes, rivers, streams or ditches, supporting more species and more uncommon species than other waterbody types (Williams et al. 2004, Davies et al. 2008). Some 90 UK Biodiversity Action Plan (BAP) species are associated with ponds - around 60% of these are restricted to this habitat type, including some of our rarest freshwater species such as starfruit, tadpole shrimp and natterjack toad.

When it comes to minerals site restoration, the focus is very much on larger waterbodies such as gravel pit lakes. This is a missed opportunity; ponds are one of the easiest semi-natural habitats to create. And if new pond schemes are well designed and located, they have the potential to quickly become exceptional wildlife habitats (Williams et al. 2008). New ponds may not only help compensate for the loss of small waterbodies due to minerals extraction activities, they also enhance the freshwater biodiversity value of restored minerals sites by adding to the mosaic of habitats and complementing the deeper water communities of lakes.

Pond Declines and What We Can Do About Them: The Million Ponds Project

Unfortunately, all is not well with freshwater habitats in the UK. Ponds have undergone a decline in condition and numbers since the last century, with threats stemming from poor water quality (primarily due to pollutants from farming and urban run-off), isolation, land drainage, changes in agricultural practices and pressure from development.



The bristly stonewort *Chara hispida* needs clean water and bare mineral substrates, but can be found in a wide range of waterbody sizes and depths, including those which dry out in the summer

Photo: Stephen Lambert

Around 80% of countryside ponds in England and Wales are in a 'poor' or 'very poor' condition (Williams et al. 2010), and 74% of rivers in England and Wales will fail to reach the new European Water Framework Directive standard (Environment Agency 2009). In other words, clean, unpolluted water is now rare in much of the British countryside. This is bad news for the many declining freshwater species that depend on good water quality for survival, including threatened wetland plant species, such as stoneworts.

To tackle this situation, ponds were added to the UK list of BAP priority habitats in 2007. Priority Ponds are those which fulfil one of five criteria (see Box 1), and this represents about 20% of the total pond resource in the UK. The Pond Habitat Action

Box 1: What Makes a Priority Pond?

UK BAP Priority Ponds are defined as permanent and seasonal standing waterbodies up to 2 ha in extent which meet one or more of the following criteria:

- **Criterion 1: Habitats of international importance.** Ponds that meet criteria under Annex I of the Habitats Directive.
- **Criterion 2: Species of high conservation importance.** Ponds supporting Red Data Book species, UK BAP species, species fully protected under the Wildlife and Countryside Act Schedules 5 and 8, Habitats Directive Annex II species, a Nationally Scarce wetland plant species, or three Nationally Scarce aquatic invertebrate species.
- **Criterion 3: Exceptional assemblages of key biotic groups.** Ponds supporting exceptional populations or numbers of key species. Based on (i) criteria specified in guidelines for the selection of biological SSSIs, and (ii) exceptionally rich sites for plants or invertebrates (i.e. supporting > 30 wetland plant species or > 50 aquatic macroinvertebrate species).
- **Criterion 4: Ponds of high ecological quality.** Ponds classified in the top Predictive SYstem for Multimetrics (PSYM) category ('high') for ecological quality (i.e. having a PSYM score > 75%).
- **Criterion 5: Other important ponds.** Individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type, historical or landscape context e.g. pingos, dune slack ponds, machair ponds.

For further information about assessing the priority status of ponds see Fairclough and Nicolet (2008) or visit www.pondconservation.org.uk/pond_hap.

Plan (HAP) forms the strategy to address threats to ponds, and includes a target to create ponds of high quality potential (Target 4, see Box 2).

Box 2: Pond HAP Targets

- **Target 1** (maintaining extent): Maintain the number of Priority Pond sites.
- **Target 2** (achieving condition): Maintain quality of Flagship Pond sites.
- **Target 3** (restoration): Restore pond sites to priority status to deliver SAP targets.
- **Target 4** (expansion): Create new pond sites of high quality potential.

The Million Ponds Project, a 50-year multi-partner initiative led and coordinated by Pond Conservation, addresses the decline in both pond *quality* and *density* as part of the Pond HAP implementation. The project aims to create sustainable networks of clean water habitats in landscapes where they are now rare. This can easily be achieved with ponds because they have small catchments, compared to lakes or rivers, and new habitats can be located where the water source is clean, and will stay clean. The target for the first phase of the Million Ponds Project (2008-2012) is the creation of 5,000 new ponds of high quality potential, including 1,000 specifically designed for BAP species. The Minerals Project sits within the Million Ponds Project and aims to support the creation of clean water ponds for wildlife on minerals sites.



Hampton Nature Reserve (Orton Pits Special Area of Conservation); former brick clay workings now important for great crested newts and stoneworts, including the Endangered bearded stonewort *Chara canescens*
Photo: Froglife

Why Target Minerals Sites for Pond Creation?

The minerals industry has the potential to make a massive contribution to the Pond HAP targets because there are so many opportunities for pond creation on minerals sites. Evidence shows that ponds created on minerals sites tend to be of high quality, and this is because minerals sites often have clean, unpolluted water sources and good ecological connectivity to other wetland habitats such as lakes and rivers (Nicolet *et al.* 2008) (see Case study: wildlife ponds on minerals sites in the Lower Windrush Valley).

Ponds are easy and cheap to make, especially where earth moving equipment is already available on site. If properly designed and located to have a clean water source, ponds

will very quickly colonise and require little management. Pond designs can be adapted to fit site circumstances, the space available and planned future management regimes. Pond schemes can be small scale (*i.e.* single ponds or small pond complexes), or can be landscape-scale pond networks. Pond creation can and should be included in wider habitat restoration schemes (*e.g.* reedbed, heathland, woodland, grassland, *etc.*), because this helps maximise biodiversity benefits by creating a mosaic of habitats.

Ponds have other advantages too. They can be integrated into almost any after-use, and pond creation schemes can be compatible with income-generating after-uses, such as angling, pastoral farming or development. Thus, for sites that cannot be restored for nature conservation *per se*, ponds provide a valuable potential biodiversity enhancement measure. Ponds can be created at any stage of the minerals extraction process, including the active phase (*e.g.* silt ponds), during site restoration, or following site restoration.



An active sand quarry in Gloucestershire where a new clean water pond complex is planned as part of the site restoration

What Kind of Ponds Are We Aiming For in the Million Ponds Project?

Clean Water is the Key

Create clean water ponds by ensuring the water source is unpolluted. Generally, groundwater or run-off from semi-natural landuse is best. Avoid linking ponds to other waterbodies, particularly those likely to be high in nutrients such as streams and rivers. Dispose of spoil, particularly topsoil, away from the pond's catchment.

Any pond with a clean, unpolluted water source, whatever its size, shape or depth, is likely to quickly become a valuable wildlife habitat. However, biodiversity will be maximised where best practice design and management principles are applied in addition to clean water principles.

Pond Complexes

If size, depths and permanence of waterbodies within a pond complex are varied, the resulting mosaic of permanent, semi-permanent and seasonal ponds will provide habitats for a far greater variety of plants, invertebrates, amphibians, mammals and birds than could be accommodated in a single pond. Pond complexes provide a protective network whatever the climate or however the ponds mature. If one pool becomes unsuitable, plants and animals can colonise another.



Create pond complexes with different depths and surface area. This will increase the range of wildlife attracted to the site, and provide habitats in all climate conditions.

Shallow Bank Angles

Make sure that almost all pond slopes are shallow, less than 1:5 (12°) and preferably less than 1:20 (3°), and create broad undulating wetland areas or drawdown zones around and between ponds. The shallow water area (less than 10 cm deep) is the richest area for wetland plants and invertebrates, and is also valuable for amphibians and wading birds.

Don't Plant Up

New waterbodies often support distinctive communities and uncommon species during their early successional stages. Cutting this phase short by adding plants or animals may therefore work against conservation objectives. Moreover, planting up can bring in unwanted invasive species like Australian swamp stonewort *Crassula helmsii*.

Protect Ponds from Disturbance

In areas of public access, design new pond schemes to minimise pressure from people and their pets on wildlife - including fish introduction and dog bathing - by creating some waterbodies away from paths and with protective buffers, such as scrub or brambles. These will also provide valuable refuges from predators for pond animals.



Pond complex on old gravel and clay extraction site near Peterborough – one year after creation, this site supports at least three stonewort species, including the Nationally Scarce clustered stonewort *Tolypella glomerata*, which is typically found in new ponds or those with fluctuation in water levels

Photo: Jim Fairclough

For more information on pond design, construction and management, have a look at the Pond Creation Toolkit, which is freely downloadable from Pond Conservation's website (www.pondconservation.org.uk/millionponds).

How the Minerals Project Can Support You...

The potential for pond creation on minerals sites, as for other priority BAP habitats (Davies *et al.* 2006), is currently not being met. One problem is that it can be difficult to include details about such small features as ponds on planning applications and restoration plans, so ponds are effectively dwarfed by other landforms and large-scale habitat schemes.

The Minerals Project aims to address this situation by promoting pond creation as a habitat restoration tool, and by providing technical advice and support to enable minerals stakeholders to apply best practice principles to pond creation, including:

- Free technical advice at sites with potential for pond creation at any stage of minerals development (i.e. at planning application stage, during the active phase, the restoration phase or at sites already restored).
- Training courses.
- The Pond Creation Toolkit, including minerals-specific factsheets, case studies and BAP species dossiers.
- A Pond Digging Fund, developed in partnership with Biffaward, for retro-fitting ponds at sites already managed for nature conservation.
- The BAP species web tool, which is designed to encourage the creation of new pond sites near to existing pond-associated BAP species populations, to facilitate natural colonisation and spread. For a potential pond creation site, the web tool provides a list of pond-associated BAP species within 1 km or 5 km of the site, and gives information on the ecological requirements of those species in new pond creation schemes.

...And What You Can Do to Help Improve the Pond Resource

As professional ecologists and environmental managers, there are several ways in which you can contribute to achieving the targets of the UK Pond HAP. Whether you're working on minerals sites, other development sites or in the wider countryside, you can:

- Report pond creation schemes either directly to the Minerals Project Officer, or through the reporting form on the website: www.pondconservation.org.uk/millionponds/reporting
- Download the Pond Creation Toolkit and design clean water ponds for wildlife.
- Use the BAP species web tool to target pond creation for threatened species.
- Identify Priority Ponds at risk on development sites and seek enhancements or compensation such as the creation of pond complexes.

The Pond Creation Toolkit and the BAP species web tool are both freely available at www.pondconservation.org.uk/millionponds

Case Study: wildlife ponds on minerals sites in the Lower Windrush Valley

Background

The Lower Windrush Valley (LWV) in West Oxfordshire has been transformed by minerals extraction over the last 60 years, with large areas of the riverside pasture transformed into a mosaic of open water. There are now over 50 lakes in the valley created through the flooding of gravel pits, and the number continues to increase. A total of 20 existing ponds on former minerals sites within the LWV were surveyed by Pond Conservation for wetland plants and macroinvertebrates, to identify the wildlife value of the ponds, the factors linked to this, and the added value that ponds bring to restored minerals sites.

Twelve of the ponds were essentially 'wildlife ponds' either located on nature reserves or country parks or on sites where the main lake was used for angling but the ponds themselves had no economic use. Seven ponds were used for angling activities and one was used for leisure activities.

Biodiversity value of the ponds

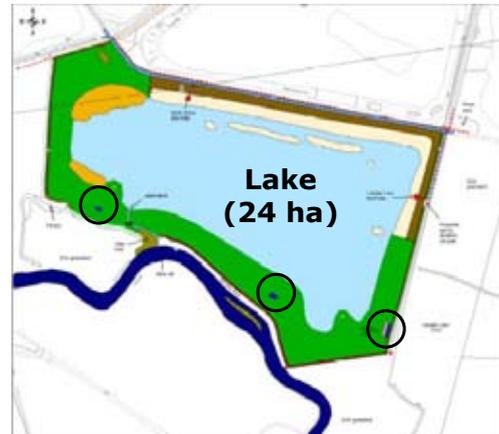
The ponds were all valuable for wildlife, regardless of their size, age or permanence. Overall, 90% of the ponds surveyed were Priority Ponds under the UK BAP, and 85% supported at least one Nationally Scarce plant or macroinvertebrate species.

The LWV ponds surveyed also supported distinct assemblages to those of the gravel pit lakes, contributing to regional (gamma) biodiversity. This is because they offer a different physico-chemical environment to lakes:

- They can dry out occasionally or annually, removing large predators such as fish.
- They are more heterogeneous than lakes, offering a lot of edge habitat.
- They are shallower and therefore the water warms faster in spring.
- They are little wave-washed compared to larger waterbodies.

The ponds effectively complement the larger, deeper lake habitat. At Standlake Common Nature Reserve (see figure),

a former gravel pit was restored to nature conservation and three small ponds (c. 50, 150 and 250 m²) were created as part of the restoration process. Collectively, these four waterbodies supported 116 species of macroinvertebrate (not including Diptera). Almost half (40%) of these were only recorded from the ponds, showing how even small ponds can add value to a site by providing a different kind of habitat to the lake. One of these small ponds supported 61 species of macroinvertebrate, almost as many as the 24 ha lake (70 species)!



Standlake Common Nature Reserve gravel pit lake (24 ha) and three small ponds (50 to 260 m²), which contribute considerably to the overall diversity of the site (Plan courtesy of Alison Hopewell of the Lower Windrush Valley Project)

Why are the LWV ponds so good for wildlife?

The patterns observed in the study suggest that the most important factor relating to pond biodiversity was water quality. The ponds were fed mainly by groundwater (usually a relatively clean water source) or by surface water draining clean, semi-natural catchments. The ponds with the best water quality tended to support exceptional communities of wetland plants and macroinvertebrates. In addition, the LWV ponds benefit from high ecological connectivity with surrounding freshwater habitats such as rivers, streams, ditches and lakes.

References

- Davies AM (2006) *Nature After Minerals – How mineral site restoration can benefit people and wildlife*. The RSPB, Sandy.
- Davies B, Biggs J, Williams P, Whitfield M, Nicolet P, Sear D, Bray S and Maund S (2008) Comparative biodiversity of aquatic habitats in the European agricultural landscape. *Agriculture, Ecosystems and Environment* **125**: 1-8.
- Environment Agency. (2009) *Water Framework Directive Classification* [Internet]. Available from: www.environment-agency.gov.uk/research/planning/34383.aspx [Accessed 20th April 2010].
- Fairclough J and Nicolet P (2008) Best Practice for the Identification and the Assessment of UK BAP Priority Ponds. *In Practice* **59**: 29-33.
- Nicolet P, Williams P and Hopewell A (2008) *Ponds on aggregate sites: creating opportunities, reducing barriers*. Pond Conservation, Oxford.
- Williams P, Whitfield M, Biggs J, Bray S, Fox G, Nicolet P and Sean D (2004) Comparative biodiversity of rivers, streams, ditches and ponds in an agricultural landscape in Southern England. *Biological Conservation* **115**: 329-341.

Williams P, Whitfield M and Biggs J (2008) How can we make new ponds biodiverse? A case study monitored over 7 years. *Hydrobiologia* **597**: 137-148.

Williams P, Biggs J, Crowe A, Murphy J, Nicolet P, Weatherby A and Dunbar M (2010) *Countryside Survey Technical Report No. 7/07, Ponds Report from 2007*. Centre for Ecology and Hydrology/Pond Conservation.

Acknowledgements

The Minerals Project is funded by Natural England through Defra's Aggregates Levy Sustainability Fund and is supported by the British Aggregates Association and the Minerals Products Association.

Correspondence: mryan@pondconservation.org.uk

Letter from Member - A Year On: Observations on the 2009 Cheshire Habitats Regulations Judgement

Greg Carson CEnv MIEEM
Ecology Network Ltd

The High Court judgement in June 2009 on the Cheshire Bryancliffe case has been hailed as a benchmark decision for conservation. Finally, it appeared that the true spirit of the Directive had somehow metamorphosed into a concrete direction irrespective of the woolly (no pun intended) wording of our domestic legislation.

Irrespective of whether one agrees with the interpretation of His Honour Judge Waksman QC, there is little doubt that, where European Protected Species (EPS) are known to be present, the judgement serves as a wake-up call to consultants, developers and, in particular, local planning authorities.

However, somewhere between a documented bat roost, and a completely sterile area of tarmac, there are many areas which may, or may not, accommodate EPS. While the Cheshire judgement may be adopted in 'spirit', the extent to which its 'letter' may serve to safeguard EPS in a wider context, is debatable.

Background

An excellent summary of the case was published by Penny Simpson in the December 2009 issue of *In Practice*, and the details will not be repeated here. Suffice to say that in February 2008, the Local Planning Authority (LPA) granted permission for the demolition of a property known to contain a small pipistrelle roost, and its replacement by a larger property. This decision was subsequently and successfully challenged by a local resident, Mr Woolley. The main issue hinged upon the interpretation of Regulation 3(4)¹ of the Conservation (Natural Habitats, &c.) Regulations, 1994, which states that: '...every competent authority in the exercise of any of their functions, shall have regard to the requirements of the Habitats Directive so far as they may be affected by the exercise of those functions.'

Alongside Planning Policy Statement 9 (Biodiversity and Geological Conservation), Circular 06/2005 *Government Circular: Biodiversity and Geological Conservation - Statutory Obligations and Their Impact Within the Planning System*, issued by the Office of the Deputy Prime Minister², sets out how wildlife legislation impacts upon the land use planning system, and provides guidance on interpretation. The Circular was a key document in this case.

It is assumed that the judgement applies equally in Wales, since the provisions of the Circular are replicated in Paragraph 6.3.6 of Technical Advice Note 5 (Nature Conservation and Planning) with the requirement to consider the 'three tests' made even more explicit.

The Relevance of Circular 06/05

For many years, the implementation of Article 16(1) has been a thorny issue for government and its agencies. The three tests, as clearly specified within the Directive, have been translated into domestic legislation, but the assessment of whether each has been met has been thwarted with difficulties, in terms of responsibilities and definitions.

Within the judgement and the case behind it, there are three points that stand out:

1. that Waksman's interpretation on 'have regard to' was steered largely by the requirement within Para 116 of Circular 06/05;
2. that in the particular development proposal, bats were known to be present through a previous survey; and
3. that the planning officer failed to make any mention of the requirements of the Directive/Regulations in the report to the Committee.

Up until the case was determined, Regulation 3(4) was widely interpreted in a more 'relaxed' fashion. The acknowledgement of licensing provisions and/or incorporation of the requirement for survey/mitigation by means of

condition, would have been deemed to be a sufficient measure of compliance, and defensible upon third party challenge. Indeed the defendant (Cheshire East Borough Council) in the Cheshire case claimed that this duty need go no further than noting the existence of the Directive, the bats and stating that a licence would be required.

That Waksman linked Regulation 3(4) inextricably with the Circular is key, since it effectively 'elevates' the Circular in terms of its degree of materiality (in effect giving it a quasi-legislative status)³. At this point, it is important to reiterate that Waksman may have been left floundering in his interpretation of Regulation 3(4) had it not been for Paragraph 116 of the Circular. Our attention is therefore drawn to the other provisions of the Circular and the bearing that these may have on EPS conservation. As mentioned above, where the presence of EPS has not been demonstrated, the judgement may not be so helpful. Perhaps the most critical part of the Circular is Para 99. To our delight, it boldly states that: 'it is essential that the presence or otherwise of protected species, and the extent that they may be affected by the proposed development, is established before the planning permission is granted.'

However, in the same breath the Circular goes on to say that: 'bearing in mind the delay and cost that may be involved, developers should not be required to undertake surveys for protected species unless there is a reasonable likelihood of the species being present and affected by the development.'

The key elements of the latter paragraph are 'reasonable likelihood', coupled with the requirement that, if present, the EPS will be (or at least are 'reasonably likely' to be) affected. Sadly, neither the judgement nor the legislation provides an indication of what constitutes 'reasonable likelihood': if a proposed development is within 100 m of a cluster of eight hitherto unsurveyed ponds near Derby, a developer would be hard pushed to claim that there is no 'reasonable likelihood' of great crested newts (GCN) being present. Irrespective of costs and delays, the

consenting body would expect the application to be accompanied by a survey.

But what if the proposed development is some 300 m from a single pond in Newton Abbot? Best practice may require that a survey be undertaken. However, there is a difference between 'best practice' and the minimum compliance required by law and/or policy. In the latter example, whether there is a 'reasonable likelihood' of GCN being present is not so clear cut, and a Local Authority (LA) ecologist may be hard pressed to insist upon a survey, especially where the applicant ticks the 'no' box in response to protected and priority species on the planning application form.

Natural England to the Rescue?

It initially appears that the Circular offers salvation at this point. Paragraph 98 of the Circular states that LPAs should:

1. consult [Natural England] before granting planning permission;
2. consider using conditions/obligations to secure the long term protection of the species; and
3. advise developers that they need to comply with species legislation.

I have highlighted the word 'consider' above, since its absence from the first and last requirements would imply (in a quasi-legal sense), that the actions within points 1 and 3 are obligatory. In other words, when faced with a grey area situation such as described above, the verdict on 'reasonable likelihood' may be provided by Natural England (NE), which after all, is in a strong position to do so, being the government advisor on the matter.

The process may however, at that point, break down. The agency is under considerable resource pressure and this may be exacerbated should there be a change of administration by the time this is published. In many regions, unless a proposed development coincides with a statutorily protected site, NE simply will not respond to planning consultations. Indeed, at the March 2010 IEEM GCN conference in Brighton, NE clearly stated that it will not comment on applications submitted without relevant protected species surveys. So in considering potential likelihood of protected species, there is a 'catch 22': the LPA may need the advice of NE to assess whether an application submitted without a survey may have a 'reasonable likelihood' to affect EPS, but NE will not comment on applications unless they are accompanied by such a survey!

In his judgement, in relation to fulfilling the derogation requirements (the 'three tests')

Waksman stated that: *'if it is unclear to the authority whether the requirements will be met it will just have to take a view whether in all the circumstances it should affect the grant or not'* (Paragraph 27).

Is it unreasonable to extrapolate from the consideration of the derogation tests? In other words, if it is unclear to the authority whether or not there is a 'reasonable likelihood' that protected species are present, would it suffice for the LPA to just 'take a view' on the matter...?

Procedure

It is very clear that the judgement which led to the quashing of the planning permission was based upon failure of procedural elements in consideration of the application. Having deemed the decision as unlawful, Waksman stated that the Court did not need to consider whether by considering the requirements of the Directive/Regulations more fully, the outcome would have been the same.

Interestingly however, Waksman did point out that the planning witness agreed that there were no imperative reasons of overriding public importance and that the retention of the structure was an alternative to its demolition.

This raises a question in relation to the grounds upon which NE issued the licence following the granting of planning permission. It perhaps stresses that although the Circular clearly states that: *'planning permission per se does not authorise development to proceed in contravention of any of the provisions of regulations 39 or 43'* it remains the case that once permission has been granted, it is very difficult (although by no means unheard of) for NE to refuse to issue a licence.

The Need for a 'Shake-Up'

It would seem, therefore, that where EPS are known to be present, so long as the LPA consults NE (irrespective of whether they elicit a response), and follows clear procedures in considering and reporting on the three derogation tests, it remains immune from third party challenge on the Regulation 3(4) issue, and indeed robust in the event of an appeal should permission be refused.

However, where there is no concrete evidence of EPS presence, the situation may not be so straightforward.

It is evident from the judgement that LPAs who are not equipped with the appropriate ecological expertise may run a significant risk of being over-cautious on the issue, thereby leaving themselves open to successful challenge by the

applicant. Conversely, the LPA may fail to request survey detail where there is a 'reasonable likelihood' of EPS being present, consequently leading to an incorrect assessment of the derogations and potential judicial review. But it is not just the input of LA ecologists that is required. In the long term, it is also critical that local record centres are integrated into the planning process, since the data they provide has the potential to make an important contribution in establishing 'reasonable likelihood'.

However, real safeguard will only be achieved through some fundamental changes to the land use planning system: at present, it is not illegal to undertake development without planning permission. Consequently, there remains a window for the less scrupulous developer to apply for retrospective permission, by which time potential EPS may have been adversely affected.

Natural England states that the use of conditions to request protected species surveys should only be used in exceptional circumstances⁴. In other words, the LPA needs to make a decision on whether a survey is required or not, and if required, insist that survey is undertaken prior to planning consent. Such an approach overcomes the inherently flawed 'survey prior to development' condition. However, as intimated in the Circular, the development project cycle from acquisition to implementation does not often coincide with the seasonality of and/or frequency required for EPS survey. It is therefore likely to take another legal challenge based upon non-determination, before LPAs will be confident in insisting upon robust surveys prior to determination.

The author thanks Mick Green for his comments on the draft of this paper.

Notes

¹ Now Regulation 9(5), The Conservation of Habitats and Species Regulations 2010

² aka Defra Circular 01/2005

³ Government circulars provide non-statutory advice and guidance on particular issues to expand on subjects referred to in legislation (see www.pas.gov.uk/pas/core/page.do?pageId=12335)

⁴ 'Protected Species Standing Advice'. Presentation by Louise Bardsley at the March 2010 IEEM GCN conference in Brighton

Correspondence:
greg@ecologynetwork.co.uk

Ecology Legal Update

Further Important Caselaw for European Protected Species; and the New Conservation of Habitats and Species Regulations 2010

Penny Simpson

Environmental lawyer specialising in legal issues relating to the natural environment, DLA Piper UK LLP

There are two important developments to cover in this edition:

1. A High Court judgment in the case of 'Morge' (*Vivienne Morge v Hampshire County Council* dated November 2009); and
2. The Conservation of Habitats and Species Regulations 2010.

1. Morge

This was a judicial review case that went to the High Court. Vivienne Morge, a local resident with legal aid, judicially reviewed a decision by Hampshire County Council to grant planning permission for a new bus route along a disused railway from Fareham to Gosport. Bats were present at the site. The judicial review case was brought on both Habitats Directive and Environmental Impact Assessment (EIA) grounds.

The resident lost the case at the High Court but there are some significant observations on interpretation of some of the European Protected Species (EPS) offences by the judge which I examine below.

Since the High Court judgment, the case has been appealed to the Court of Appeal. However, frustratingly, although the Court of Appeal hearing took place in March 2010, its judgement has at the time of writing not yet been handed down. This case therefore may need to be the subject of further comment in the next edition of *In Practice*, depending on what the Court of Appeal says!

a. Observations on the EPS offence of 'deliberate disturbance'

How significant does the 'deliberate disturbance' have to be?

In my last article in the December 2009 edition of *In Practice* I discussed the 'deliberate disturbance' EPS offence under (what used to be) Reg 39(1)(b) of the Conservation (Natural Habitats, &c.) Regulations 1994 (now Reg 41(1)(b) of the Conservation of Habitats and Species Regulations 2010). This offence has been the subject of a number of changes over the years but in its current form it is an offence to 'deliberately disturb wild animals of an EPS' and 'disturbance includes in

particular any disturbance which is likely to (a) impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young; or (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate; or (b) to affect significantly the local distribution or abundance of the species to which they belong.'

I commented in my last article that in the absence of the statutory guidance from the Secretary of State (or the appropriate nature conservation body with the Secretary of State's approval) envisaged under the Conservation Regulations, the offence had to be read as potentially covering any disturbance, not just disturbance that is significant. Despite the fact that this guidance was expected last summer, it has still not arrived.

Morge however has now thrown some helpful judicial light on this question; and I would now hope that, as soon as we have the Court of Appeal judgment through, there would be no further delay to the statutory guidance being issued.

Although the judge did not analyse the offence in great detail himself and indeed was expressly reluctant to do so, he did refer to and effectively endorse the comments on the disturbance offence of the EU Commission's 'Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC' dated February 2007: '*...This does not exclude however some room for manoeuvre in determining what can be described as disturbance. It would also seem logical that for disturbance of a protected species to occur a certain negative impact likely to be detrimental must be involved. ...In order to assess a disturbance, consideration must be given to its effect on the conservation status of the species at population level and biogeographic level in a Member State ...For instance any disturbing activity that affects the survival chances, the breeding success or the reproductive ability of a protected species or leads to a reduction in the occupied area should be regarded as a disturbance in terms of Art 12. On the other hand, sporadic disturbances without any likely*

negative impact on the species, such as, for example, scaring away a wolf from entering a sheep enclosure in order to prevent damage, should not be considered as disturbance under Art 12' (bold is my emphasis).

The judge also said that one had to note and bear in mind that there is no 'significant' qualification under the disturbance offence, but logically, having regard to the aims of the Habitats Directive, for disturbance of a protected species to occur a 'certain negative impact likely to be detrimental' must be involved.

This means that there is now case law authority (albeit only High Court which is not strictly binding but which will still be very useful) that the deliberate disturbance offence is to be regarded as focusing on disturbances which (in my words) (i) do not have to be 'significant' but (ii) still have to be likely to be detrimental to the animals in a way which threatens their conservation/survival. One could well say that any difference between (i) and (ii) would be splitting hairs! I certainly would find it difficult to think of a scenario where (ii) applies but (i) does not. However perhaps what it does mean is that you should add a little extra caution to your analysis of the facts before you, so as to err on the side of caution in relation to assessing the impacts of any disturbance on the species you are considering.

In relation to the facts of Morge, the judge noted that the bat report had concluded that 'with successful mitigation, the long term impact on bats of the works is anticipated to be slight adverse, and no significant impacts to the bats are anticipated'; and that Natural England had withdrawn its objection. He said that this was not a case where the offence of 'deliberate disturbance' was triggered.

b. Observations on the EPS offence of 'damage or destruction of a breeding site or resting place'

The judge's comments as regards the offence of 'damage or destruction of a breeding site or resting place' are to my mind a little more controversial and it will be interesting to see whether the Court of Appeal will comment on this.

The judge said that this offence is not concerned with an 'indirect' effect such as the obstruction of bats commuting to and from a roost which is not within the works footprint. Such an obstruction, he said, does not amount to deterioration or damage or destruction of a breeding site or resting place.

The judge relied, in support, on the EU Commission's guidance which states that Art 12(1)(d) is different to the other Art 12 prohibitions in that it does not 'concern directly the species but protects important parts of their habitats'. On that basis the judge said "it is unnecessary to read into Art 12(1)(d) or reg 39(1)(d) any concept of 'indirect effect' so that a busway obstructing commuting bats to and from the roost situated outside the site does not involve a breach of Art 12(1)(d) which is concerned not directly with the species but with the habitat."

Despite these judicial comments, I would (respectfully) not tend to rule out (as the judge has) as a matter of law the possibility that obstruction of EPSs could mean that their breeding sites or resting places are damaged or destroyed. In my view this is perfectly possible but would of course depend on the facts of the case. I do not myself believe that the part of the EU Commission guidance relied upon by the judge in coming to this conclusion was intended to be taken as he has read it. Nevertheless the judgment is there and, unless overruled by the Court of Appeal, will of course stand.

c. Comments on the Woolley case

The Woolley case was covered in my article dated December 2009 in the 66th edition of *In Practice*. Woolley highlighted the need for LPAs to apply the three licensing tests (imperative reasons of overriding public interest; no satisfactory alternative; and maintenance of favourable conservation status) when granting planning permission where EPS offences would be committed.

It has become apparent to me over the last few months given the number of inquiries I have had that this case has caused some genuine confusion within LPAs and others whose work involves EPSs.

One of the issues that comes up regularly is an assumption that the three tests for EPS licensing should be applied whenever EPS are relevant to a planning application. Indeed Natural England's published note on the Woolley case states this: '*Such due regard means that planning authorities must determine whether the proposed development meets the requirements of Article 16 of the EC Habitats Directive before planning permission is granted (where there is a reasonable likelihood of European Protected Species being present). Therefore in the course of its consideration of a planning application, where the*

presence of a European protected species is a material consideration, the planning authority must satisfy itself that the proposed development meets three tests as set out in the Directive.' (http://www.naturalengland.org.uk/Images/WoolleyVsCheshireEastBC_tcm6-12832.pdf)

However, this is not an accurate interpretation of the case (I have already brought this to the attention of NE). Rather, the three tests only have to be applied by the LPA when one or more of the EPS offences is likely to be triggered. If no offence is likely to be committed, for example because of mitigation proposed by the developer (and when I say mitigation, I mean mitigation and not compensation) then there will be no need for an EPS licence from the nature conservation body and similarly the LPA need not apply the three tests.

The judge in Morge has also made clear that this is the correct approach. So the key question for the LPA in Morge, in order to decide if the three licensing tests needed to be applied, was whether the proposals (after taking into account any mitigation being offered (but not compensation)) would lead directly or indirectly to 'deliberate disturbance' of the bats.

The confusion that has arisen is understandable, because the judge in Woolley did not make this point clearly. Indeed he did not need to, as the facts of that case were that a bat site was being completely destroyed. There was therefore no question in Woolley that an offence was going to be committed. There was therefore no need for the judge in that case to dwell on that issue in his judgment.

2. The Conservation of Habitats and Species Regulations 2010

The Conservation of Habitats and Species Regulations 2010 came into force on 1 April 2010.

For England and Wales (and their territorial seas) the 2010 Regulations replace the Conservation (Natural Habitats, &c.) Regulations 1994. Northern Ireland continues to be subject to the Conservation (Natural Habitats, &c.) Regulations (Northern Ireland) 1995. In Scotland the 2010 Regulations will apply in relation to reserved matters and otherwise the old Conservation (Natural Habitats, &c.) Regulations 1994 remain in force.

The main purpose of the 2010 Regulations is to consolidate and put in one place all the amendments that have been made over the years to the 1994 Regulations. In addition the 2010 Regulations contain new provisions to implement some aspects of

the Marine and Coastal Access Act 2009. Consequently one of the main changes is that all the regulation numbers have now changed.

However, there have been other small changes made to the text of various of the regulations. I have not made a comparison of the entire 2010 Regulations with the 1994 Regulations. But I have noticed one significant change to the offence of 'Breach of an EPS licence condition'.

Regulation 46A of the 1994 Regulations (now Reg 58 of the 2010 Regulations) used to say 'it is an offence for any person authorised by virtue of a licence to which this paragraph applies to contravene or fail to comply with any condition which the licence requires him to comply with.'

However, new Reg 58 of the 2010 Regulations states that 'it is an offence for the holder of a licence to contravene or fail to comply with any condition attached to the licence.'

This will be a welcome change to those ecologists who work in consultancy and who are named on their clients' EPS licences even though their clients are now the licence holders. Under the original version of the offence, the named ecologists were exposed potentially to criminal liability if a breach of the licence took place. However under the new version of the offence, it is only the licence holder who is subject to the offence. There will be no implications under that offence for the ecologist named on the licence.

Whilst this is obviously good news for consultants in that criminal liability for a breach of a licence condition is no longer an issue, there is a potential indirect negative impact. The old offence gave the ecologist good justification to report any breaches of licences by their client. They could say to their client that they had to report in order to protect themselves, a reasonable position which a client would be unlikely to argue with. I have seen this often work to persuade a client to comply. Now, however, this legal justification for an ecologist to 'blow the whistle' no longer exists. This may make it more difficult for the ecologist to blow the whistle and points even more so now to the need for the consultancy to have favourable conditions drafted into their client contracts so as to allow the ecologist the contractual flexibility to report if necessary without fear of litigation over breach of confidentiality.

Correspondence:
penny.simpson@dlapiper.com



IEEM Tony Bradshaw Best Practice Awards 2010

The Institute of Ecology and Environmental Management is pleased to announce the call for entries for the 2010 IEEM Tony Bradshaw Best Practice Awards.

Entries that demonstrate best practice whilst contributing to the five objectives of IEEM are welcomed from all ecological professionals including from the public, voluntary and consultancy sectors. Projects of any size will be considered.

At least one IEEM member must have been involved in the project.

The five objectives of IEEM are:

1. to advance the science and practice of ecology and environmental management for the public benefit in the United Kingdom and internationally;
2. to further the conservation and enhancement of biodiversity and maintenance of ecological processes and life support systems essential to a fully functional biosphere;
3. to further environmentally sustainable management and development;
4. to promote and encourage education, training, study and research in the science and practice of ecology, environmental management and sustainable development; and
5. to establish, uphold and advance the standards of education, qualification, competence and conduct of those who practise ecology and environmental management as a profession and for the benefit of the public.

Entrants will be expected to submit an entry form and then, if short-listed, to produce a poster for the IEEM Conference in November 2010.

The short-list will be announced in September 2010. A representative for each short-listed entry must be available for the IEEM conference in November 2010. The awards will be presented at the conference dinner.

The deadline for entries is 2 July 2010.

For more information and an application form please visit: www.ieem.net/awards.asp



IEEM Spring Conference 2010: Ecosystem Services

Nick Jackson AIEEM
Education and Professional Development Officer, IEEM

IEEM's spring conference took place on 24 March 2010 in London. The aim of the conference was to provide delegates with a much better understanding of the whole ecosystem services concept. Speakers presented the application of ecosystem services evaluation into mainstream ecological practice using examples of recent case studies from the terrestrial, marine and freshwater sectors.

IEEM was very pleased to welcome **Professor Robert Watson**, Defra's Chief Scientist, to give the opening keynote address at the conference. Professor Watson introduced the concept of ecosystem services and explained what is meant by the ecosystems approach. He spoke about Defra's publication *Securing a Healthy Natural Environment: an Action Plan for Embedding an Ecosystems Approach* (2007) which sets out the steps Defra have taken (and will take) to mainstream the ecosystems approach into policy. He also talked about valuing ecosystem services in decision-making, ecosystem services and climate change, and developing an evidence base.

The next speaker was **Diana Pound MIEEM** from Dialogue Matters. Diana gave a talk entitled 'The Eco- What Approach?' which outlined some of the fundamental differences between the values and methods of the 'ecosystem services approach' and the '(Convention on Biological Diversity) Ecosystem Approach'. These sound the same but are from two quite different paradigms. One has its roots in environmental economics and the other in integrated management and systems thinking. Diana's presentation explored these and other differences and drew attention to some potential hazards with the ecosystem services approach.

Stewart Clarke, from Natural England, considered the major issues in implementing the ecosystem approach in practice and outlined a new initiative where Natural England are testing an

ecosystem service focused approach to land and water management in three upland pilots. The 'Delivering Nature's Services' programme was explained and is being carried out in Bassenthwaite catchment in the Lake District, the Southern Pennines, and uplands in south west England (Dartmoor and Exmoor). It demonstrates how a collaborative approach can deliver an environment resilient to future change and can unlock new mechanisms for funding.

Laurence Jones, from CEH Bangor, gave the next presentation which described the work he has been doing as part of the SENSOR FP6 project to produce a software tool for policy-makers in Brussels to assess the sustainability of future EU policies. The software basically modelled the impacts that changes in land use or changes in the socio-economic conditions would have on the environment, using indicators relating to ecosystem services. This approach allowed assessment at multiple levels – spatially, regionally and at EU level.

Gary Grant MIEEM finished off the morning session with a presentation about delivering ecosystem services through ecological networks. He outlined a project he was involved with in south east Wales, partnered with the Welsh Assembly Government, the Countryside Council for Wales, Environment Agency Wales, Wales Environment Link, AECOM and Forest Research. Green Infrastructure provides ecosystem services, which have an essential role to play in sustainable development, enhancing quality of life and adaptation to climate change. The network includes the Valleys Regional Park and the rivers flowing south as well as proposed links between existing sites such as grasslands, heathlands, bogs, woodlands and plantations. The network was devised using GIS mapping to identify existing 'core areas' (usually designated sites) which are surrounded by 'buffer zones', where habitats can be restored. Finally, 'green connections' were proposed, to build the network.

Claire Brown, from the UK National Ecosystem Assessment (UK NEA), gave the first presentation after lunch on the UK NEA and presented some initial

findings. The UK NEA is the first analysis of the UK's natural environment in terms of the benefits it provides to society and its continuing prosperity. The assessment began in mid-2009 and will be reporting its findings in early 2011. It is an inclusive process involving individuals and institutions with a wide range of perspectives, in government, academia, NGOs and the private sector. Some of the provisional findings are mentioned below:

- Provisioning services have increased since WWII – more land and intensification.
- More timber and food produced in the last decade than any other time last century.
- Key supporting services (nutrient cycling), regulating services (pollination and soil quality) and cultural services (change in landscape) have all been impacted.

Claire also outlined how IEEM members can contribute to the UK NEA by taking part in the peer review and stakeholder consultations; and also by providing a case study (the management of ecosystem services or trade-offs that have occurred between ecosystem services). Further information can be found at <http://uknea.unep-wcmc.org>.

Mel Austen, Head of the Plymouth Marine Laboratory 'Sea and Society' Team (which covers policy and commercially-related research), spoke on marine ecosystem services. Mel outlined how valuing (monetary or non-monetary) marine ecosystems and their biodiversity can be a route to assessing their socio-economic importance. Quantifying how societal benefits are impacted by different marine management options requires fundamental understanding of the underlying biodiversity/ecosystem function/ecosystem service relationships and of the impacts of anthropogenic activities, as well as global change impacts (climate change, ocean acidification, overfishing) on these relationships.

Kerry Lock, Berks Bucks and Oxon Wildlife Trust, gave the next presentation on the subject of vulnerability of flood plain meadow communities to flood storage. She used the case study of

Chimney Meadows Nature Reserve (250 acres) which sits on a 1,700 km² flood plain in the upper Thames catchment. Floodplains are an important human asset in terms of the ecosystem services they provide, including winter flood storage. Chimney Meadows boasts rare floodplain meadow communities including meadows with some Sites of Special Scientific Interest (SSSI) status. These communities require specific hydrological requirements and would therefore be at risk if flood storage were to occur out with the natural winter flooding period. Kerry's presentation focused on data collated during and subsequent to one major summer flood event in 2007 and a further two in 2008. These data demonstrated declines in species richness and abundance, providing an insight into the vulnerability of these floodplain communities to such stochastic events and flood storage out with the natural winter flooding period.

Simon Potts, from Reading University, gave a presentation on valuing and managing pollination services for UK agriculture. He said that pollinators provide a key ecosystem service supporting the productivity of many crops and reproduction of wildflowers. The value of pollination services to UK

agriculture is estimated to be at least £440 million per year and without interventions, continued declines in both managed and wild pollinators will ultimately impact on food production and farmer livelihoods. The cost of replacing this service through alternative methods such as hand pollination is expected to be more than £1,500 million annually and so does not present a viable alternative. However, the cost of halting the loss of pollinators, and even reversing the declines, through targeted habitat management is estimated to be £7-10 million per year. Simon's conclusion was that protecting pollinators is therefore the best option for ensuring sustainable delivery of pollination services now and in the future.

The last presentation of the day was a 'double act' from **Peter Glaves MIEEM**, Environmental Management Lecturer at Northumbria University, and **Dave Egan**, Economist at Sheffield Hallam University. They spoke about using and valuing ecosystem services via demonstration pilots in the East of England. These pilots are looking at how ecosystem services can practically input into planning and other decision-making processes at local, regional and sub-regional levels. So far six pilot studies applied ecosystem

services to regional planning, sustainable catchment management, coastal planning, regeneration and green space planning and local urban development. The pilots have shown that an ecosystem services approach can be used for a wide range or purposes from environmental planning to linking grey and green infrastructure, to reviewing future development options and tackling public health and social deprivation agendas.

The presentations from this conference are now available on the IEEM website (www.ieem.net/ieemspringconference2010.asp). I would like to thank all the speakers for their time and presentations and hope that the delegates found it a useful and interesting day.

IEEM's next conference is taking place on 2-4 November 2010 in Dun Laoghaire, Ireland (IEEM's first annual conference overseas!) and will be entitled 'Biodiversity Beyond 2010: Missed Opportunities, New Targets'. Further details and the programme will be available on the IEEM website shortly.

Correspondence: nickjackson@ieem.net

Greetings from the New CEO

*Sally Hayns
Chief Executive Officer, IEEM*

Hello! I am delighted to be joining IEEM as Chief Executive and look forward to meeting as many members as possible at future conferences and events.

My own background is probably best described as that of somebody who has made a career out of communicating ecological concepts. Following my Masters in Ecology from the University College of North Wales (UCNW), Bangor I have worked primarily for environmental charities, first as a tutor for the Field Studies Council and subsequently for organisations such as the Wildfowl and Wetlands Trust, Thames Chase Community Forest, Learning through Landscapes and, most recently, as Head of People and Wildlife for Hampshire and Isle of Wight Wildlife Trust. In between, I managed to squeeze in six years in the public sector working for the City of London Corporation at Epping Forest on the London-Essex border.

In each case I have been passionate about the need to communicate an understanding

of how the natural world works and how human activity impacts on natural ecosystem processes. I intend to bring that passion to bear on your behalf at IEEM. As the world (somewhat slowly!) faces up to the need to protect biodiversity and manage finite resources more effectively, ecologists and environmental managers are under intense pressure to come up with solutions to such problems - and fast. As your professional body I believe that IEEM should be a champion for the profession, communicating the importance of the roles we deliver and the need to develop evidence-based environmental policy and practice based on good science. I also believe that IEEM must help to inspire young people to choose our profession as a future career.

But it is a responsibility we all share. As IEEM members, whether we are from the public, private, voluntary or statutory sector, our individual and collective contributions to building a more sustainable future are going to be vitally important. By sharing our knowledge and skills and by inspiring others to join we can all help make

IEEM and our profession stronger, more widely recognised and more influential. Together we will make a difference and I look forward to sharing that journey with you in years to come.

Correspondence: sallyhayns@ieem.net



New Horizons for IEEM

Jim Thompson HonFSE CEnv FIEEM
Executive Director, IEEM

Redundancy can have its silver lining. I was interviewed for a senior post in Hampshire County Council the very day that Michael Heseltine announced the review of Local Government with the idea that the County Councils should be disbanded. Five years later, Portsmouth and Southampton had become Unitary Authorities, and I became the victim of the Hampshire policy of 'downsizing by top slicing'. And so started 14 years with IEEM.

IEEM in 1996 was a very different animal – 700 members, one full-time member of staff (me), and services provided by the Nature Conservation Bureau in Newbury under Paul Goriup and his staff. It was characterised by bags of enthusiasm and genuine belief in the cause and these traits are still evident in the members today. Two weeks after my start, IEEM received a writ in the High Court for defamation. It also included three people closely associated with the Institute at the time. Little could I have guessed that almost two years later the legal battle would still be raging, I would have made several High Court attendances and paid over considerable sums in barristers' fees. Little had I imagined that I would actually have prepared the notices for IEEM to go into bankruptcy. There was eventually a settlement but it was costly and it set back IEEM for quite a significant period. Little could the several members of Council have known that they would then be asked to loan IEEM up to several thousand pounds of their own money – just to survive. But survive we did and in a gesture of huge commitment to the future of IEEM and the profession, the loans from members and other sources were agreed. All were repaid a good time ago.

Legal battles over, it was time to set up our own HQ and the offices in Winchester were secured in 1998. But resources were stretched. Servicing all of the Committees took me a good 25% of my time so other opportunities were limited. Anna Thompson came in firstly on a part-time basis and our two mothers stuffed many an envelope despite both being in their eighties. Pat Rae also gave some invaluable voluntary help. Membership numbers started to grow and we were able to start the process of further staff expansion with the key appointments of Joel Bateman, Nick Jackson, Linda Yost and Jason Reeves.

The banner headline for the very first *In Practice* in 1991 had been 'Yet another Professional Institute!' The need for IEEM was not uniformly appreciated with one correspondent predicting that it 'would die out in a mess of club tie pins, conversaciones and bogus academic titles.' Well, we have never had an IEEM tie – although it has been suggested, our conversaciones have tended to be rather popular sessions in conference bars and having just been awarded the suffix FIEEM I am reluctant to regard it as bogus.

But how would you describe an IEEM member? How do professional ecologists compare in appearance with other professions? Readers of *In Practice* will have noticed that this point often features in the musings of Basil O'Saurus. Stereotypes perhaps but some are easily recognisable – mustard cords for the land agent, perhaps a bow tie or a purple shirt for the architect or planner, a dark suit for the accountant, perhaps a stripe or two for the lawyer – note also the male domination. But what of ecologists? Beards, sandals, shorts, anoraks – surely no longer and so 60s. But times have moved on and the anorak is now North Face and the sandals Merrill. Looking around at an IEEM conference dinner, the picture is mixed – some suits, jackets, dresses, some field gear, a reasonably young

audience – well that's how they look to me and probably 50% female so it's a really good mix. Will there ever be a black tie dinner for IEEM members I wonder, or is that a professional step too far?

One of the annual highlights has been the annual conference – it is quite astonishing to see how attendance has grown over the years. Conference location has also generated a good deal of discussion over the years. It was long felt that as professionals, university campuses were not really suitable for IEEM conferences and as members always wanted such events to be out of the survey season, this inevitably meant term time when campus accommodation was not generally available. IEEM members also did not seem to want to pay very much but wanted to be all under the same roof if possible.

But solutions were at hand – large run down hotels in sometimes run down coastal resorts in November – and there were such bargains to be had! My first introduction to IEEM conferences was the celebrated Grand Hotel, Margate. This was actually a Butlin's Hotel complete with Red Coats, indoor bowls and other diversions. One conference report from Margate said 'I would rather have camped in a field than stay in that hotel'. Becoming the conference organiser in those early days, I suspect I was sometimes offered one of the better rooms and so did not always appreciate the anguish caused by the faulty plumbing or erratic heating experienced by some Council members or even the occasional President!

There is little doubt that IEEM has some very remarkable and talented members. And one of the most pleasant aspects of joining IEEM was to remake contact with some who I had known from my earlier research or Local Authority days. Peter Beale had supplied me with sandwich students from 1980 onwards whilst I ran the Essex Country Parks. The link to Tony Bradshaw went back even further to the time when he interviewed me as a prospective agricultural botany student at Bangor. Many other acquaintances were renewed through former links to Bangor University, Edinburgh University and Imperial College and then Essex County Council, the Lee Valley Regional Park and Hampshire County Council.

After the legal excitement there was a period of steady growth for IEEM. All the debts were cleared, we expanded the office space, we took on more staff and we reached the point in which an office move to larger premises was necessary. Although we have now contracted a little in terms of staff, this hopefully will be a temporary phase and the current offices will remain fit for purpose for some time to come.

Expansion in IEEM has been achieved on a broad front. Membership has risen from 700 to 4,000. Our finances are in robust shape. We have moved significantly towards the position that membership of IEEM is recognised as a licence to practise. The workshops have increased from six to over 100, and the conferences have expanded in numbers and attendances. The attendance at the Glasgow conference of over 400 was quite remarkable.

We have a full complement of Geographic Sections and we are now able to deal with issues over professional standards in an effective manner. There has been a significant rise in our external profile - we respond to consultations, issue position statements and are increasingly looked to as the representative voice of practising ecologists. We have improved our communications out of all recognition with *In Practice*, the website, the E-Newsletter, many printed publications and a clearly recognizable house-style. We now have strong links to a number of relevant external organisations.

Of a number of landmark events, I would pick the award of the first IEEM Medal to David Attenborough in Richmond Park and the several that have followed. There have been others: the Tony Bradshaw Best Practice Awards, the inauguration of the Society for the Environment, the Parliamentary Event jointly with the British Ecological Society (BES).



Sir David Attenborough is presented with the very first IEEM Medal in December 2006

The Society for the Environment (SocEnv) remains an important part of our activities. It gives IEEM the chance to interact with other professionals and to raise the profile of biodiversity and this is a role which only IEEM can really fulfil within SocEnv. There are currently over 5,000 Chartered Environmentalists and, across the spectrum of Constituent Bodies, IEEM has the highest proportion of its eligible members who are actually chartered. The involvement of IEEM and my personal commitment, being a member of the Board, the Management Committee, the Contracts Review Panel have been considerable. I am confident that this will prove to be worthwhile.



Alex Tait, Jim Thompson and Tim Bines with the Society for the Environment's Royal Charter

Hot off the press is the idea that we should work much more closely with the Countryside Management Association (CMA) and that this might possibly lead to a formal merger. A number of our members are also members of the CMA and that link fits in very well with our membership of the Europarc Federation – not only in the UK but also as part of the wider European environmental network.

I have long had connections with Europarc when I was once the Chair of the UK Section and so was particularly pleased that IEEM could join Europarc, a thriving network of those involved with the management of National and Regional parks including in the British Isles, the AONBs. Eurosite membership is also valuable with its emphasis on protected areas for their nature conservation value.



At the EFAEP General Assembly in Bilbao in March 2009

Another source of satisfaction has been the growth of EFAEP, the European Federation of Associations of Environmental Professionals and I am currently its Treasurer. EFAEP in the wider European scene is a mirror image of SocEnv where being alongside engineers, environmental scientists and others, IEEM acts as a champion of biodiversity issues. Both SocEnv and EFAEP signed up to the Countdown 2010 initiative of IUCN.

Some may question our European involvement but the work of many of our members hinges directly on the various Directives that have emanated from Brussels over the years. This is logical in that the environment does not recognise the boundaries of EU Member States. There will be further significant developments in climate change and biodiversity, much to watch and indeed a good number of opportunities for IEEM members.

Then there are our wider international connections. I am proud of the fact that IEEM is a member of IUCN and its UK Section. It was a privilege for me to represent IEEM at the World Conservation Congresses in Amman, Durban, Bangkok and more recently in Barcelona. Several IEEM representatives attended there and we had a joint stand with the BES. Signing the Memorandum of Understanding (MOU) with the Institute of Environmental Professionals Sri Lanka (IEP-SL) was further evidence of our growing international connections.



Signing the Memorandum of Understanding with the IEP-SL

I see the Geographic Sections as being a real focus for future growth and development within the Institute. The inaugural meeting of the Scottish Section, our first Geographic Section, actually took place as the negotiations to terminate the defamation case were in full spate. It has really been pleasing to see them established one by one up to our full complement of 11 including an all Ireland Section. But if this potential is to be fully realised there will have to be stronger support from the Secretariat than we are currently able to offer.

The longest running issue is individual Chartered Status for IEEM. The ball is now rolling and we have a green light to take this forward. It will not be an instant process. But this is almost the final piece

in the jigsaw of gaining status for our profession. With Chartered Status comes wider recognition and the prospect of increased membership.

Finally, I list below some of the bullet points where I would personally like to see progress. But that will be for the Members, Council and the new CEO to decide.

Membership

- Reach a target membership of 5,000 within two years.
- Ensure annual retention remains at a high level.
- Ensure the services we provide match the expectations of members.
- Combat any suggestion that the IEEM membership requirements are less stringent than most.
- Increase our membership in the Statutory Agencies and the NGOs.
- Approve more Chartered Environmentalists.
- Approve more Fellows.

Professional Standards

- Maintain our vigilance over professional standards and transgressions of the *Code of Professional Conduct*.
- Develop further guidelines for specific technical topics following on from the Ecological Impact Assessment (EclA) guidelines.
- Increase the Professional Guidance Series notes as more issues arise.
- Make more of the professional experience of IEEM members available as evidence based ecology.

Education

- Maintain and develop our provision of short courses.
- Continue with the Annual Conferences on relevant themes.
- Attempt to influence the alarming loss of biodiversity and conservation related courses in higher education.
- Make an effective contribution to the professional skills issue.
- Consider how accreditation might help.

External Affairs

- Increase the policy work, consultation responses and position statements.
- Increase our involvement with the Statutory Agencies.
- Increase our profile in political circles especially following the election.
- Maintain our involvement with SocEnv.
- Maintain our involvement with EFAEP.
- Increase our involvement with other organisations where merger may be feasible.
- Increase the number of MOUs with suitable bodies.

Geographic Sections

- Maintain our current complement of Sections.
- Encourage events and conferences at Sectional level.
- Provide the back up essential for Sections to thrive .

General

- Continue to develop governance procedures which are fit for purpose for an organisation of the size of IEEM.
- Continue to build up the financial reserves.
- Achieve our own Charter.

It would be foolish to imagine that all of the 14 years with IEEM have been uniformly harmonious but they have been rewarding and with never a dull period. I have said at a number of AGMs that a creative partnership between the Membership and the Secretariat is crucial for the success of such an organisation. This balance will change as the Institute grows and may already have been influenced by the recession. Those members in work are under greater pressure and have less opportunity to give of their valuable time and experience. This in turn raises the expectations on the Secretariat.



The IEEM Secretariat brushing up on identification skills

One other thing - IEEM members are not at their best with rules and regulations and free spirits abound, something that future Secretariats would do well to remember.

Finally, huge thanks are due to the IEEM staff past and present – now Carol Best, Zacyntha Dunhill-Rice, Nick Jackson, Jason Reeves, Anna Thompson and Linda Yost who, as IEEM has expanded, have taken on an increasing share of the work allowing my role to change to more of an overseeing one. IEEM has been very fortunate in having a succession of Presidents - Tony Bradshaw, David Goode, David Parker, David Hill, Sue Bell, Chris Spray, Andy Tasker and Steve Ormerod - who have each applied their own wide-ranging experiences to the benefit of IEEM both through turbulent and less turbulent times.



Jim Thompson, Andy Tasker, Sir John Harman, Tony Bradshaw, David Goode and David Parker

My thanks are due to them and the many Council and Committee members, past and present.

IEEM is in great shape and I am really pleased that strong and secure foundations have been laid for my successor, Sally Hayns, to take over. I wish her and the whole of IEEM well for the future.

Correspondence: jimthompson1@fsmail.net

Institute News

Sally Hayns, Our New CEO

Sally will be starting at IEEM on 1 June 2010 and we look forward to welcoming her.

The plan is that she and Jim Thompson, the current Executive Director, should have an overlap of a month before she takes over formally. This promises to be a very busy period and will be the start of a new era for IEEM.

Sally has already been introduced to the Society for the Environment at its last Board meeting and there was also an opportunity to meet a number of key contacts in the British Ecological Society at the recent celebration of its new headquarters in Charles Darwin House.

Steve Ormerod, IEEM President, commented: *"Sally's ecological expertise, leadership qualities, management experience, in-depth knowledge of environmental issues and policy, track-record in the NGO and government sectors, prominence in a membership organisation, and general breadth of appropriate skills, combined to make her our ideal choice."*

There is a short introduction from Sally on page 38.

Patrons

IEEM is grateful to **Dr Duncan Poore** and **Professor David Bellamy**, who have just retired as Patrons having served 10 years and eight years respectively.

IEEM is pleased to welcome two new Patrons – **Professor David Goode**, urban ecology specialist, and **Mr Chris Packham**, the TV wildlife presenter. IEEM is very pleased that both of these distinguished individuals have agreed to become Patrons.

David Goode

David Goode was the Vice President of IEEM from 1991-1993 and President from 1994-1997. He has a BSc Special Hons Geology from the University of Hull, a Postgraduate Diploma in Conservation from University College London and a PhD from the University of Hull. He has been a towering figure in the world of urban conservation for many years and was influential in the development of the subject globally including China and Chile. He is currently Visiting Professor at University College London. He is a Fellow of IEEM and a Chartered Environmentalist and a member of several learned Societies.

He is currently a consultant ecologist based in Bath and has held a series of extremely influential environmental posts, most notably with the London Ecology Unit and Head of Environment for The Greater London Authority. His career is summarised below:

2000-2004	Head of Environment, Greater London Authority
1986-2000	Director, London Ecology Unit
1982-86	Senior Ecologist, Greater London Council
1976-82	Assistant Chief Scientist, Nature Conservancy Council, London
1973-76	Principal Scientific Officer, Chief Scientist's Team Nature Conservancy Council (Edinburgh)
1969-73	Senior Scientific Officer, Head of Peatland Ecology Section, Nature Conservancy (Edinburgh)
1967-69	Scientific Officer (Peatlands), Wetlands Habitat Team, Nature Conservancy (Edinburgh).

Chris Packham

Chris Packham was educated at Bitterne Park Secondary School, Southampton and has a degree in zoology from the University of Southampton. He lives in the New Forest.

He is known for his television appearances, notably the BBC1 children's programme *The Really Wild Show* and nature photography series *Wild Shots* on Channel 4, as well as the BBC1 series *The X Creatures* and BBC2's *Hands on Nature* and *Nature's Calendar*. He was until recently the lead presenter on the BBC South region's version of the BBC local television series *Inside Out*. In June 2009 he became a presenter on the BBC2 show *Springwatch*.

With his production company, Head Over Heels, he has made numerous wildlife programmes for Discovery Channel, National Geographic, and the BBC.

Chris is an enthusiastic supporter of many wildlife, conservation and environmental charities - as President, Vice President or Patron - including the Bat Conservation Trust, the London Wildlife Trust, the Southampton Natural History Society, RSPB, Butterfly Conservation, the Hampshire Wildlife Trust, The Wildlife Trusts, the Wildfowl and Wetland Trust and the Hawk Conservancy Trust.

IEEM Goes to Ireland - Autumn Conference 2010

The 2010 IEEM Autumn Conference, 2-4 November, will be in Dun Laoghaire, close to Dublin. The theme is 'Biodiversity Beyond 2010: Missed Opportunities, New Targets'. Further information about the conference will be posted on the website shortly. Offers of papers are welcome - please contact Nick Jackson (nickjackson@ieem.net) as soon as possible.

2010-2011 Subscriptions Stay Unchanged

Council considered the membership fees at its last meeting and concluded that they should stay the same for the next round of renewals. This means that they will have been maintained at this level for the last three years. Council recognised the difficulties that some members may be experiencing because of the recession and felt that this was not the right time to agree any increase.

IEEM Membership Surveys

The long awaited IEEM Membership Surveys - one for Student members and the main survey for the rest of the membership - have been circulated to members. We know it was rather lengthy so this is a big thanks to those who have responded so far - you may be the lucky winner of the prize! The results will be analysed during the course of the summer and reported in the next edition of *In Practice*.

Position Statements

At its last meeting Council approved the latest IEEM Position Statement, which is on the topic of Renewable Energy. The paper can be found at www.ieem.net/positionpapers.asp.

Direct Debit

To save hassle and in some cases money (Full and Associates), why not pay your future membership subscriptions by direct debit? The forms are available from the members' section of the website (www.ieem.net/members.asp) and should be returned by 16 July 2010.

Students

If you are changing address at the end of term please let us know. Mail delivered to halls of residence and student flats is rarely forwarded.

New Fellows

Council at its meeting on 2 April 2010 approved four new Fellows bringing our total up to 43.

Colin Shawyer

Colin Shawyer is an ornithologist but particularly known for his work on owls and was Director of the Hawk and Owl Trust for 11 years. Since 1999 he has headed the Wildlife Conservation Partnership specialising in ornithological matters. He has numerous related publications and books, particularly on barn owls and aimed at a more popular readership.

Peter Beale

Peter Beale is a Founder Member of IEEM and has served on the Training, Education and Career Development Committee (as Chair), Council and currently sits on the Membership Admissions Committee. He has had a very varied career starting with river authorities and then moving on to local authority work before becoming a lecturer at Seale Hayne College. He has run his own consultancy since 1991, specialising in farm environmental enhancements, and owns and manages an area of heathland in South Dorset. He has undertaken numerous advisory roles including training advisor to the Danube Delta Biosphere Reserve.

Eirene Williams

Also a Founder Member, Eirene Williams is well known to IEEM members and has been the Vice President, Chair of the Professional Affairs Committee, member of the Finance and General Purposes Committee, will shortly be joining the Membership Admissions Committee and is a Board member of the Society for the Environment. She has had a long career in teaching in various capacities, most notably in countryside management at Seale Hayne College but also at other locations in the UK and Malawi and is also a practising farmer. She has a considerable list of publications and has served in a wide variety of outside capacities relevant to the work of IEEM and countryside management.

Jim Thompson

Jim Thompson is the current Executive Director of IEEM and has been in post since 1996. Apart from his work for IEEM, he had previously worked in research on wind and on the effects of the environment of motorways on plants used for landscaping. This was followed by 15 years in Local Government in Countryside Management and Recreation including Essex County Council, the Lee Valley Regional Park and Hampshire County Council. He had played a significant part in the development of the Europarc Federation in the UK, the Society for the Environment and the European Federation of Associations of Environmental Professionals.

Staff Changes

IEEM is pleased to welcome **George Knights** as a temporary intern as Operations Assistant. George has been helping with

the membership survey, workshop bookings, maintaining the job adverts on the website and a number of other issues related to the marketing of the Institute. He has a BSc in Environmental Science and an MSc in Environmental Assessment and Management from the University of East Anglia.

We are sorry that **Tanya Waring** has left IEEM after having worked on a part-time basis to assess how IEEM might meet the needs of its students, the various courses that are relevant to the needs of IEEM members, and also to work on a contract for the Field Studies Council. Tanya will be working at the University of Portsmouth and part-time for Atkins as a consultant.

We are also sorry to report that **Jill Sutcliffe** left her post as the Ecological Skills Gap Project Officer in March. This project, a vital piece of work for IEEM, is now being reviewed and it is hoped that a report will be presented to the next Council on the way forward. This topic remains high on the IEEM agenda with reports of the closure of courses at the University of Sussex and the University of Bristol, both of which have informal links with IEEM, and have provided a number of student members but more importantly graduates who meet the needs of the market place.

As reported on pages 39-41, this is the last edition with **Jim Thompson** as the Executive Director.

Obituaries

Michael Woods

IEEM is very sad to report the passing of Michael Woods who was a longstanding member of IEEM. He is perhaps better known for his work with the Mammal Society, which he served for 27 years and where there were many tributes paid to him. He was Chair of the Mammal Action Youth Group (1982-1999), Vice Chair of the Society (1999-2003) and Chair (2003-2009).

He recognised that raising the profile of mammals was important for conservation. He believed in the importance of equipping youngsters with 'proper field skills' and he recognised the value in giving them the opportunity to see and experience mammals 'up close'.

Michael became a Full member of IEEM in 2002. He ran his own consultancy - Michael J Woods and Associates in Cheddar, Somerset - specialising in bats, dormice, badgers, otters, water voles, birds, reptiles and amphibians. All members of the consultancy are Full or Associates members of IEEM.

IEEM would struggle to match his enthusiasm for Mammal Society surveys and their engaging titles. There was 'Battitudes' (a survey of member's attitudes and knowledge of bats) and 'Rattitudes' but it was the 1997 survey 'What the cat brought in' that turned up such a major response, and revealed the extent and range of species (mammal, bird and amphibian) that domestic cats were responsible for catching.

Janet Slattery

IEEM has learned with regret that Janet Slattery CEnv MIEEM, Environmental Specialist of J B Barry and Partners in Ireland, has passed away after a long illness. She was the mainstay of the Environmental Group of the company, particularly in the Transportation Section.

Janet became a Full member of IEEM in November 2005 and until about a year ago, had served on the Committee of the Irish Section. She was particularly involved with Environmental Impact Statement (EIS) work and was well known to IEEM members in Ireland.

Irish Section News

In December 2009, IEEM partnered with BirdWatch Ireland and the Institute of Environmental Management and Assessment (IEMA) to organise a one-day conference on Appropriate Assessment held at the Royal Dublin Society. The conference was sponsored by the National Parks and Wildlife Service (NPWS) and Environmental Protection Agency (EPA) and officially launched the NPWS guidelines on Appropriate Assessment. The event booked out very quickly with many members disappointed at not securing a place. A steering group will be formed to decide on the direction of future Appropriate Assessment events with a second similar conference and a series of focused workshops being proposed.

Members enjoyed an informal 'winter warmer' event held at the Wexford Wildfowl Reserve in February 2010. After an excellent talk given by Dominic Berridge of NPWS describing the history, management and wildlife of the reserve, we visited a number of hides in the reserve before departing for a fairly epic walk around The Raven. Other informal events are currently being planned and we will alert members in Ireland via e-mail when details are finalised.

Two workshops have been held to date in 2010 and have proved very popular with members and non-members.



In March 2010, a workshop on lesser horseshoe bats was held with the Vincent Wildlife Trust in Mayo (see photos) Everyone who attended now knows what an attic used by over 400 lesser horseshoe bats smells like and, by pure chance, participants got an opportunity to have a really good look at a freshly dead horseshoe bat found outside one of the sites, as well as seeing a number of torpid bats inside the sites. Lucky participants also got to take a small container of fresh droppings away with them!

Our 'bryophyte identification for habitat survey' course was held at the Field Studies Centre in Derrygonnelly at the end of April 2010, a beautiful spot with a wealth of natural habitats on its doorstep. Jo Denyer MIEEM introduced enthusiastic participants to the new field key for bryophytes, and they learnt how bryophytes can be used to distinguish habitats outside of the main

higher plant flowering season. Jo will run a two-day workshop at this location in July 2010 focusing on using keys to identify grasses, sedges and rushes. Places are still available for those of you interested.

The Committee has been approached by Gerry Clabby of Fingal County Council and Richard Nairn CEnv FIEEM of Natura with a proposal to run an event on Green Infrastructure. We hope to be able to arrange something on this topic this year. At the time of writing we are waiting for a study on Green Infrastructure by Comhar to be published in order to inform the type of event we might hold. There is a possibility of collaborating with Comhar and/or other institutes. We would encourage all members to review the Comhar study (which was due for publication in April 2010) and approach any contacts you have in forward planning departments throughout the country to discuss what is being done in your county. Proactive promotion of the vital role of our profession in forward planning is needed and the Green Infrastructure 'movement' is an excellent opportunity for ecologists to get involved at an early stage in the planning process.

Finally, for those of you who haven't done so, I'd like to ask you to complete your details on the commercial directory. To do this go to the IEEM website, click on 'Members', log in, then click on 'Commercial Directory Registration Form'. This year we aim to promote this directory to other organisations and institutes in Ireland as a way of finding an ecologist with the expertise they are looking for, but we need to get more of our members in Ireland registered first.

*Kate Harrington MIEEM
Convenor, Irish Geographic
Section*



North East England Section News

Section Meeting Report

Land use change in Northumberland from 1800s to today: lessons from agricultural history?

The NE Section met on 21 January 2010 to hear Steve Pullan CEnv FIEEM (Natural England) talk on the historical farming systems of Northumberland and their impact on land use over the last 200 years.

Steve's analysis was based upon the historical information within major regional texts written by George Culley in the 18th century and Professor Pawson in the 20th century, plus more recent Defra statistics. Steve highlighted the impact of a range of government policy changes on the land use of Northumberland. The data showed that Northumberland was dominated by pasture and livestock (and particularly beef) from 1870 to 1939 when agriculture was governed by free trade (i.e. without subsidy or interference from central government). This reflected the influence of the prevailing climate which is well-suited to grass production (notwithstanding the importance of a longstanding demand for high quality malting barley from farms on the coastal plain). The Second World War (WWII) was a period of dramatic change through government dictate. Extra land was brought into arable production and land use shifted away from grassland. Despite these changes the overall area of agricultural land fell by 126,847 ha between 1900 and 2000. In particular, 186,085 ha of grassland have been lost over this time; the fall partly compensated by increases in tilled land.

Changes in the area of tillage have (very crudely) been the mirror inverse of those seen in areas of grassland. However, changes in acreage are not the full story. The historical texts, and finer analysis

of the data, reveal a range of other changes in the types of cereal crops grown and the change from spring to winter cropping. This latter change occurred in Northumberland in the 1980s and involved mainly a switch from spring barley to winter wheat. The decline of mangles, turnips, and swedes grown as animal feed to be grazed *in situ* during the winter occurred from the 1960s and can be coupled to a decline in cattle numbers. A change to all-arable farms from mixed farms has had a widespread impact in Northumberland, but organic farming practices have also had a recent impact. Using specific farms as examples, Steve showed how crop rotations in 2009 have some similarities to those 200 years ago. For example, the rotation on Fenton Farm (at Wooler in North Northumberland) was 'wheat - barley - vegetables - wheat - grass (two years)' in the 1800s, and that under an organic regime the farm had recently returned to a mixed farming system with a 'wheat - potatoes - wheat - carrots (two years) - wheat - vining peas' rotation after a period of all-arable farming from the 1970s.

Overall, Steve's presentation showed large scale changes in land use over the last 200 years and placed more recent changes in a broader historical perspective. In some respects past changes in areas under different land uses (e.g. during periods of free trade and WWII) were, at least, as dramatic as those seen more recently. Steve finished by posing the question of how we should view current priorities in farmland ecology in the light of continuous change over hundreds of years. How can we determine a desired 'target' in the light of such historical change? Following the presentation the group moved to a local pub to continue the discussion.

*Andy Cherrill CEnv MIEEM
Committee member, North East England Geographic Section*

West Midlands Section News

The West Midlands Shadow Section has formed with a small, enthusiastic Committee.

In the last year we have undertaken a survey of members to find out their aspirations, held a 'Guerrilla Day' surveying event at RSPB's new reserve at Middleton Lakes and held an extremely successful autumn event, hosted by Arup. A presentation by Johnny Birks MIEEM challenging us to be more rigorous in mammal identification and survey techniques was followed by one from Mike Oxford MIEEM on the challenges facing planners and consultants in the planning system. Both generated lively debate.

Most recently, we visited The Wall Farm at Kinnersley on 22 April 2010 (see photo), a small family-run mixed farm on the edge of the Weald Moors. The farm has been under Countryside and Higher Level Stewardship Agreements since 1993 which have helped restore and create important wetland and grassland habitats. The farm is also of national significance for its Iron Age lowland hill

fort and boundaries which occupied a strategic position of the Weald Moors. The farm has been awarded the prestigious RSPB President's Award for its work to protect rare farmland birds, particularly wetland species.

As well as the relationship between the landscape ecology of the farm and the Weald Moors and the opportunities and perhaps challenges that agri-environmental schemes face in the future, the farm walk looked at:

- restoration of former wet grassland for wading birds;
- creation and management of species rich neutral grassland; and
- the identification and management of historic environment features.

Looking to the future, we are planning another 'Guerrilla Day' on 12 or 13 June 2010 - an opportunity to meet fellow members and contribute to local biological records - this time at Kinver Edge, an AGM on 13 July 2010 and a bat event in the autumn.



Details to follow. We are also keen to expand our activities and bring new members onto the Committee, so if you are interested, please contact Stewart Rampling at stewartrampling@countrysideconsultants.co.uk.

*Paul Cobbing CEnv MIEEM
Convenor, West Midlands Shadow Geographic Section*

Partnership News

European Federation of Associations of Environmental Professionals

EFAEP holds its General Assembly every six months and the next one will be held in Porto courtesy of our Portuguese member, APEA. On the agenda will be the approval of the 2009 accounts, the progress of the Working Groups (including the Biodiversity Working Group headed up by Mike Barker), a proposal to set up a Scientific Committee, and progress reports on the appointment of a Brussels-based Project Officer and the extension of EFAEP's office facilities in Mundo-B. EFAEP will also welcome the Society for the Environment as its first Associate Member. The work for these events is largely undertaken by Jason Reeves in his capacity as the EFAEP Co-ordinator. The event will be followed by a major climate change conference organised by the Portuguese.

Immediately after that will be Green Week in Brussels where the theme for this year will be biodiversity. It is very pleasing that EFAEP, strongly supported by IEEM, will have a stand for the very first time. This is located close to the area where the main plenary sessions will be held. The Commissioners and the President were only elected relatively recently and it will be interesting to hear what they have to say. Commissioners to watch will be Janez Potocnik for Environment from Slovenia, an economist but with an honorary DSc from Imperial College, Máire Geoghegan-Quinn from Ireland for Research, Innovation and Science who was the first woman Cabinet Minister in the Irish Government, Maria Damanaki from Greece (Crete) for Maritime Affairs and Fisheries and who has an MSc in chemical engineering, Connie Hedegaard from Denmark for Climate Action who was the Minister in the Danish Government for the Climate Change Conference in Copenhagen and Dacian Ciolos from Romania for Agriculture and Rural Development who has a degree in horticultural engineering.

www.efaep.org / www.environmentalprofessionals.eu

Europarc Federation

Europarc has just completed its move from Grafenau close to the Bavarian Forest National Park to Regensburg on the Danube. This is being hailed as a leap forward for Europarc. The Brussels office of Europarc is now likely to be shared with EFAEP in the near future and there is now also serious discussion of a merger with Eurosite. This has made some sense for a good time although their approaches and culture are somewhat different. Europarc has been marking the loss of its former President, Aitken Clark, formerly Chief Executive of the Broads Authority, and IEEM members may have seen the recent *Guardian* obituary. It has also marked the passing of Jordi Falgarona from the Spanish Section and Geraint George who was connected with the Snowdonia National Park and a driving force behind Natur in Wales. All three had contributed significantly to Europarc.

www.europarc.org

Society for the Environment

The Society recently held its last Board meeting with a full agenda. Jim Thompson will be stepping down as one of the IEEM Board members shortly and this was an opportunity for Sally Hayns to see first hand how the Society works before she takes over in June. Eirene Williams, the former IEEM Vice-President will also be stepping

down at the AGM in June and will be replaced by Robin Buxton, the current Vice-President. One of the pressing issues is to decide on a future location for the SocEnv offices. There is general agreement that a move from the current offices in Atherstone is now necessary and London is increasingly the favoured location. A number of locations are currently being examined. Chartered Environmentalists (CEnvS) will be pleased to learn that the Board decided to hold the fees for next year at current levels. Also on the agenda was the approval of revised terms of reference for its various committees, approval of joining EFAEP as an Associate and an MOU with the Environmental Institute of Australia and New Zealand (EIANZ).

SocEnv has recently started a biodiversity blog for CEnvS. IEEM CEnvS are encouraged to add to this at www.socenv.org.uk/home/sustainability/biodiversity-2010.

Enquiries from IEEM members to become CEnvS continue to arrive and Zacynta Dunhill-Rice in the IEEM office is making arrangements for the next batch of interviews. Applications to become Chartered seem to be rising across the spectrum of Constituent Bodies and it is anticipated that there will shortly be 6,000 CEnvS.

www.socenv.org.uk

International Year of Biodiversity

This year sees the creation of the First Global Business of Biodiversity Symposium (www.businessofbiodiversity.co.uk) - the largest biodiversity conference-exhibition to take place anywhere in the world to date. Its scale and content makes this the most important meeting place for governments, businesses and NGOs operating across all industrial sectors and will provide informed dialogue and debate in the run up to the Convention on Biological Diversity (CBD) COP10 in Nagoya, Japan. The conference will demonstrate to business how it is not possible to address climate change, water scarcity and human rights without considering biodiversity. It is where business will have the first opportunity to respond to *The Economics of Ecosystems and Biodiversity synthesis for business* (TEEB D3 report). The symposium will take place on 13-14 July 2010 at the Excel Exhibition Centre in London where IEEM will have a presence.

Global Biodiversity Outlook is the flagship publication of the CBD and preparations are currently underway for the production of its third edition. *Global Biodiversity Outlook 3* (GBO-3) will be formally launched later in 2010. GBO-3 will be an important vehicle for informing a variety of audiences of the importance of biodiversity and the progress made in meeting the 2010 Biodiversity Target. Information regarding the status and trends of biodiversity, both at global and regional levels, will be presented as will information regarding the progress made in mainstreaming biodiversity issues into the development agenda. There will be an emphasis on case studies that illustrate the positive actions taken to effectively conserve and sustainably use biodiversity. GBO-3 will use information provided by Parties to the CBD in their National Reports to highlight the practical actions taken to promote biodiversity initiatives. This will be supplemented by information, including biodiversity indicators, from various assessments and partner agencies.

www.biodiversityislife.net

Recent Publications



New Flora of the British Isles

Author: Clive Stace
ISBN-13: 978-0-521-70772-5
Available from: www.nhbs.com
Price: £50.00

This third edition of the leading academic British and Irish flora is the standard reference for ecologists conducting any type of habitat or vegetation survey. It should also be cited in all ecological survey reports as a reference for vascular plant nomenclature. This flora is one of the first in the world to use the new phylogenetic, largely (but far from exclusively) molecular based, angiosperm plant classification. This represents the most revolutionary shift in plant classification in the last 200 years. Consequently, there are changes to plant families and species names that ecologists need to follow.

The New Flora now includes 160 additional species, to cover 4,800 taxa. The taxonomy benefits from Professor Stace's independent and critical eye, so that it does not indiscriminately follow, for example, other works such as Sell and Murrell's multi-volume on-going *Flora of Great Britain and Ireland*. The keys have been revised in many places, from small but useful amendments, such as noting that the leaves of certain *Viola* species may be slightly pubescent, to substantial improvements to some groups, such as *Cotoneaster* and *Sorbus*. There is a useful revised system indicating species level of rarity, adding a third category, as previously only extremely rare plants were flagged. However, there is no mention of legal and/or policy protection, so Schedule 8, Red List and UK BAP species are not flagged, probably because these designations change, but then so do distributional rankings.

This review has highlighted why ecologists should buy this book as a reference; but why should they use it rather than more accessible picture guides, of which several now have some type of key? Many fledgling botanists have experienced the well-known phenomena 'lost in Stace'. It is not a beginner's book. But compared to many floras, it is remarkably user-friendly, aided by many new line drawings and leaf scans, so that the total species illustrated in whole or part reaches 1,600. The existing illustrations have been skilfully digitally enhanced, to produce much clearer images. The use of technical botanical terms is often cited as a barrier by those struggling with this book, but as with any specialist subject, it is advisable to get some training before you can expect to progress. The bottom line is that no other guide (despite what is claimed on the cover) is any where near as comprehensive, or as likely to produce a correct identification.

In the preface, David Bellamy calls for universities to urgently train more field botanists and professional taxonomists. This is a salutary note, as the New Flora has evolved with assistance from nearly 400 botanists over 25 years, of whom many are professional ecologists, but perhaps only one or two are working plant taxonomists. Clearly, ecologists have a major role to play in preserving botanical skills to support production of the next edition!

Clare O'Reilly MIEEM
 Ptyxis Ecology



The Badger (2nd Edition)

Author: Michael Woods MIEEM
ISBN-13: 9780906282700
Available from: www.mammal.org.uk
Price: £3.50

This second edition of *The Badger* is a fully revised and very well illustrated publication. Written by the late Michael Woods, it is an excellent reference source for anyone working with or studying badgers. It is a useful booklet giving basic information on Britain's best known member of the weasel family, covering natural history, behaviour, ecology, and conservation.



European Red List

Author: IUCN
Available from: http://ec.europa.eu/environment/nature/conservation/species/redlist/index_en.htm
Price: Free downloads

The *European Red List* is a review of the conservation status of around 6,000 European species (mammals, reptiles, amphibians, freshwater fishes, butterflies, dragonflies, and selected groups of beetles, molluscs, and vascular plants) according to IUCN regional Red Listing guidelines. It identifies those species that are threatened with extinction at the European level so that appropriate conservation action can be taken to improve their status. Status assessments have now been completed for mammals, reptiles, amphibians, butterflies, dragonflies and saproxylic beetles. The assessment process is currently underway for the European Red Lists for molluscs, freshwater fish and vascular plants and these are expected to be published in early 2011.



Agriculture, Biodiversity and Markets: Livelihoods and Agroecology in Comparative Perspective

Editors: Stewart Lockie and David Carpenter
ISBN-13: 9781844077762
Available from: www.nhbs.com
Price: £60.00

This book explores the range of strategies that farmers use to manage agrobiodiversity and other livelihood assets as they adapt to changing social, economic, and environmental circumstances. Chapters explore relationships between the exploitation and conservation of agricultural biodiversity and the livelihoods of agricultural communities, and evaluate the capacity of national and multilateral institutions and policy settings to support the protection and capture by communities of agrobiodiversity values. The place of ecosystem services in valuing biodiversity in the marketplace is emphasised. The book takes a comparative approach, drawing on empirical case studies from across the developed and developing worlds. In doing so, it shows how global trade and multilateral institutions bring otherwise disparate communities together in networks that exploit and/or preserve agrobiodiversity and other resources.



Connectivity Conservation Management: A Global Guide

Editors: Graeme L Worboys, Wendy L Francis and Michael Lockwood
ISBN-13: 9781844076048
Available from: www.nhbs.com
Price: £49.95

This publication argues that in an era of climate change, deforestation and massive habitat loss, we can no longer rely on parks and protected areas as isolated 'islands of wilderness' to conserve and protect vital biodiversity. Connectivity has started to expand to the regional and even the continental scale to match the challenges of conserving biodiversity in the face of global environmental change. This book brings together a decade and a half of practice and covers all aspects of connectivity planning and management. The book establishes a context for managing connectivity conservation and identifies large scale naturally interconnected areas as critical strategic and adaptive responses to climate change.

In the Journals

Sponsored by



British Ecological Society

Jim Thompson HonFSE CEnv FIEEM and Jason Reeves AIEEM

Since the early days of the fledgling IEEM and beyond, the BES financial support to IEEM in return for certain services has been very valuable and highly appreciated. One of these services - and going back to before my time - has been the reviews of the papers in the Journals of Ecology, Animal Ecology and Applied Ecology. We have always tried to select papers which we felt practising ecologists could use in their daily work or where they might find reference to a particular paper of value in a report. Basil O'Saurus also has some ideas on improvements that could be made - see page 54. As you would expect Applied Ecology has tended to get the lion's share of the coverage. All in all over 500 journal articles have received my comment or have been summarised, usually in a 200-250 word form. It has been a great exercise in keeping my grey cells turning over but I must admit to struggling from time to time to condense articles which are particularly densely written into something digestible for the practitioner.

Jim Thompson

F Bulleri and M G Chapman

The introduction of coastal infrastructure as a driver of change in marine environments

Journal of Applied Ecology 2010, **47**: 26-35

Coastal landscapes are being transformed as a consequence of the increasing demand for urban infrastructure to sustain commercial, residential and tourist activities and a variety of man-made structures, such as breakwaters, jetties and seawalls have become ubiquitous. Urban infrastructure supports different epibiota and associated assemblages and does not replace natural rocky habitats. Its introduction in the intertidal zone or in near-shore waters can cause fragmentation and loss of natural habitats. The natural patterns of dispersal of species may be modified or the establishment and spread of exotic species may be modified. Incorporating natural elements of habitat (e.g. wetland vegetation; seagrass) into shoreline stabilization can reduce ecological impacts, without impinging on its efficacy in halting erosion. Improving the ecological value of artificial structures by adding features of habitat that are generally missing from such structures (e.g. rock-pools) can contribute to mitigation of the detrimental effects of urbanization on biodiversity.

Correspondence: fbulleri@biologia.unipi.it

R Tropek et al.

Spontaneous succession in limestone quarries as an effective restoration tool for endangered arthropods and plants

Journal of Applied Ecology 2010, **47**: 139-147

The authors compared the restoration of limestone quarries by spontaneous succession with more formal approaches using topsoil, sowing fast-growing herb mixtures and planting trees. They sampled communities of vascular plants and 10 arthropod groups in limestone quarries in the Bohemian Karst, Czech Republic. They recorded 692 species with a high proportion of red-listed (10%) and xeric specialist (14%) species, highlighting the great conservation potential of the quarries. Naturally restored post-mining sites did not differ in species richness from the formally restored sites but they supported more rare species. The microhabitat cover of leaf litter, herbs and moss, were all directly influenced by the addition of topsoil during reclamation. Such active intervention should be limited to maintenance of early successional stages, instead of attempting to accelerate succession.

Correspondence: robert.tropek@gmail.com

D Lesbarrères et al.

Recovery of anuran community diversity following habitat replacement

Journal of Applied Ecology 2010, **47**: 148-156

While numerous restoration programmes for aquatic habitats and species have been carried out, there is an urgent need to evaluate their effectiveness. This paper reports on the colonization success of an anuran (frog) community across multiple replacement ponds created to mitigate large-scale habitat disturbance. The amphibian communities of eight ponds were surveyed before they were destroyed. Replacement ponds were created and the presence of amphibian species was recorded every year during the breeding period for the following four years. Species richness initially declined following construction of the replacement ponds but generally returned to pre-construction levels. Species diversity followed the same pattern but took longer to reach the level of diversity recorded before construction. Pond surface area, depth and sun exposure were the most significant habitat characteristics explaining both amphibian species richness and diversity. Similarly, an increase in the number of vegetation strata was positively related to anuran species richness, indicating the need to maintain a heterogeneous landscape containing relatively large open wetland areas. The work suggests that successful replacement ponds can be designed around simple habitat features, providing clear benefits for a range of amphibian species, which will have positive cascading effects on local biodiversity. However, consideration must also be given to the terrestrial buffer zone when management strategies are being planned.

Correspondence: dlesbarreres@laurentian.ca

J Karlsson and Ö Johansson

Predictability of repeated carnivore attacks on livestock favours reactive use of mitigation measures

Journal of Applied Ecology 2010, **47**: 166-171

Predation on livestock is one of the main reasons for low tolerance of large carnivores in many parts of the world. Measures to reduce the conflicts have been developed, but resources for using them are often scarce. If wildlife managers as well as farmers learn more about when the risk of predation on livestock is higher, they will be able to make more effective use of resources for reducing predation. The authors tested the hypothesis that the risk of predation on livestock immediately after an attack is higher on the affected farm compared with other farms in the same area. Data on sheep predation by brown bear *Ursus arctos*, lynx *Lynx lynx* and wolf *Canis lupus* in Sweden 1998-2006 were used in the analysis. On farms that were attacked, there was approximately a 55 times higher risk for a repeat attack within 12 months compared to any other farm in the same area. During the first five weeks, 63%, 60% and 50% of the repeat attacks had occurred. The authors suggest that the main mechanism behind repeat attacks on livestock is carnivores returning to the kill site to feed on carrion. Measures taken to prevent further attack within five weeks of the initial attack are likely to be more effective than permanent measures.

Correspondence: jens.karlsson@nvb.slu.se

P W Atkinson, I M D Maclean and N A Clark

Impacts of shellfisheries and nutrient inputs on waterbird communities in the Wash, England

Journal of Applied Ecology 2010, **47**: 191-199

Overexploited fisheries threaten many species that depend on the exploited resource. Shorebird populations are in decline globally and the authors describe how changing shellfishery management and nutrient inputs have had dramatic influence on waterbird

communities. *Cerastoderma edule* and mussel *Mytilus edulis* fisheries conflict with shorebirds by removing prey and increasing mortality amongst non-target benthic invertebrates. Under intense dredging pressure, evidence suggests that benthic invertebrates such as worms, with rapid growth and short-generation times, should predominate over species such as bivalves, with slower growth and longer generation times. The authors investigated the change in the waterbird assemblage in the Wash, eastern England, between 1981–1982 and 2002–2003. This period was characterized by heavy fishing pressure on mussels and cockles, ultimately leading to a crash in the mussel stocks. During the study period, the waterbird assemblage underwent a gradual change from one dominated by those species with a high proportion of bivalves or ‘other’ prey (e.g. crustaceans, fish) in their diet to those with a higher proportion of worms. Oystercatcher, knot *Calidris canutus* and shelduck *Tadorna tadorna* showed the highest levels of decline. Changes in the waterbird assemblage were significantly related to mussel and cockle stock levels and, to a lesser extent, nutrient levels. Setting annual quotas that provide sufficient food for shellfish-eating birds is essential to maintain the favourable status of this and other internationally important wetlands where shellfish are exploited.

Correspondence: phil.atkinson@bto.org

T Diekötter *et al.*

Oilseed rape crops distort plant–pollinator interactions
Journal of Applied Ecology 2010, **47**: 209–214

The EU subsidies for energy crops have recently fostered a strong increase in the area cultivated with oilseed rape *Brassica napus*. Such changes in landscape structure affect biodiversity and associated ecosystem services. Mass-flowering oilseed rape has been shown to positively affect colony growth and densities of bumblebees. The authors analysed the effects of mass-flowering crops on the abundance of long-tongued bumblebee pollinators, nectar robbing by short-tongued bumblebees (by making holes in the lower half of the corolla) and seed set in the long-tubed flowers of red clover *Trifolium pratense* in 12 landscape sectors with differing amounts of oilseed rape. Densities of long-tongued bumblebees visiting long-tubed plants decreased with increasing amounts of oilseed rape. The abundance of short-tongued bumblebees is enhanced by oilseed rape which may threaten the more specialized and rare long-tongued species and their functions. Semi-natural habitats were found to positively affect seed set in long-tubed plants indicating that they can counteract the potentially distorting effects of transient mass-flowering crops such as rape on plant–pollinator interactions in agroecosystems. Future agri-environmental schemes should recognise the value of diversification to diversify pollinators..

Correspondence: tim.diekoetter@uni-giessen.de

G R Potts, J A Ewald and N J Aebischer

Long-term changes in the flora of the cereal ecosystem on the Sussex Downs, England, focusing on the years 1968–2005

Journal of Applied Ecology 2010, **47**: 215–226

This paper presents the results of 38 years of annual monitoring of the weed flora of cereal crops on the Sussex Downs. Species occurrence and weed abundance were recorded annually in June from 1970 to 2005 inclusive. Stubbles were surveyed in 1968, 1971, 2004 and 2005. Overall, 97% of fields were treated with herbicides prior to sampling, reducing dicotyledonous weed abundance by 64% and taxon occurrence by 52%. From 1970 to 2005 there was no trend in overall abundance of dicotyledons, although monocotyledons decreased by 13% relative to the early 1970s. Of 66 taxa monitored from 1970 to 2005, 18 increased, 38 rose and fell (or vice versa) and 10 showed no trend. Annuals increased until the early 1980s, when many were not susceptible to herbicides, before levelling off or declining slightly as the efficacy of herbicides expanded. Ninety-two species of dicotyledons were found on stubbles, with no significant overall change in occurrence from 1968–1971 to 2004–2005. In both

stubbles and crops, species uncommon at the start have tended to increase whereas common species have tended to decrease. The results indicate that the soil seed bank remains sufficient to enable a rapid restoration of the pre-herbicide flora where needed for wildlife conservation purposes, without ‘enhancement’, *i.e.* seeding. The means to do this are available through the UK’s agri-environment ‘in-field measures’, but these are very unpopular with farmers. Incentives need to be much improved to ensure the future conservation of the traditional arable flora.

Correspondence: twyneham1@btinternet.com

K Fletcher *et al.*

Changes in breeding success and abundance of ground-nesting moorland birds in relation to the experimental deployment of legal predator control

Journal of Applied Ecology 2010, **47**: 263–272

An eight-year field experiment on moorland in northern England manipulated the abundance of predators whilst maintaining consistent habitat conditions. Subsequent changes in both the breeding success and abundance of five ground-nesting bird species were monitored: lapwing *Vanellus vanellus*, golden plover *Pluvialis apricaria*, curlew *Numenius arquata*, red grouse *Lagopus lagopus scoticus* and meadow pipit *Anthus pratensis* and the abundance only of snipe *Gallinago gallinago* and skylark *Alauda arvensis*. Control of fox *Vulpes vulpes*, carrion crow *Corvus corone*, stoat *Mustela ermina* and weasel *Mustela nivalis* reduced the abundance of fox (-43%) and crow (-78%); no changes were detected in already low stoat or weasel abundances. Reductions in foxes and crows led to an average threefold increase in breeding success of lapwing, golden plover, curlew, red grouse and meadow pipit. Predator control led to subsequent increases in breeding numbers (14% per annum) of lapwing, curlew, golden plover and red grouse, all of which declined in the absence of predator control (17% per annum). Considerable sums of public monies are currently spent on habitat improvement for conservation and some of these public funds should be used to underpin habitat works with predator removal.

Correspondence: kfletcher@gwct.org.uk

I Bartomeus, M Vilà and I Steffan-Dewenter

Combined effects of *Impatiens glandulifera* invasion and landscape structure on native plant pollination

Journal of Ecology 2010, **98**: 440–450

The authors tested the hypotheses that (i) the invasive plant *Impatiens glandulifera* outcompetes native plant communities for pollinators, and (ii) pollinator abundances depend on landscape structure, but are modulated by this mass-flowering invader. They selected 14 study sites in riparian habitats along a landscape gradient with decreasing proportion of natural land cover. Within each site paired invaded or non-invaded plots were studied. They performed standardised surveys of pollinators and established experimental plots by adding *Raphanus sativus* to assess the impact of *I. glandulifera* on visitation rates and seed set. *I. glandulifera* received higher visitation rates than simultaneously flowering native riparian plants and the experimentally added native *R. sativus*. However, visitation rates to the native plant community showed no significant differences between invaded and non-invaded plots, with the exception of honeybees, which slightly increased their visits in invaded plots. The presence of *I. glandulifera* reduced bumblebee visitation to *R. sativus* plots, but had no significant effects on seed set. The authors found enhanced visitation rates of bumblebees in intensively used agricultural landscapes. However, in the presence of *I. glandulifera* this landscape effect was masked by bumblebees being highly attracted to *I. glandulifera* stands independent of the structure of the surrounding landscape. Wild bees and hoverflies were not affected by landscape structure, but, as also the case with bumblebees, they were principally affected by the immediate community flower abundance.

Correspondence: nacho@creaf.uab.es

J L Denyer, S E Hartley and E A John

Both bottom-up and top-down processes contribute to plant diversity maintenance in an edaphically heterogeneous ecosystem

Journal of Ecology 2010, **98**: 498-508

Both top-down and bottom-up influences, such as grazing herbivores and edaphic factors, may maintain species-rich vegetation by preventing dominant plants from reducing diversity. This paper reports on the manipulation of access by small and large vertebrate herbivores on an edaphically heterogeneous site. The authors investigated whether: (i) grazing and soil properties interacted in their impact on vegetation, (ii) the effects of herbivores on different plant functional groups depended on soil properties, and (iii) small and large herbivores were functionally equivalent. Treatments allowed mixed rabbit and livestock grazing, rabbit grazing only or no grazing and were replicated within three areas differing in vegetation, soil nutrient availability and pH. Soil properties, plant species composition, vegetation height and above- and below-ground biomass were measured after 6 years. Soil properties and grazing explained 42.1% and 9.2% of the variability in species composition between plots, respectively. Grazing enhanced the impact of soil properties on the plant community by preventing dominance by *Ulex europaeus* and maintaining differences in species composition between the areas. Grazing removal caused graminoid abundance to increase in the area where grasses were the dominant functional group, but to decrease in other areas. Rabbit grazing pressure did not increase in plots ungrazed by livestock but where this occurred there was an improvement in forage quality and increasing access to plots by rabbits.

Correspondence: e.a.john@sussex.ac.uk

I M Smallegange *et al.*

Tits on the move: exploring the impact of environmental change on blue tit and great tit migration distance

Journal of Animal Ecology 2010, **79**: 350-357

In response to warmer spring conditions in Central Europe many migratory bird species have shifted their timing of breeding. Environmental change has also led to warmer winters, shortening the distance between the breeding grounds of migratory birds and their overwintering areas. The paper shows that in response to warmer winters, blue tits *Cyanistes caeruleus*, but not great tits *Parus major*, breeding in Germany decreased their migration distance between 1964 and 1996. In a nest box population in southern Germany, both species laid their first clutch earlier with increasing spring temperature, but over the study period (1974–1999) blue tits showed a significant and stronger advancement in laying date than great tits. For both species, selection for earlier breeding did not vary with environmental change, indicating that early laying pairs did not do better than later laying pairs as spring temperature increased. Blue tits in the nest box population were single-brooded and such species are likely to advance their laying date to match timing of reproduction with the advancing food peak in spring. This might be one reason why blue tits adjusted their migration strategy as closer proximity to the breeding grounds in winter allows better prediction of the onset of spring. Ten per cent of great tits successfully produced second broods and their first clutch laying date is a compromise between first and second clutch laying date, which might be why great tits had not advanced their laying date nor altered their migration strategy.

Correspondence: i.smallegange@imperial.ac.uk

A Holzschuh, I Steffan-Dewenter and T Tschamtko

How do landscape composition and configuration, organic farming and fallow strips affect the diversity of bees, wasps and their parasitoids?

Journal of Animal Ecology 2010, **79**: 491-500

In a two-year study, the authors analysed the relative importance of changed landscape composition (increased areas of cropped habitats), reduced habitat connectivity and reduced habitat

quality on nest colonization of cavity-nesting bees, wasps and their parasitoids. They selected 23 pairs of conventional and organic wheat fields in the centre of landscape circles (500 m radius) differing in edge densities (landscape configuration) and % non-crop habitats (landscape composition). Standardised trap nests were established in the field centres and in neighbouring permanent fallow strips. Factors at all three scales affected nest colonization. While bees were enhanced by high proportions of non-crop habitat in the landscape, wasps profited from high edge densities, suggesting that wasps are enhanced by connecting corridors. Colonisation of herbivore-predating wasps was lower in field centres than in fallow strips for conventional sites, but not for organic sites, indicating a fallow-like connectivity value of organic fields. Local and landscape effects on parasitoids were mainly mediated by their hosts. A specialist parasitoid was more sensitive to high land use intensity than its host, whereas generalist parasitoids were less sensitive. The conversion of cropland into non-crop habitat may not be a sufficiently successful strategy to enhance wasps or other species that suffer more from isolation than from habitat loss. Habitat connectivity appeared to be enhanced by both higher edge densities and by organic field management.

Correspondence: a.holzschuh@agr.uni-goettingen.de

A Zurbuchen *et al.*

Long foraging distances impose high costs on offspring production in solitary bees

Journal of Animal Ecology 2010, **79**: 674-681

Solitary bees return to their nests several times a day with pollen and nectar to provision their brood cells. They are especially susceptible to landscape changes that lead to an increased spatial separation of suitable nesting sites and flower rich host plant stands. While knowledge of bee foraging ranges is currently growing, quantitative data on the costs of foraging flights are very scarce, although such data are crucial to understand bee population dynamics. In this study, the impact of increased foraging distance on the duration of foraging bouts and on the number of brood cells provisioned per time unit was experimentally quantified in the two pollen specialist solitary bee species *Hoplitis adunca* and *Chelostoma rapunculi*. Females nesting at different sites foraged under the same environmental conditions on a single large and movable flowering host plant patch in an otherwise host plant free landscape. The number of brood cells provisioned per time unit by *H. adunca* was found to decrease by 23, 31 and 26% with an increase in the foraging distance by 150, 200 and 300 m, respectively. The number of brood cells provisioned by *C. rapunculi* decreased by 46% and 36% with an increase in the foraging distance by 500 and 600 m, respectively. The results of this study clearly indicate that a close neighbourhood of suitable nesting and foraging habitats is crucial for population persistence and thus conservation of endangered solitary bee species.

Correspondence: andreas.mueller@ipw.agr.ethz.ch

E F Graneke *et al.*

Ecosystem Services as a Common Language for Coastal Ecosystem-Based Management

Conservation Biology 2010, **24**: 207-216

Ecosystem-based management of coastal ecosystems, which lie at the interface between marine and terrestrial ecosystems and provide an array of ecosystem services to different groups, is logistically and politically challenging. Estimating the provision of ecosystem services under alternative management schemes offers a systematic way to incorporate biogeophysical and socio-economic information and the views of stakeholders in the policy and management process. Employing ecosystem services as a common language to improve the process of ecosystem-based management presents both benefits and difficulties. The authors use a case study to illustrate its potential.

Correspondence: graneke@pdx.edu

W Nentwig, E Kühnel and S Bacher

A Generic Impact-Scoring System Applied to Alien Mammals in Europe

Conservation Biology 2010, **24**: 302-311

The authors present a generic scoring system that compares the impact of alien species among members of large taxonomic groups. The scoring can be used to identify the most harmful alien species so that conservation measures to ameliorate their negative effects can be prioritised. The authors assessed impact reports for all alien mammals in Europe. Impact was classified as either environmental or economic, with each group further subdivided into five subcategories (environmental: impact through competition, predation, hybridization, transmission of disease, and herbivory; economic: impact on agriculture, livestock, forestry, human health, and infrastructure). All categories had impact scores that ranged from zero (minimal) to five (maximal possible impact at a location), which were added together to calculate 'potential impact' scores. 'Actual impact' scores were calculated by multiplying potential impact scores by the percentage of area occupied by the respective species in Europe. The authors then correlated species' ecological traits with the derived impact scores. Alien mammals from the orders Rodentia, Artiodactyla, and Carnivora caused the highest impact, with the brown rat *Rattus norvegicus*, muskrat *Ondatra zibethicus*, and sika deer *Cervus nippon* scoring highest overall.

Correspondence: sven.bacher@unifr.ch

V Stelzenmüller, J R Ellis and S I Rogers

Towards a spatially explicit risk assessment for marine management: Assessing the vulnerability of fish to aggregate extraction

Biological Conservation 2010, **143**: 230-238

Managing anthropocentric activities in the marine environment increasingly requires spatially explicit risk assessments that link the occurrence and magnitude of a pressure to information on the sensitivity of the environment. The authors developed a spatial risk assessment framework for the UK continental shelf assessing the vulnerability of 11 fish and shellfish species to aggregate extraction. They calculated a sensitivity index using life-history characteristics and modelled species distributions on the UK shelf. They mapped sensitivities to aggregate extraction by merging sensitivity indices and predicted species distributions. The highest sensitivity in the case study occurred in coastal regions, and where nursery and spawning areas of four important commercial species occur. Scallop, lobster and queen lobster scored the highest sensitivities, whilst turbot, whiting and plaice were the least sensitive. The authors add that their spatially explicit risk assessment framework can be applied to other ecosystem components and pressures at different spatial scales and is therefore a promising tool that can support the sustainable development of marine spatial plans.

Correspondence: vanessa.stelzenmuller@cefas.co.uk

C B Embling *et al.*

Using habitat models to identify suitable sites for marine protected areas for harbour porpoises (*Phocoena phocoena*)

Biological Conservation 2010, **143**: 267-279

Being highly mobile, the harbour porpoise represents a considerable challenge in the context of using Marine Protected Areas for conservation. The shelf waters off the west coast of Scotland were identified as the location for possible Special Areas of Conservation (SACs) as the area has year-round presence, high density in comparison to surrounding areas, and a high young to adult ratio in summer. The authors conducted surveys over three summers in the southern Inner Hebrides and used generalised additive models to predict areas of high relative density for each year. Distribution was best explained by maximum tidal

current, with higher densities predicted in areas of low current, and the same high density areas were predicted year-on-year. Perimeter-to-area ratio was used to identify which areas should be considered as a basis for designating SACs for harbour porpoise.

Correspondence: c.b.embling@abdn.ac.uk

J Wretenberg, T Pärta and Å Berg

Changes in local species richness of farmland birds in relation to land-use changes and landscape structure

Biological Conservation 2010, **143**: 375-381

The study tested the hypotheses that an increase in the area of low-intensity land-use on arable land (e.g. set-aside fields and short-rotation coppice), and high or increased farmland habitat heterogeneity, may halt or reverse the decline of farmland birds. This was done by undertaking farmland bird censuses during two contrasting periods of agricultural policies and land-use (1994 and 2004) in a farmland region covering a gradient of forest-to farmland-dominated landscapes in Sweden. Local species richness declined significantly between 1994 and 2004 and was positively related to habitat heterogeneity in both years but temporal change in species richness was not. Local change in species richness was positively associated with a change in the proportion of low-intensity land-use forms, but also to changes in the amount of spring-sown crops. However, the effect of low-intensity land-use was significantly dependent on the amount of forest in the surrounding landscape. An increase in low-intensity land-use was linked to an increase in species richness at sites located in open farmland surroundings but to a decrease in richness at sites located in forest surroundings. The results reiterate that conservation measures of farmland biodiversity have to be put in a landscape context.

Correspondence: Ake.Berg@cbm.slu.se

R A Griffiths, D Sewell and R S McCrea

Dynamics of a declining amphibian metapopulation: Survival, dispersal and the impact of climate

Biological Conservation 2010, **143**: 485-491

This study describes how climatic factors influenced the dynamics of a great crested newt *Triturus cristatus* metapopulation over 12 years through interactions with survival, recruitment and dispersal. Mild winters and heavy rainfall were linked to low annual survival at the regional level. Survival varied between years but not between subpopulations. However, the four subpopulations studied were largely asynchronous in their dynamics. Three out of the four subpopulations suffered reproductive failure in most years, and recruitment to the metapopulation relied on one source. Variation in recruitment and juvenile dispersal was therefore probably driving these asynchronous population dynamics. These observations are consistent with models that predict that two subpopulations will have an extinction risk of >50% if adult survival falls below 30% in combination with low juvenile survival. Intermittent recruitment may therefore only result in population persistence if compensated for by relatively high adult survival. Mild winters may consequently reduce the viability of amphibian metapopulations. In the face of climate change, conservation action may be needed at the local scale to compensate for reduced adult survival and would need to include management to enhance recruitment, connectivity and dispersal.

Correspondence: R.A.Griffiths@kent.ac.uk

News in Brief

New Countryside Survey reports published

The Countryside Survey reports from the 2007 survey have recently been published for Soils, Headwater Streams and Ponds in Britain. Examples of the key findings described include: no change in soil carbon concentration (0-15 cm), broadly positive changes to the ecological status of headwater streams and ponds were widely degraded. The reports and the data which underpins them can be downloaded from the Countryside Survey website at: www.countrysidesurvey.org.uk

Scottish badger population estimated at around 9,000 clans

The Scottish Badger Distribution Survey, conducted by the charity Scottish Badgers, confirmed that important habitats for badgers in Scotland include woodland and farmland, but badgers are also present on Scotland's most barren moorlands, coastal sites and urban areas. Their geographical distribution is also widespread, with badger presence confirmed from the far north-west of Sutherland, south to the Isle of Arran and into the Border region.

New vision for the English National Parks and the Broads

A new Circular gives policy guidance for all those whose decisions or actions might affect the National Parks and the Broads. This will include, amongst others, government departments, government agencies, local authorities and public bodies of various kinds. The Circular is available at www.defra.gov.uk/rural/national-parks/index.htm and sets out the Government's views on various issues and explains how it intends to use powers which have been given to it in legislation. It is a formal statement of Government policy and may be referred to in, for example, planning inquiries but it is not law and public bodies are not obliged to follow its advice; but they might be seen to be acting unreasonably if they ignored it and/or acted differently unless they gave sound reasons for doing so.

UK Mammals Grants

The People's Trust for Endangered Species is inviting applications from voluntary conservation organisations, scientific researchers, individuals and consortia, needing financial support for work that relates to the

conservation of mammals in the British Isles and Eire, to apply for funding of up to £30,000 through their UK mammals grant programme. The trust aims to fund scientific research, practical habitat management work, reintroduction and monitoring programmes and educational projects. The deadline for applications is 22 November 2010. www.ptes.org/index.php?cat=89

Bats in the UK: a way to find out whether they migrate?

Stable hydrogen isotopes in metabolically inert tissues such as hair provide a set of markers that are useful for establishing migratory connectivity in animals. Ana Popa-Lisseanu, from the Leibniz Institut in Germany, is currently using this technology to find out more about bat migration. Over 3,000 hair samples from four species (*Nyctalus noctula*, *Nyctalus leisleri*, *Pipistrellus nathusius* and *Vespertilio murinus*) have been sent to Ana from all over Europe. So far, however, she has no samples from the UK. In order to rectify this, any members involved in trapping bats this summer could ask for an add-on to their licence in order to send some hair samples to Ana. This could help determine whether and what migration there is between the UK and mainland Europe. Get in touch directly with Ana for more information: Anapopa@izw-berlin.de.

Offshore windfarms to help pay for air defence

A pioneering deal under which the wind farm industry will spend at least £16 million on advanced radar defence systems has cleared the way for a significant boost in the UK's supply of renewable energy. Wind energy projects across Britain have been held up before because of concerns over interference from turbines that can baffle air-traffic control and defence systems, creating blind spots in coverage known as 'blackout zones'. The radar system will be based onshore in Norfolk.

Disease threatens Britain's oak trees

Acute oak decline (AOD), which is thought to be caused by a previously unknown bacteria, causes trees to 'bleed' black fluid and kills them within five years. So virulent and lethal is the infection that foresters believe it could devastate the countryside and urban green spaces even more than

Dutch elm disease, which has killed 25 million trees in Britain since 1967. The Forestry Commission has identified 55 sites across southern England, the Midlands and East Anglia which have been infected so far. However, woodland groups believe it has already spread to many more locations. Scientists at Forest Research have identified three types of bacteria believed to be the cause of the infection, but the precise mechanism of the disease is not understood, hampering attempts to control its spread. The effectiveness of AOD in killing oaks is also exacerbated by *Agrilus* beetles, which opportunistically attack infected trees and speed their decline by boring deep into the trunk and further weakening them. One particular problem for foresters is that the method of spreading the disease, whether through the air or through animal or human contact, is unknown. The Forestry Commission is expected to announce new advice shortly about how to manage the disease while further research takes place.

Golden eagle deaths under investigation

The bodies of three golden eagles, Britain's rarest bird of prey, were found on the Skibo estate in the Scottish Highlands in early May. Police suspect that the deaths were due to poisoning and an investigation is ongoing. It is estimated that there are only 442 breeding pairs of golden eagle in the UK. They only reach sexual maturity late in life and only tend to rear a solitary chick in each brood (which may not survive). They are also under threat from habitat destruction, persecution and egg collectors.

Owls benefit from soaring vole population

According to the Forestry Commission, the tawny owl population in one of the UK's largest forests - Kielder Forest, Northumberland - is booming as a result of the harsh winter. It is believed that the large amount of snow which fell in the forest during the winter allowed voles to hide from prey and breed successfully.

Marine ecosystem impacts of wave energy installations

A recent study in *Renewable and Sustainable Energy Reviews* has shown that environmental impact studies which are conducted early on in the development of wave and tidal-power schemes allow the schemes' technology to be adapted

to consider their impacts on marine ecosystems. Although the technology is still under development, some forms are close to commercialisation. As all renewable energy installations have an environmental impact, the opportunity exists now for ecologists and engineers to work together to design wave power parks that address environmental concerns and conservation issues.

New methods for valuing intangible ecosystem services

Some 'intangible' ecosystem services, such as the aesthetic and cultural value, as well as the recreational use of land, are particularly difficult to price. New research in *Ecological Complexity* has proposed three explorative methods to value these more intangible services using landscape evaluation, statistics on level of recreational use and the price of real estate in the area. The research suggests that, for the cases in question, the soft ecosystem services may in fact be rivals to the harder services, such as conservation and CO₂ sequestration. Although a range of soft and hard services are present in both areas, hard services are not unique to any specific area, unlike aesthetic and recreational value. By exploring the three methods the research has taken preliminary steps in possible ways to evaluate these price-elusive ecosystem services and highlighted the need for planners and policy-makers to consider them in their decision-making.

Standards and initiatives to minimise biofuel impacts

New research in *Conservation Biology* has reviewed the standards and initiatives that exist to minimise the negative environmental impacts of growing crops for biofuels and recommended minimally acceptable criteria in the areas of biodiversity, agricultural practices, and mitigation of indirect land-use change. The study identified three issues which mitigation of risk should focus on: 1. Conservation of areas of significant biodiversity value. 2. Mitigation of negative effects related to indirect land-use change (ILUC). 3. Promotion of agricultural practices with low negative impacts on biodiversity.

Fall in fish stocks worse than feared

A recent study in *Nature Communications* has shown that today British fishing fleets have to work 17 times as hard to catch a given amount of fish than the largely sail-powered vessels of the late-19th century. The paper states that assessments of

fish stocks go back only 20-40 years, therefore the management targets based on them are incomplete. A more realistic assessment should look at the past 100 years or more.

Evaluating biodiversity and ecosystem services in France

A report commissioned by the French Government has calculated reference values for French ecosystems. Based on an analysis of existing literature, the report calculated minimum estimates of the value of biodiversity, based on ecosystem services it provides to society. Reference values calculated by the study include those for temperate forestry (valued at a mean of €950 per hectare/per year) and pasture land (minimum valuation of €600 per hectare/per year). Forest valuations ranged from €500-2000 per hectare/per year; values varied primarily depending on whether the forest attracted tourism or was used for recreation and on the forest management applied. These reference values can be integrated into decision-making processes, for example, into socio-economic impact assessments made prior to all large public infrastructure projects. Values quoted are the 'absolute minimum' values and can be used instead of 'zero' in public accounting of biodiversity. With further research, these values could significantly increase if more services were taken into account.

Dispelling myths around ecosystem service projects

A new study in the *Annals of the New York Academy of Sciences* has compared conservation projects that focus on promoting only biodiversity with projects that focus on promoting both biodiversity and ecosystem services. The results dispel several myths surrounding ecosystem service projects.

Myth 1 - Ecosystem service projects direct resources towards a different set of threats than biodiversity projects. The results indicated both types of projects addressed all the major threats to similar degrees. For example, 94 per cent of ecosystem service projects and 100 per cent of biodiversity projects focused on reducing habitat destruction.

Myth 2 - Ecosystem service projects veer away from investment in protected areas. However, the results indicated that the two project types encouraged the same set of conservation activities and with similar frequencies.

Myth 3 - Ecosystem service projects are unstable and potentially short-term

in nature. There was no significant difference between project types in their investments in areas such as education, community forums and workshops which all support a long-term perspective.

The study also identified additional benefits of ecosystem service projects compared with biodiversity projects. For example, ecosystem service projects target more agricultural landscapes through measures similar to the EU's agro-environmental policies. Ecosystem service projects also use a wider range of financial tools, such as carbon markets and ecotourism fees, which attract a wider range of funders, including private finance.

No single cause for mass loss of honey bees

The World Organisation for Animal Health (OIE) has stated that the huge die off of bees worldwide, a major threat to crops depending on the honey-making insects for pollination, is not due to any one single factor, adding that parasites, viral and bacterial infections, pesticides, and poor nutrition resulting from the impact of human activities on the environment have all played a role in the decline.

Mapping Europe's potential to provide ecosystem goods and services

New Europe-wide maps show the potential of landscapes to provide ecosystem goods and services over the next 20-30 years. Partly funded by the EU, the research in *Environmental Management* evaluated the relationship between the ecological properties of larger areas of land and the capacity or potential of these areas to deliver goods and services. These capacities are also known as 'landscape functions' which were classified into four groups:

1. production functions, supplying 'natural products' to people; for example, commercial forest products;
2. regulation functions, maintaining the quality of the environment; for example, water regulation;
3. habitat functions, essential for maintaining nature and biodiversity; and
4. information functions, providing people with cultural and recreational services.

Tauro-Scatology and Twitter

This issue of *In Practice* sees our special correspondent tracking down Basil O'Saurus, the IEEM's resident Professor of Tauro-Scatology, for some breaking news on scientific communication. Tell us more, Prof...

In this issue, I want to talk especially to all those IEEM members who are finding it increasingly difficult to keep up do date with the scientific literature. Some, it is rumoured, don't even have time to read *In Practice* thoroughly, such are the pressures of modern life.

Tell me about it. So you're going to give us some lifestyle coaching; some advice on how to prioritise and create more quality time so that we can fulfil our obligations for unstructured professional development?

No.

You are going to tell us about some new internet-based search engine that allows us to filter through the myriad of irrelevant papers and articles and focus on those most relevant to our work?

No.

So what are you going to do?

I'm going to relaunch the *Journal of Applied Ecology* as a Twitter feed.

Meaning what, exactly?

I'm going to force the authors of articles to distil their message down to 140 characters or less. We need to encourage them to cut to the chase. Let's face it, most of us don't get any further than reading the abstract of articles, do we?

But surely... this is dumbing down our science...

The exact opposite: I'm distilling every paper down to a manageable length. That way we can actually read more than we do at present

Doesn't this mean that you miss some of the nuances of the arguments that the authors develop?

No problem. We can find room on a server for Excel spreadsheets and PDFs with all the details, partly because a few people may actually want these details but mostly because the authors like to think that lots of readers pore over their every word. But the core communication will be via short soundbites. Much more effective.

Let's have a look at a paper that I've selected at random from a recent issue and you can explain how it all works. Volume 47, issue 2, pages 263-272: Kathy Fletcher, Nicholas J Aebischer, David Baines, Robin Foster and Andrew N Hoodless 'Changes in breeding success and abundance of ground-nesting moorland birds in relation to the experimental deployment of legal predator control.'

OK, let's take it from the top. 'Kathy Fletcher, Nicholas J Aebischer, David Baines, Robin Foster and Andrew N Hoodless' just doesn't cut it as a Twitter moniker. We need something with more pizzazz.

So what would you suggest?

The paper is about birds, there are several authors, most of them male... how about 'Game Bird Krew'? It sounds so much more urban and streetwise than 'The Game and Wildlife Conservation Trust', don't you think?

I'll leave you to run that one past them. Let's move on to the title: 'Changes in breeding success and abundance of ground-nesting moorland birds in relation to the experimental deployment of legal predator control'.

To be frank, titles are so last century. This one, for example, is 125 characters long and we only have 140 characters for our entire message. In our Brave New World, the title is the message. The irksome thing about their title is that you have to read the paper to find out what they are going on about...

...I think that was probably their intention...

...whereas, if we read on, we find that the paper explains how control of foxes, carrion crows and other predators can lead to improved breeding success of lapwing, golden plover, curlew, red grouse and meadow pipit.

So how would you put their message across?

First of all, what do they mean by 'legal predator control'? There are various options, of course, including trapping and shooting, and this is all explained in the paper. Shooting is the one that will catch the reader's attention so let's focus on that. Second, if you look at Twitter, Facebook or any other social networking sites, you'll see abbreviations and expressions being used to grab people's attention. So I would condense the whole paper down to: OMG moorland drive-by is big up for ground-nesting birds, lol.

And you honestly think that that does the same job as nine A4 pages in *Journal of Applied Ecology*?

It does for me, but then I'm not an ornithologist.

Perhaps we should let them loose on some of your work.

They're very welcome to have a go. Most of it distils down to 'different plants live in different places and I can make rough guesses about what to find where but wish I could make better guesses'. Twenty-five years of work condensed into 109 characters. Pathetic, really.

But doesn't the use of abbreviations such as 'OMG' and 'lol' mean that you risk turning applied ecology into something that our teenage children understand better than us?

Another way of looking at it is that I'm repositioning ecology to appeal to a techno-savvy generation.

Or, to be more pessimistic, we'll now have to ask our children to interpret key papers for us, as well as helping us upload music to our MP3 players and changing the ring tone on our mobiles?

Maybe. But that's life.

Suppose we applied your theory to *In Practice* too. Wouldn't that mean that you have to condense your columns to 140 characters? Why not end with a Twitter version of a Basil O'Saurus article?

OK. How about: '950 words and you, dear reader, are five minutes older and no wiser than you were at the start.' That's just 94 characters but I think it says all that I need to say.

I couldn't say it better. Thanks for yet another ground-breaking idea, Prof.

Editor's note: See page 49 for the *In the Journals* review of the Fletcher *et al.* paper.

thomson habitats

wildlife habitats fencing and traps vegetation management invasive species control

Introducing the next generation of fencing...

caudon specialist wildlife
fencing systems



- More secure
- Longer lasting
- Cost effective
- Quicker to install
- Fewer joins

Call us to see how this can help you with your project

t: 01483 466066 e: enquiries@thomsonhabitats.com

w: www.thomsonhabitats.com



01392 682401

Ecological skills courses

Acorn Ecology offers a range of short courses, that provide you with essential field skills and knowledge for CPD or to get you into that ecological job.

NEW! Certificate in Ecological Consultancy**

- Phase 1 Habitat Surveys*
- Survey Techniques for Protected Species*
- Site Assessment and Report Writing*
- Reptile Surveying and Handling*
- Dormouse Ecology and Conservation
- Badgers and Development
- Bat Ecology, Conservation and Introduction to Bat Survey Techniques
- Beginner's Botany*
- Bat Mitigation Techniques
- Introduction to Bats*

** Longer package course, includes career planning
* Beginner's courses

To find out more or book a course please visit www.acornecology.co.uk.

T Courses are held in Devon, and taught by experienced practicing ecologists.




Get ahead with Conservation Ecology and Environmental Change at BU




- Courses are delivered by experienced conservation ecologists, remote sensing and GIS specialists
- Excellent laboratory, computer facilities and state-of-the-art field equipment
- Fieldwork and research at internationally important habitats

Find out more about our courses:
www.bournemouth.ac.uk/pgenvironment

Visit us at a Discover Postgraduate Study event:
www.bournemouth.ac.uk/discover

Alternatively contact us on:
Tel: **+44 (0)1202 961916**
Web: www.bournemouth.ac.uk/askBU

First Class Ecological Contracting



THREE SHIRES LTD

- Ecological Landscaping
- Vegetation Clearance
- Ecological Fencing
- Habitat Creation

Contact the team on
01664 444 604
or email enquires@threeshires.com

www.threeshires.com




Habitat Creation

- Hibernacula
- Ponds
- Badger Setts
- Otter Holts
- Bat Boxes
- Vegetation Translocation
- Wetland, Woodland and Grassland Creation and Management

Habitat

Ecological Fencing

- Newt Fencing
- Reptile Fencing
- Snake Fencing
- Water Vole Fencing
- Badger Fencing
- Otter Fencing
- Deer Fencing
- Tree Protection Fencing

Fencing

Vegetation Clearance

- Destructive Searches
- Nesting Bird Site Clearance
- Mulching and Flailing
- Aquatic Vegetation Management
- Japanese Knotweed and Invasive Weed Control

Clearance

Ecological Landscaping

- Planting
- Seeding and Hydroseeding
- Turfing
- Aquatic Landscapes

Landscaping






Get your message out to over 4,000 professional ecologists and environmental managers.

Advertise with IEEM in *In Practice*, on the website, on the annual Wallplanner or at one of our conferences.

More information

www.ieem.net/advertising.asp

scott
cawley

Ecological Consultant

Ecologists sought to join a rapidly-growing consultancy in Dublin, Ireland.

Scott Cawley Ltd is an ecological consultancy operating in the Republic of Ireland and Northern Ireland. Services include ecological impact assessment and specialist ecological advisory services.

Candidates must have a minimum of 3 years employment experience in ecology and ecological impact assessment, (minimum of 18 months in environmental consultancy) and a degree in ecology or related discipline.

Apply by return of CV and completed application form which is available from Scott Cawley, 27 Lower Baggot Street, Dublin 2, Ireland, info@scottcawley.com.

Detailed job description also available on request.



The essential environmental management book

If you're looking for a comprehensive introduction to managing environmental issues, then IOSH's *Essentials of environmental management* is a must-have.

Clearly structured and illustrated, *Essentials* focuses on the issues and principles underpinning environmental management. It also explains why and how organisations are managing their environmental interactions at both strategic and operational levels.

For more information about *Essentials of environmental management* (£30) visit www.iosh.co.uk/books. To order your book phone +44 (0)1787 249293 and quote A28INP.

The Institution of Occupational Safety and Health,
The Grange, Highfield Drive, Wigston,
Leicestershire, LE18 1NN, UK
t +44 (0)116 257 3100 f +44 (0)116 257 3101
www.iosh.co.uk



ALID/120510/A28INP

Buy **HERPETOSURE**[®] Fencing Direct

For the first time **HERPETOSURE** Newt, Reptile, Snake and Water Vole fencing is available to ecologists and contractors as a supply only product!

Forward Order Discounts and Volume Discounts Available - Get a Quote Today

HERPETOSURE[®] Fencing



- Newt Fencing
- Reptile Fencing
- Snake Fencing
- Water Vole Fencing

Invasive Weed Solutions



- Japanese Knotweed
- Giant Hogweed
- Himalayan Balsam
- Common Ragwort
- Aquatic Invasives

Japanese Knotweed Eradication Techniques



- Herbicide Treatment
- Soil Screening
- On-site Cell Burial
- Managed & Monitored Excavation & Removal

A combination of techniques can be employed to meet site requirements

Exhibition Calendar 2010 – If you would like to attend one of our ecological contracting and invasive weed seminars please contact the team on 01664 444 660.

Blackpool: 17 March, Middlesborough: 26 May, Manchester: 16 June, Cardiff: 14 September, Bristol: 23 September

Photograph © 2007 David Green
www.natureimage.co.uk

Piper Hole Farm | Eastwell Road
Scalford | Leicestershire LE14 4SS
Telephone: 01664 444 660 | Fax: 01664 444 605
E-mail: info@herpetosure.com
www.herpetosure.com



HERPETOSURE[®] Group
Ecological & Invasive Solutions

New and Prospective Members

APPLICANTS

If any existing Member has any good reason to object to someone being admitted to the Institute, especially if this relates to compliance with the Code of Professional Conduct, they must inform the Executive Director by telephone or letter before **9 July 2010**. Any communications will be handled discreetly. The decision on admission is usually taken by the Membership Admissions Committee under delegated authority from Council but may be taken directly by Council itself. IEEM is pleased to welcome applications for Membership from the following:

APPLICATIONS FOR FULL MEMBERSHIP

Associates applying to upgrade to Full membership were listed previously for their Associate application and are not listed again.

Mr Joseph M Adamson, Mrs Liz Anderson, Mr Danny Ardeshir, Mr Steve Bloor, Miss Rachel Craythorne, Mr Thomas Hastings, Mr Simon Jennings, Mrs Kirsty S Kirkham, Mr Charles Morrison, Mr Patrick W Roberts, Mr Paul Spencer

APPLICATIONS FOR ASSOCIATE MEMBERSHIP

Mr Robert Firmin, Miss Cheryl Gogin

APPLICANTS WISHING TO UPGRADE TO ASSOCIATE MEMBERSHIP

Miss Faye M Durkin, Miss Sara J Hill, Mrs Helen Lundie

ADMISSIONS

IEEM is very pleased to welcome the following new Members:

FULL MEMBERS

Mrs Erica J Adamson, Mr Guy R Belcher, Mr Jonathan L Bramley, Dr Susie Brown, Mrs Janet E Burnell, Mr Matthew Crabb, Miss Nichola Davies, Mr Lewis J Deacon, Ms Aoife Delaney, Ms Virginia Green, Mr Matthew Harris, Mr Kevin Jay, Mr Jeremy Kinsley, Miss Tawny Lord, Dr Katherine Massey, Miss Karen A McArthur, Mr Jon H Mellings, Mr Christian Middle, Dr Kelly Moyes, Mr James M Parkin, Miss Joanna Ramsay, Mr Jonathan O Roe, Mr Thomas E Rogers, Mr David Sanger, Miss Catriona Scobie, Mrs Hayley J Scoffam, Miss Samantha Smith, Mr Vincent BT Smith, Mrs Lucy J Temple, Dr William J Trehwella, Mr Denis J Vickers, Mr Andrew P Walker, Mr Nicholas Warren, Mr Paul Watts, Dr Mark J Whittingham, Miss Nicola J Wiltshire

ASSOCIATE MEMBERS

Mr Alexander B Ash, Miss Mary Campling, Mrs Naomi Condron, Mrs Hannah M Corcoran, Dr Carys A Davies, Ms Dunia Hatuqa, Mr Kevin Johnson, Mr Nicholas Marchant, Miss Suzanne C Melhuish, Mr Thomas P Ryan, Miss Carly Smith, Prof Judith A Smith, Mr Jack Sykes, Mr Simon Trevenna, Mr James I Webster, Miss Emily R Williams

GRADUATE MEMBERS

Mr Thomas R Appleby, Mr John Atkinson, Miss Montserrat Auladell-Mestre, Miss Kate M Basley, Mr Jean-Michel J A Bellas, Miss Lucy Blades, Miss Sabrina B Bremner, Miss Helen Chance, Mr Sean Crossland, Miss Petra C Fay, Mr Daniel Flenley, Mr Russell P Goodchild, Mr Marten P Hall, Miss Charlotte Harris, Miss Amy R Hyde, Mr Maurice A Tse-Laurence, Miss Jenny Leon, Ms Lucy Lush, Miss Teresa Mackintosh, Miss Isabella McAdam, Mrs Amy McCallum, Miss Jennifer L McLarty, Mr Joseph McMinn, Ms Jacqueline N Merrick, Mr Jonathan Miller, Mr Ian Moore, Miss Caroline Mullen, Ms Siddy Parratt-Halbert, Miss Eleanor K Partridge, Miss Fiona Poulter, Miss Lisa Prickett, Miss Fabrizia Ratto, Miss Rebecca J Searle, Ms Lauren Stothert, Miss Katherine Sydney, Mr Simon Taber, Mr Ralph Tallis, Miss Clare L Tuddenham, Barry Walsh, Mr Daniel S W Ward, Miss Stacey D Waring, Miss Alexandra L Webb, Miss Elizabeth Webster, Mr Andrew Weston

AFFILIATE MEMBERS

Miss Justine W Brandon, Mr Adam J H Collinge, Miss Sophie Conway, Miss Maria A Crastus, Mr Alan E Edwards, Mrs Denise G Foster, Mr Soeren C Hoejlund, Mr Adam Jones, Miss Caroline Langdon, Mr Thomas P Seward, Mrs Delia Shannon, Ms Virginie Timothee

STUDENT MEMBERS

Mannan Ahmed, Nahid Ahmed, Miss Kathleen E Anderson, Miss Helen E Archer, Mr MD Jubaer Arefin, Mr Muhammad Asad, Mrs Megan Austin, Mr MD Ayatullah, Miss Rachel Bates, Mr MD Masum Billah, Mr Gareth Buchanan, Mr Brendan Canning, Mrs Angela Collins, Mr Matthew Dixon, Mrs Fiona J Eccleston, Mrs Elizabeth A Fagg, Miss Claire Feniuk, Mr MD. Azim Ferdous, Ms Michelle C Fielden, Ms Aisling Flanagan, Mrs Bridget Freeman, Mrs Mary Fuller, Ms Rachel H Gibson, Mr Justin Grainger, Miss Josephine Griffiths, Miss Marian Griffiths, Miss Caroline Hicks, Miss Catherine M Highfield, Miss Rachael E Iveson, Miss Helen Jameson, Mr Markus U Jaskari, Mr Jonathan Jones, Miss Sabrina Kelly, Mr MD Khan, Mr Muhammad Z Khan, Mr Justin R Lansdell, Mr Malcolm MacLachlan, Mrs Denise C Mair, Mr Richard Malin, Miss Natalie Marr, Mrs Sarah J Martin, Miss Bonnie McBride, Miss Jennifer Morgen, Mr Joseph M Mould, Miss Octavia J Neeves, Miss Ashrafun Nessa, Miss Katie O'Brien, Ms Catherina O'Keefe, Miss Joanne L Parsons, Kelli Pearson, Ms Audra Peterson, Miss Izabel R Phillips, Ms Anna Pielach, Miss Eileen F Power, Miss Kathleen G Radford, A F M Zakaria A L Razi, Mr Simon J Rimell, Mr Steven Roe, Miss Donna Scott, Mr James W Stevenson, Mrs Claire Templeman, Mr Ian A G Thornhill, Miss Sarah C Tibbatts, Othuke Ukoro, Mrs Sharmain U Wijemanna, Miss Sharon Yardy, Ms Miriam A Zemanova

UPGRADES

The following have successfully upgraded their Membership:

UPGRADES TO FULL MEMBERSHIP

Miss Sarah Allen, Mr Timothy Bradford, Mrs Deborah E Brown, Miss Caroline Chipperfield, Miss Sally M Cowley, Miss Marie S Evans, Mr Richard Finch, Mr Dominic Gane, Mr Benjamin R Gardner, Miss Laura Gore, Mr David Green, Mr Thomas I Hall, Mr Paul Hanson, Dr David Harries, Mrs Jennie Hatts, Mr Matthew J Haydock, Mr Daniel Hone, Ms Katherine A Howell, Miss Laurie Jackson, Mr Stuart Johnson, Mr Chris Kerfoot, Miss Rachel Kerr, Mr Andrew D King, Mr Kenneth J Lipscomb, Mr Lee A Miles, Ms Dervla O'Dowd, Mr Edward Partridge, Miss Hannah Procter, Mr Oliver J Ramm, Miss Lynne Richards, Mrs Joanna A Saich, Mrs Victoria J Salas, Mr Nicholas Sanderson, Miss Catherine Shields, Dr Robert J Simpson, Ms Susan Slamon, Mr Richard Smith, Mr John Sproull, Mr Andrew C Taylor, Miss Cyrise Weaire, Miss Ann M Weddle, Miss Alison M Whalley, Mr Barry Wheeler, Mrs Hazel Willmott, Dr Philippa J Wood

UPGRADES TO ASSOCIATE MEMBERSHIP

Miss Adele L Antcliff, Mrs Gaele SE Bardsey, Miss Hannah Bilston, Mr John W Bleach, Mr Adam D Bratt, Miss Jane Brinkley, Mr Antony PW Chadfield, Miss Nicola M Darwin, Mr Eamon Delaney, Mr Harry Fox, Mr Jamie T Glossop, Mr Aaron SM Grainger, Miss Ruth Gregory, Miss Rosamund Hall, Miss Sharleen Hanlon, Mr Paul Hiscocks, Miss Eszter Horvath, Miss Eleanor A Jones, Dr Kevin Linnane, Miss Frances Lowe, Miss Shona McCombie, Miss Samantha Mellor, Miss Chloe Phelan, Mrs Melissa Phillips, Miss Anna Price, Miss Victoria L Rowe, Dr Richard D Sandifer, Mr Matthew G Scott-Campbell, Miss Beth Sidaway, Miss Lorraine Smith, Mrs Jayne A Walker, Mr Mark Wingrove

UPGRADES TO GRADUATE MEMBERSHIP

Mr Thomas J Austin, Miss Natasha L Burdis, Miss Anna Duncan, Miss Jessica Frame, Miss Sara King, Miss Maeve Lee, Mr Richard Price, Miss Sarah Lloyd Williams, Miss Samantha Stark, Miss Sarah J Tree, Mr Amir Zeb

Forthcoming Events

IEEM Conferences

DATE	EVENT	LOCATION
2 - 4 November 2010	IEEM 2010 Autumn Conference - Beyond 2010: Missed Opportunities, New Targets	Dublin

For more information on conferences please visit: www.ieem.net/conferences.asp

IEEM Training Workshops

7 - 9 June 2010	Introduction to Sedges	Yorkshire and the Humber
8 June 2010	Woodland Management and Wildlife Protection	East Midlands
8 June 2010	Introduction to Wild Flower Identification	South East England
9 - 11 June 2010	Working in Rivers and Streams	Yorkshire and the Humber
10 June 2010	How to Complete an (Entry Level) Environmental Stewardship Scheme Application (Workshop 1 of 2)	South West England
10 - 11 June 2010	Calcicolous Grassland in Southern England, Botany and the National Vegetation Classification	South West England
16 June 2010	Introduction to Grass Identification	Yorkshire and the Humber
22 - 23 June 2010	An Introduction to ESRI ArcGIS for Ecologists and Ecological Consultants	South West England
24 June 2010	Accessing and Using Satellite Data in GIS - An Introduction for Ecologists and Ecological Consultants	South West England
24 June 2010	Identifying Freshwater Macroinvertebrates to BMWP Families	South West England
24 - 25 June 2010	Grassland Management, Creation and Translocation	East Midlands
29 June 2010	Coastal Vegetated Shingle	South East England
29 June 2010	Dormouse Ecology and Conservation	South West England
29 - 30 June 2010	Invasive and Non Native Plants (and Animals)	Wales
1 July 2010	How to Complete an (Higher Level) Environmental Stewardship Scheme Application (Workshop 2 of 2)	South West England
3 - 4 July 2010	Invertebrate Survey and Site Assessment	Yorkshire and the Humber
8 - 9 July 2010	Phase 1 Habitat Survey for Upland Habitats	North East England
12 July 2010	Reptile Identification, Surveys and Handling	South West England
17 - 18 July 2010	Using Keys to Identify Grasses, Sedges and Rushes	Ireland
22 July 2010	Introduction to Grasshopper Identification	South East England
2 August 2010	Fern and Horsetail Identification for Beginners	South West England
3 August 2010	Sedge Identification for National Vegetation Classification (NVC) Survey	North East England
13 August 2010	Introduction to Butterfly Identification and Basic Ecology	South East England
31 August - 1 September 2010	Otters: Survey and Mitigation	Scotland
1 September 2010	Invasive Weeds: Environmental Catastrophe or Manageable Nuisance?	South East England

For the full list of workshops and more information please visit: www.ieem.net/workshops.asp

IEEM Geographic Section Events

18 June 2010	North West England Section Event - Guided tour of the new Fishwick Local Nature Reserve	Preston
7 July 2010	North East England Section Event - Field Meeting at Saltholme RSPB Reserve	Teesside
13 July 2010	West Midlands Section AGM and Event	TBC
20 July 2010	Welsh Section Event - European Protected Species and the licensing system in Wales - focus on historic and built environment	Llandrindod Wells, Powys
1 October 2010	North East England Section AGM and Annual Conference - The River Till, floodbanks, floods and wetlands	Northumberland
4 Sept 2010	IEEM Irish Section Event – Invertebrates of <i>Succisa</i> Rich Meadow	Fermanagh

For more information on IEEM Sections please visit: www.ieem.net/geographicsections.asp