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The Society for the Environment and Chartered Environmentalist

Dr Alex Tait, MIEEM

The Home Stretch

For several years now Jim Thompson and I have been making periodic reports of meetings, discussions, negotiations and even some progress towards the creation of a new Chartered Society dedicated to the promotion of environmental professionalism. Now, at last, I can report that we are on the home stretch!

The Queen granted, at the Privy Council meeting of 6th May, a Petition for a Royal Charter from the Society for the Environment. Once this Charter has been sealed with the Royal Seal, the Society will be able to award the designation of Chartered Environmentalist. The sealing is expected to take place later this summer.

At this point, perhaps I should refresh your memories as to how we have got to this position? For many years there was a loose arrangement of professional institutes, called the Forum for Environmental Professionals, that met occasionally to discuss issues of mutual interest; about four years ago it was suggested that a more formal alliance was needed which could pursue a chartered designation for environmental professionals. The result was a new working alliance of nine professional bodies that was given the snappy title of CUBE (Chartered Umbrella Body for the Environment).

IEEM had been an active member of the Forum and your Council felt that this initiative had great potential for enhancing the role of ecologists and environmental professionals and could provide an appropriate route to chartered status for IEEM members; so the Institute became a founder member of CUBE. Jim and I (then Vice President) became embroiled in the complex, at times 'warm', but always friendly series of meetings to establish a constitution, rules and procedures for a legal entity.

SocEnv Board Members celebrate charter

All this hard work culminated in the launch of the 'Society for the Environment' by Barbara Young at the Environment Agency Conference at Stoneleigh on 23rd October 2002 and its legal incorporation in the Spring of 2003.

The Members of the Society for the Environment are:

- Chartered Institution of Wastes Management (CIWM)
- Chartered Institution of Water and Environmental Management (CIWEM)
- Institute of Ecology and Environmental Management (IEEM)
- Institute of Environmental Management and Assessment (IEMA)
- Institute of Fisheries Management (IFM)
- Institute of Professional Soil Scientists (IPSS)
- Institution of Agricultural Engineers (IAgrE)
- Institution of Civil Engineers (ICE)
- Institution of Environmental Sciences (IES)
- Institution of Water Officers (IWO)

Associate Member and Founding Constituent Body:

- Royal Meteorological Society (RMS).

The Aims of the Society for the Environment

Environmental professionals are spread across a wide range of disciplines and represented by a variety of professional bodies; as a result there is a perceived lack of an authoritative 'voice' for the environment. As a step towards meeting this need the Society for the Environment (SocEnv) aims to co-ordinate the views of its member bodies and represent these to governments, industry, the environment profession and all those it seeks to influence. However, this co-ordination will not compromise the right of any individual institution to put forward its own views, even if these differ from those presented by SocEnv.

SocEnv will also create a new professional qualification 'Chartered Environmentalist' (CEnv) and intends to establish this as the leading qualification for environmental practitioners. Through these, and other means, SocEnv will raise the profile of environmental professionals and promote best practice and the ethical behaviour of those who work in the profession.

All members of Constituent Bodies, whether or not they qualify as Chartered Environmentalists, will be encouraged to participate in the affairs of their organizations and hence, the new body itself, thus assisting in the delivery of SocEnv's aims and aspirations. In order to foster this inclusiveness the Society will seek to exploit opportunities to arrange joint meetings and activities for the mutual benefit of all members of the Constituent Bodies.

The Role of Constituent Bodies

Membership of SocEnv is open to professional bodies and learned societies with environmental practitioners within their membership; these Members are known as the Constituent Bodies. There is no individual membership

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Contents

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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.

IEEM Office: 45, Southgate Street, Winchester, Hampshire, SO23 9EH.
Tel: 01962 868626, Fax/Ans: 01962 868625.
Email: enquiries@ieem.demon.co.uk
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MEMBERSHIP
Full £100 (outside UK: £80) Associate £70 (outside UK: £55)
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Full membership is open to those with three years' experience, and Associate membership with less experience. Appropriate qualifications are usually required. Details are given in the Membership criteria. The membership year is 1st October – 30th September.

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The European Question

The European Union had its elections last week and across the board, except apparently Denmark, there was a rising tide of anti Brussels feeling.

Most ecologists and environmental managers would probably give high marks to Brussels on environmental issues – with the exception of the Common Agricultural Policy and nervousness about GM Crops. But even the CAP is looking less of threat than a few years ago.

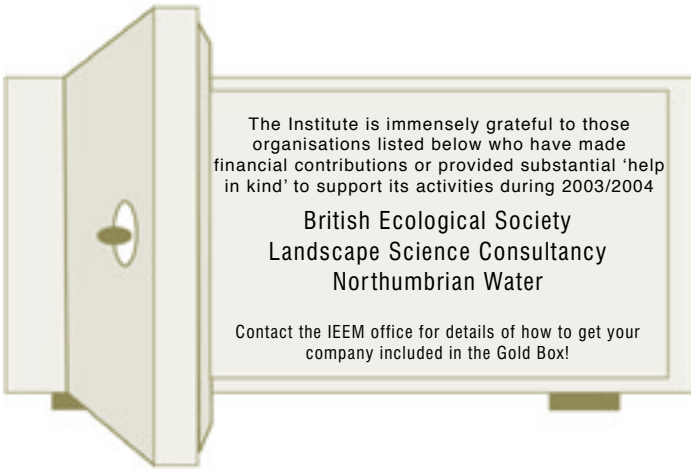
The rationale for this is of course that wildlife does not respect national boundaries: issues like bird migration, fisheries management, legislation on species such as whales, air pollution and global warming cannot be dealt with by one country alone – an IEEM readership does not need to be convinced on those scores.

Then there are all the regulations and directives and what would many IEEM members do for a living without them? It is these issues fuelling the skills argument - ecologists are in demand as never before and it's well overdue.

Why am I writing this editorial? – because I think it may be time to be a little more cautious about environmental issues and European regulations. Following the Habitats Directive, the Water Framework Directive and others, the latest of these is Strategic Environmental Assessment. There was a very interesting seminar on this in London in early June which saw the launch of a very informative guide. This dealt with how S.E.A. would be applied and the regional context in which it was applicable. Assurances were given that no, this would not be another time consuming hurdle in the way of any development and timing all depended on getting the ecological issues into the picture at the first opportunity. Well, the latter point can hardly be contested. Seeing the bigger picture must be welcome but the practical application of this significant legislation will need to be handled with care.

With record levels of employment in this country, as opposed to the situation in quite a few other European countries, arguments about environment versus jobs are somewhat muted. But there is a danger for environmentalists in the UK through championing the use of EU legislation to substitute for legislation which may or may not have eventually occurred in the UK and then saying - ah well it's a European Directive so it has to be carried through. It would be a very unwelcome turn of events if environmental issues just got swept aside in the rush for greater subsidiarity and national independence. Arguing the environmental advantages of closer European integration on the doorstep may count in some quarters but I fear not generally. So the threat of an environmental backlash needs to be watched carefully.

Jim Thompson



of the Society but full members of all the Constituent Bodies are eligible to apply for Chartered Environmentalist status.

Each Constituent Body nominates two members to the Board that governs the Society. In addition the Constituent Bodies will manage the selection and registration of Chartered Environmentalists, under the scrutiny of the Society's Registration Authority and independent auditors.

The individual identities of the Constituent Bodies will be maintained and their primacy and the centres of their excellence within their fields recognised and enhanced.

Associates

Full Membership of the Society will be confined to professional bodies and learned societies with environmental practitioners within their membership. Organisations that do not wish to become Constituent Bodies or which do not have an appropriate membership structure may become 'Associate Bodies'. Such bodies will be able to be part of the wider vision of SocEnv and participate in much of the non-charter work of the Society but will not appoint voting representatives to the Board.

Organisation

SocEnv is a company limited by guarantee and is controlled by a Board of Directors nominated from its member bodies. The Board elects a Chairman from its members and appoints committees to deal with specific aspects of the Society's work. At present it is proposed that there will be a Management Committee, to deal with the day-to-day management of the Society, particularly finance and resources, and a Registration Authority to deal with issues relating to the Chartered Environmentalist qualification.

So far, SocEnv has been funded from subscriptions paid by its founder member bodies; additional income will, in due course, be derived from the administration of its chartering activities. It is anticipated that such income will soon be sufficient to pay for the appointment of a permament Chief Executive and a small Secretariat. In the meantime a Chief Executive will see the Society through the coming transition to a Chartered Body and the establishment of the Chartered Environmentalist award process. Many of you will know the recently appointed CEO, Dr Tim Bines, who is an IEEM Council Member and a former English Nature General Manager.

Tim Bines signs as the new Chief Executive

The Board's intention is that the Secretariat of the Society will remain quite small as the Constituent Bodies will retain most of the responsibility for awarding and administering Chartered Environmentalist status.

Chartered Environmentalist

To become a Chartered Environmentalist an individual must maintain Full Membership of a Constituent Body and demonstrate (through qualifications and experience) competence, knowledge and engagement in sustainable environmental management and development. Such demonstration will include a rigorous Professional Review and will be assessed against a clear syllabus of learning. The underlying principle is that through membership of the professional body the individual has demonstrated competence in their specialist field, to achieve Chartered Environmentalist requires a further demonstration of environmental excellence.

The exact fee structure for Chartered Environmentalist has not been fixed but the current proposal is for a registration fee of £50 (for joining and the first year's fee) and £25 per year thereafter. The conduct of the Professional Review process will be delegated to the Constituent Bodies but subject to rigorous quality assurance audit. Constituent Bodies may choose to levy an administration fee for managing this process, although any such fee will be kept to a reasonable minimum. IEEM is proposing a fee of £25.00.

Grandparenting

The Society anticipates that an initial surge of applications from existing well qualified members of the Constituent Bodies would lead to a log jam of applications. Therefore, during the first year of a Constituent Body's membership of SocEnv, admission to Chartered Environmentalist status for its existing full members will be by a 'grandparenting' process. The process will admit those full members who meet the qualification criteria and can demonstrate commitment to and understanding of the principles of 'sustainability' and the Society's Code of Ethics. The grandparenting process will be kept straightforward and will involve a simple application form without the need, in most cases, for any interviews. Once the initial 'bulge' of existing qualified members has passed a more lengthy admission procedure involving interview and assessment will be instituted. Don't miss this opportunity and put in your application soon!

Qualification Requirements

Before an application for Chartered Environmentalist can be considered a candidate must demonstrate some fundamental qualifications, in broad terms:

· full voting membership of a Constituent Body at an approved grade (for IEEM a Full Member)
· at least 12 units of learning – one year of relevant study counts as two units and one year of relevant work experience counts as one unit
· the candidate must have at least four years of relevant work experience
· candidates without relevant academic qualifications will need to demonstrate at least 12 years relevant work experience at a senior level.

IEEM Full Members will all have at least nine units (degree plus three years working experience) and many have postgraduate degrees and working years that put them well over 12 units. IEEM membership records indicate that more than 60% of existing Full Members would qualify under the grandparenting process.

Conclusion

We have achieved all that we wished for so far, in that IEEM (and all the other constituent institutions) will retain full independence, that the new Society is **for** the Environment and that individual Chartered status will depend on a clear commitment to protection of the environment and an understanding of the principles of sustainability.

Now it is up to you, our members, to support the Society for the Environment and its aims by applying for Chartered Environmentalist as soon as the application window opens! I expect that by the time membership renewals are due, we will be in a position to send out the forms and receive grandparent applications.

Further details can be seen at: www.socenv.org.uk

Dr Alex Tait is the County Ecologist for East Sussex and the IEEM Treasurer.

Capturing Carbon and Conserving Biodiversity: the market approach

The Eleventh DICE Annual Lecture.

Ian R. Swingland

Conventional donation-driven conservation

Previously, in order to preserve the rapidly diminishing natural world it seemed logical that we should intervene and pay to protect it, and exclude people. Thus the past 50 years have been spent industriously engaged in research, planning, stocking zoos, creating protected areas and removing villages and settlements, disturbing the sustainable balance of hunters with their prey populations of plants and animals (thereby stimulating the invention of poaching), exacerbating poverty and introducing disease where none existed before. All motivated by a donation-driven western culture permeated by the idea that so-called expert and political committees could and should plan what would happen, and draw lines on maps as boundaries between people and the rest of the animal and plant world. Well-meaning it may have been, but disastrous it has proved.

In the past, remedial action has focused on on-site and off-site conservation approaches. The establishment of protected areas has been the primary focus of on-site conservation. Off-site conservation has focused on conservation of, for example, germplasm or certain plants or animals away from their site of origin, in botanical gardens, zoos or gene banks. Until recently, the financing and management of protected areas remained the responsibility of the public sector. However, over the last few decades, severe cutbacks in the availability of public resources have severely undermined the effectiveness of such strategies. This, coupled with ever-increasing pressures on the land and resources held within protected areas, especially in developing countries, has constrained the lasting success of such approaches.

Social equity and financial stability

The manner of how biodiversity can pay for itself through benign systems of sustainable extraction, where people can receive some equitable share by right, not patronage, is addressed in this article. Some projects are moving down this path in a number of countries but much is yet to be done. Biodiversity yields many sustainable development benefits yet, paradoxically, human societies continue to undermine this valuable resource base, instigating large-scale biodiversity losses and species extinctions. Most worrying, however, is that the situation is deteriorating faster than resources can be mobilized to counteract the destructive processes, hence the commonly expressed view that we are in the midst of a sixth 'mass extinction'.

The disenfranchisement of people and their isolation from their natural habitat through conventional approaches to conservation, i.e. exclusion in the cause of conservation and natural resource planning, not only fuelled resentment and resource fragmentation but also accelerated inevitable failure. The donation-driven 'model' was not sustainable, either economically or environmentally. It relied on the continuing goodwill of donors and the consistency of the charitable bodies' commitment to maintain the funding support for each and every project indefinitely. Withdrawal of such funding, or a change of mind by the donors, inevitably left the people and the wildlife in a worse position than before. Charitable conservation organizations must maintain their overheads (rent, salaries, airfares, etc) to survive. If whales, for example, stop attracting donations from the public and elsewhere they may shift to, say, great apes, leaving the cetaceans beached. There is no doubt that 'pump-priming' a project for a short period, so it can earn its own living thereafter, is the best use of donations or direct payment, but as a method of maintaining continuity, ecologically or socio-economically, it is a disaster.

Alternative incentive-based mechanisms, governance and communities

Consequently, the conservation sector has been forced to look at alternative methods of biodiversity conservation, and especially methods that can generate viable and desired livelihood or development returns over the long term, while at the same time conserving biodiversity. Given that the root causes of biodiversity loss are linked to increasing populations and poverty on one hand, and high levels of consumption or economic development on the other, finding alternatives is not an easy task. Demanding that people radically change their life-styles or give up their aspirations for a better life is futile. In the face of this enormous challenge, the 1990s spawned a series of innovative approaches, which focus mainly on providing suitable social and economic incentives for conservation. It is now widely recognized that, given the lack of public funding, biodiversity conservation must start to pay for itself, otherwise biodiversity, and perhaps even the human race, are in jeopardy. Hence the growing interest taken in opportunities for biodiversity conservation that might arise from market-driven approaches to sustainable land use and management.

Market-based approaches to environmental management are increasingly important not least because they offer a chance to reconcile humanity's need for development and the biosphere's need for stability. Market mechanisms can encourage environmental protection and promote greater economic efficiency while saving taxpayers money. In the forestry sector, policy-makers are beginning to heed this advice by shrinking command and control systems in favour of incentive mechanisms that seek to align private gain with the public good. In some cases, governments are promoting the creation of markets where none existed before. In others, markets are evolving of their own accord. In such times of change, it is difficult to stand back and take stock. Yet, it is during such times that guidance is most needed. In the rush to introduce market-based solutions to environmental problems, a particular concern is how markets impact on the poor.

The international convention on climate change focuses on a large ecosystem and does not specifically recognize the need to conserve species, while other treaties do recognise the importance of biodiversity. Species, including *Homo sapiens*, are the building blocks of ecosystems, and they provide a means of capturing market values from ecosystems. Achieving successful conservation globally will require the systems under which species and ecosystems are conserved to be more inclusive than statutory protected areas. Equal emphasis needs to be placed on including effective regimes that also encompass private and communal ownership through incentive-based approaches. If globalised industries, such as nature-based tourism or sustainable use, are to provide meaningful incentives locally, a key requirement is to reduce leakage of revenue earned as a result of conserving species, such that local development concerns are addressed. Current biodiversity conventions that address these needs are largely aspirational, while globalised industries such as tourism mainly promote their green credentials through voluntary codes of conduct. Greatly improved linkages are needed between international conservation concerns and ensuring effective solutions to sustainability, which inevitably rest at national and sub-national levels, through systems of rights, tenure, benefits and incentives.

But what has yet to be worked out in nearly every programme is how there is to be a stable governance system, which works and is satisfactory to the local people, the public sector (i.e. governments and politicians) and the private sector. The question of intellectual property rights, for example, is

fraught with concerns that communal knowledge may be hijacked. Private interests and governmental interference also complicates an important area of income to people and conservation. The most critical questions, however, concern real property rights, land ownership and government land use policies.

Carbon-emission trading and social capital.

New incentives for protection and on-site use of forests and the services they provide raise hopes for the reversal of tropical and temperate deforestation. Past management of forests appropriated the rights of forest communities, providing incentives to convert natural forest into financial capital through logging, while destroying the underlying physical property. Carbon-emission trading aims to provide a means to convert the forest property into financial capital, while protecting the physical property of forests, providing new incentives for sustainable on-site forest management. The potential for carbon-emission trading as a contributor to these new incentives is tempered by often irrational declarations such as that it is another tool for capitalists and neo-colonialists seeking to exploit the developing world.

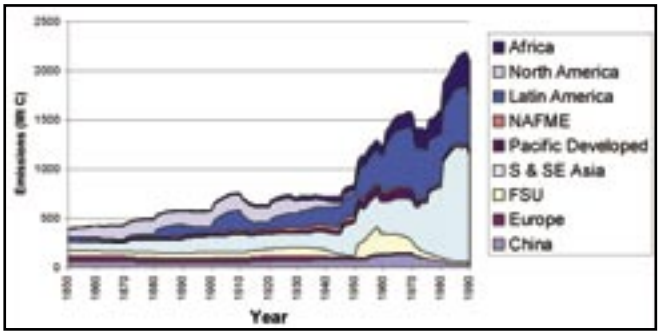


Figure 1. Estimated net carbon emissions from land use change, divided by region.

There are legitimate reasons for concern, as the history of exploitation of indigenous people, the appropriation of their rights; the loss of forests and their benefits is well documented and examined . This exploitation resulted in the exclusion of forest communities from the basic tenets for development created by the wealth generated by traded property. However, one virtue of trade is that it can be made subject to constraints. Through international treaties and agreements, it can be constrained and national governments and private interests obliged to observe rules. The value of tradable carbon credits will be discounted or invalid if they do not meet these criteria, providing all parties with strong incentives to achieve the performance standards relating to both processes and contracts. For carbon trading to develop social capital from natural capital requires the admission of forest communities into the policy and management of forest resources.

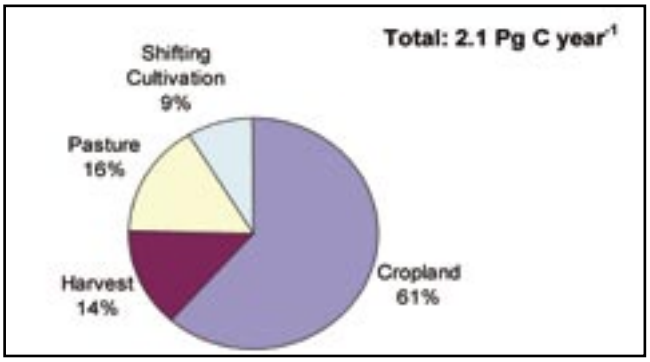


Figure 2. Annual emissions from land use change, 1990.

I argue for responsible carbon-emission trading based on the clear and appropriate definition of carbon entitlements, with the proviso that trading respects the rights and needs of local and indigenous people. Emissions' trading now seems inevitable and there should be proper rules to control this trade where it affects forests and their inhabitants. It is imperative that the poor and indigenous people are not excluded from these systems. They may benefit greatly from these systems provided that the trading systems and the property systems they depend on are accountable, transparent and inclusive.

The development of the Kyoto Protocol and perverse incentives

As with markets for many other goods and services, a carbon market may generate negative environmental externalities. Possible interpretations and application of Kyoto Protocol provisions under the sixth and seventh Conference of the Parties (COP-6bis and COP-7) to the United Nations Framework Convention on Climate Change (UNFCCC) raise concerns that rules governing forestry with respect to the Kyoto Protocol carbon market may increase pressure on native forests and their biodiversity in developing countries. Two specific concerns with Kyoto provisions for forestry measures are uppermost. First, whether, under the Clean Development Mechanism (CDM), by restricting allowable forestry measures to afforestation and reforestation, and explicitly excluding protection of threatened native forests, the Kyoto Protocol will enhance incentives for degradation and clearing of forests in developing countries. Second, whether carbon crediting for forest management in Annex I (industrialized) regions under Article 3.4 creates a dynamic that can encourage displacement of timber harvests from Annex I countries to developing nations. Given current timber extraction patterns in developing regions, additional harvest pressure would certainly entail a considerable cost in terms of biodiversity loss. In both cases, the concerns about deleterious impacts to forests and biodiversity are justified, although the scale of such impacts is difficult to predict. In order both to ensure reliable progress in managing carbon concentrations and to avoid unintended consequences with respect to forest biodiversity, the further development of the Kyoto carbon market must explicitly correct these perverse incentives.

The history of climate-change negotiations over the last decade provides a vivid illustration of an underlying transformation of the environmental movement from consciousness-raising to practical implementation. This has been the case particularly with respect to the debates on the role that carbon sinks and emissions trading are to play in addressing global warming. Moreover, issues surrounding carbon and biodiversity are inextricably linked, and this connection raises the temperature even further.

Carbon sinks and emissions' trading versus ideology

Every year, forest gross photosynthesis cycles approximately one-twelfth of the atmospheric stock of CO_2, accounting for 50 per cent of terrestrial photosynthesis. This cycling has remained almost constant since the end of the last ice age but, since the Industrial Revolution, has undergone substantial disruption due to the injection of 480 PgC (petagrams or billions of tonnes) into the atmosphere through fossil-fuel combustion (Fig. 1) and land-use change (Fig. 2), including forest clearance. Tropical deforestation is resulting in a release of 1.7 PgC yr^{-1} into the atmosphere. However, there is also strong evidence for a 'sink' for carbon in natural vegetation (carbon absorption), which can be explained partly by the regrowth of forests on abandoned lands, and partly by a global change factor, the most likely cause being 'fertilization' resulting from the increase in atmospheric CO_2. In the 1990s this biosphere sink was estimated to be sequestering 3.2 PgC yr^{-1} and is likely to have substantial effects on the dynamics, structure and biodiversity of all forests.

An extensive global carbon sequestration programme has the potential to make a particularly significant contribution to controlling the rise in CO_2 emissions in the next few decades. In the course of the century, however, even the maximum amount of carbon that could be sequestered will be dwarfed by the magnitude of (projected) fossil-fuel emissions. Forest carbon sequestration should only be viewed as a component of a mitigation strategy, not as a substitute for changes in energy supply, use and technology that will be required if atmospheric CO_2 concentrations are to be stabilized (Fig. 3).

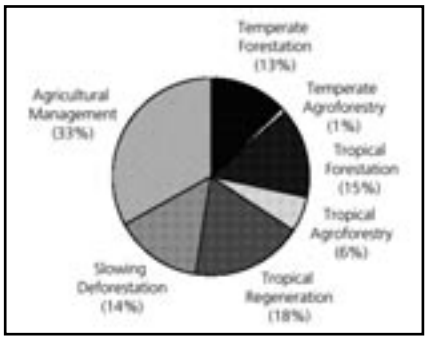


Figure 3. The potential of various land management activities to mitigate global emissions of CO_2 by increasing the carbon sink potential of forestry and agriculture or reducing emissions at source (reducing deforestation). Estimates suggest that a maximum mitigation of 100 Pg C could be achieved between 2000 and 2050.

It is fair to say that those debates over carbon sinks and emissions trading have generated more heat than light and been based more on ideology than sound science. The controversy is based primarily on two arguments: sinks may allow developed nations to delay or avoid actions to reduce fossil-fuel emissions; and the technical and operational difficulties are too threatening to the successful implementation of land-use and forestry projects for providing carbon offsets.

The importance of including carbon sinks in efforts to address global warming and the consequent social, environmental and economic benefits to host countries is central. Activities in tropical forestlands provide the lowest cost methods for reducing emissions and reducing atmospheric concentrations of greenhouse gases (GHGs) (see Fig. 4). A major concern about land use, land-use change and forestry (LULUCF) projects under the Clean Development Mechanism of Kyoto (CDM) is the potential for leakage. Leakage refers to a net increase of GHG emissions in an area outside the project resulting from the CDM activity. Various papers provide an overview of leakage, its definitions and its causes . It describes ways that LULUCF projects may suffer from leakage and attempts to assess the magnitude of leakage risks for different LULUCF project types. It also summarizes some of the approaches, both in terms of policies and project development, to address LULUCF leakage.

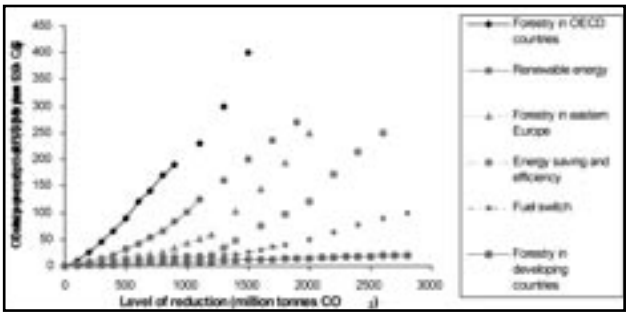


Figure 4. Indicative curves of costs (US$ per t CO_2^{-1}) of emission reduction or carbon sequestration by level of total reduction.

Steps could be taken by climate policy-makers to ensure that conservation and restoration of biodiversity-rich natural forests in developing countries are rewarded rather than penalized. To correct incentives to clear natural forests through CDM crediting for afforestation and reforestation, for the first commitment period policy-makers should establish an early base year, such as 1990, such that lands cleared after that year would be ineligible for crediting. An exception to this rule should be made for CDM projects that are explicitly designed to promote natural forest restoration and that pass rigorous environmental impact review. Restoration efforts are typically most effective on lands that are adjacent to standing forests and hence likely to have been recently cleared; for these projects establishing a more recent base year, such as 2000, would be preferable.

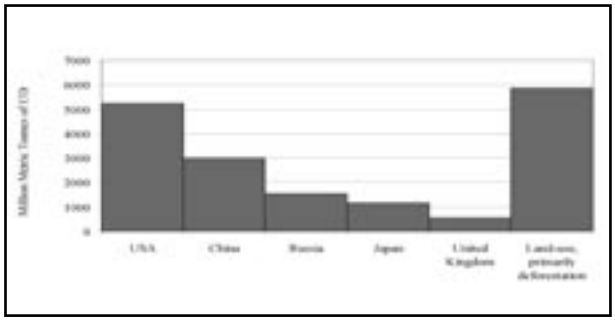


Figure 5. Millions of metric tonnes of CO_2 produced per annum by 5 countries and deforestation.

For the second and subsequent commitment periods, climate policy-makers should act to restrain inter-annex leakage and its impacts by ensuring that crediting for forest management in industrialized countries is informed by modelling efforts to anticipate the scale of leakage associated with different Annex I LULUCF policy options, and coupled with incentives to protect and restore natural forests in developing countries. The latter should include expanding the options permitted under the CDM to carbon crediting for projects that protect threatened forests from deforestation and forest degradation. Ultimately, carbon market incentives for forest clearing can be reduced and incentives for forest conservation most effectively strengthened by fully capturing carbon emissions associated with deforestation and forest degradation (Fig. 5) and other sources (Fig. 6) in developing countries under a future emissions cap.

The current asymmetry in treatment of forests favours the rich against the poor and monoculture over biodiversity.

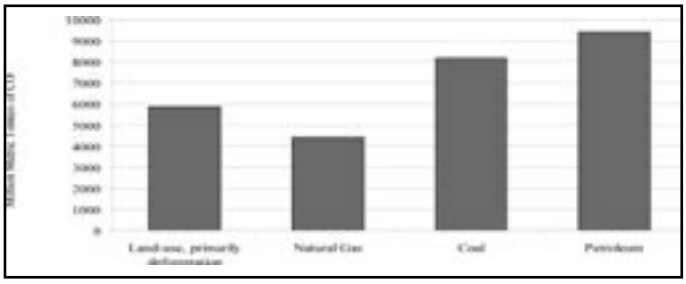


Figure 6. Millions of metric tonnes of CO_2 produced per annum by different activities.

Kyoto, carbon accounting and conservation

The major international treaties to address ecosystem protection lack meaningful binding obligations and the financial instruments to affect large-scale conservation. The Kyoto Protocol's emissions-trading framework creates economic incentives for nations to reduce GHG emissions cost-effectively. Incorporating GHG impacts from land-use activities into this system would create a market for an important ecosystem service provided by forests and agricultural lands: sequestration of atmospheric carbon. This would spur conservation efforts while reducing the 20 % of anthropogenic CO_2 emissions produced by land-use change, particularly tropical deforestation. The Kyoto negotiations surrounding land-use activities have been hampered by a lack of robust carbon inventory data. Moreover, the Protocol's provisions make it difficult to incorporate carbon-sequestering land-use activities into the emissions-trading framework without undermining the atmospheric GHG reductions contemplated in the treaty. Subsequent negotiations since 1997 failed to produce a crediting system that provides meaningful incentives for enhanced carbon sequestration in tropical forest conservation. Notably, credit for reducing rates of tropical deforestation was explicitly excluded from the Protocol. Ultimately, an effective GHG emissions-trading framework will require full carbon accounting for all emissions and sequestration from terrestrial ecosystems. Improved inventory systems and capacity building for developing nations will, therefore, be necessary.

Carbon pools that are based on field measurements should be incorporated

into the calculation of carbon benefits. This system allows for trade-offs between expected carbon benefits, costs and desired precision, while maintaining the integrity of the net carbon benefits. Techniques and methods for accurately and precisely measuring individual carbon pools in forestry projects exist, are based on peer-reviewed principles of forest inventory, soil sampling and ecological surveys, and have been well tested in many parts of the world. Experience with many forestry projects in tropical countries has shown that with the use of these techniques carbon stocks can readily be estimated to be within less than ±10 % of the mean. The various objections raised as to the inclusion of carbon sinks to ameliorate climate change can be addressed by existing techniques and technology. Carbon sinks provide a practical available method of achieving meaningful reductions in atmospheric concentrations of CO_2 and at the same time contribute to national sustainable development goals.

Compromises: cock-up or conspiracy?

The controversy over the issues of carbon sinks and emissions trading nearly aborted the Kyoto Protocol . The lengthy and intense debate over the roles that each is to play under the Protocol and the consequent political compromises have resulted in a complex set of provisions and an arcane nomenclature. The distinction drawn between the uses of carbon sinks in developed countries under Joint Implementation (JI) and their use in developing countries under the CDM is a particular source of intricacy. It is at least arguable that key elements of the compromises reached at COP-6 and COP-7 in this regard are inconsistent with the terms of the Protocol and are ultra vires the UNFCCC. This is a source of both uncertainty and potential legal challenge.

Not only do the recent decisions create needless complexity, they also clearly discriminate against developing nations. Among the recent political compromises is the creation of a third type of non-bankable but tradeable unit with respect to forest management, which is only available to Annex I countries. The result is an anomalous one in which a variety of otherwise equivalent carbon credits can be generated under three different regimes including one, the CDM that is subject to an elaborate regulatory overlay that discriminates against carbon sequestration by developing countries. For example, complying developed countries can essentially self-certify sequestration projects. In contrast, projects in developing countries must obtain prior approval from a subsidiary body, the CDM Executive Board, mandated to require detailed information and impose substantive and procedural hurdles not required or imposed by its companion body, the Article 6 Supervisory Committee on Joint Implementation Projects.

The parallel and related debate over the third 'flexibility' mechanism, emissions trading, compounded the complexity of an already asymmetric and bifurcated system. The new requirements devoted to 'environmental integrity' not only have raised the costs of compliance of developing country projects but also virtually ignore the fundamental principle of sustainable economic growth and development embodied in the Convention and related international agreements. The regulations for carbon sinks now being formulated at Conferences of the Parties will have a significant impact on their use worldwide. Of key importance, in addition to their successful integration of carbon sinks and emissions trading into other international treaties, is the development of practically achievable and objective standards and an efficient and transparent approval process consistent with the terms of the Convention and the Protocol. Most important of all is a rebalancing that restores the primacy of addressing climate change in the context of sustainable economic growth and development.

Markets

The convergence of environmental and financial markets, and the evolution of market-based environmental programmes, is an example of the evolutionary process witnessed in a variety of markets, and summarises the emergence of GHG mitigation markets and their potential role in advancing land stewardship, biodiversity and other environmental services. Emissions' trading has been developed to meet the demand to reduce pollution while avoiding economic disruption. Consistent with the pattern of market evolution, the US programme to reduce the damage from acid rain established a standardized environmental commodity, developed 'evidence of ownership' necessary for financial instruments and provided the infrastructure to efficiently transfer title. The success of the system in reducing pollution at low cost has provided a model for other market-based environmental protection initiatives.

The demand for cost-effective action to reduce the threat of climate change has initiated the same evolutionary process for markets to reduce GHG emissions. Many of the land- and forest-management practices that can capture and store atmospheric CO_2 can also provide other environmental benefits, such as biodiversity preservation and enhanced water quality. The presence of a carbon-trading market will introduce a clear financial value for capture and mitigation of CO_2 emissions, thus introducing a new source of funding for land stewardship and forest rehabilitation. The market is now emerging through a variety of 'bottom-up' developments being undertaken through governmental, multilateral, private sector and non-governmental-organization initiatives. The extension of markets to other emerging environmental issues is now underway, and the linkages between environmental sustainability and capital markets are being more deeply understood. Early evidence indicates that environmental sustainability can be compatible with maximization of shareholder and stakeholder value.

Developing countries and their `goldmine'(?)

The many opportunities for mitigating atmospheric carbon emissions in developing countries include reforesting degraded lands, implementing sustainable agricultural practices on existing lands and slowing tropical deforestation. Analysis shows that over the next 10 years, 48 major tropical and subtropical developing countries have the potential to reduce the atmospheric carbon burden by about 2.3 billion tonnes of carbon. Given a central price of US$10 per tonne of carbon and a discount rate of 3 %, this mitigation would generate a net present value of about US$16.8 billion collectively for these countries. Achieving these potentials would require a significant global effort, covering more than 50 million hectares of land, to implement carbon-friendly practices in agriculture, forest and previously forested lands. Reviews of 40 sustainable agriculture and renewable resource management projects in China and India under the three mechanisms estimated a carbon mitigation potential of 64.8 $MtCyr^{-1}$ from 5.5 Mha. The potential income for carbon mitigation is US$324 million at US$5 per tonne of carbon. The potential exists to increase this by orders of magnitude, and so contribute significantly to GHG abatement. Most agricultural mitigation options also provide several ancillary benefits.

These estimates of host-country income potentials take no account of the additional benefits of carbon sequestration in forest soils undergoing reforestation, increased use of biomass and reduced use of fossil-fuel inputs and reduced agricultural emissions. In all events, realizing these incomes would necessitate substantially greater policy support and investment in sustainable land uses than is currently the case.

Ethical carbon funds

The World Bank initiated the Prototype Carbon Fund (PCF) in April 2000, to help spur the development of a global carbon market and to 'learn by doing' how to use carbon-purchase transactions across a range of energy-sector technologies (and some forestry applications) to achieve environmentally credible and cost-effective emissions reductions that benefit developing countries and economies in transition. Building on the success of the PCF (US$145 million raised from public and private sector investors), the World Bank launched the Community Development Carbon Fund (CDCF) at the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa, in September 2002. The CDCF seeks to provide carbon finance to small-scale energy and biocarbon projects in the least developed countries. In November 2002, The World Bank launched the BioCarbon Fund, a public–private partnership (target size US$100 million) providing an opportunity for farmers and rural communities in the developing world to find new value in their agricultural lands and forests as they earn income from sequestering or conserving carbon. Whereas the PCF deals mainly with energy related projects, the BioCarbon Fund will focus on sink-related projects. These funds will target synergies between carbon markets and objectives such as biodiversity conservation, combating desertification and small-scale community-driven development.

Experience from the PCF shows that developing countries can have a comparative advantage in supplying this global market, as emissions reductions can be achieved in developing countries in the range of US$3–US$5 per ton of CO_2 equivalent, compared with a marginal abatement cost of US$10–US$15 per ton of CO_2 equivalent in most countries within the Organisation for Economic Co-operation and Development (OECD). However, realizing this economic potential over the next decade, and targeting the market to the rural poor, will require substantial assistance with project development and government legal and institutional capacity building. Specific needs include raising awareness of the potential of carbon markets at all levels (particularly in energy and land-use sectors), clarifying property rights, particularly in the case of communally held land and resources, ensuring the existence of an attractive investment climate, eliminating policies that create perverse incentives and constraints, and mitigating logistical, political and 'reputational' risks that could deter private-sector investors. It will also be necessary to find ways to reconcile the short-term needs of the rural poor and the typically long-term revenue stream associated with carbon sequestration.

Politics versus success

It is also time for a dispassionate review of where the political process has led us thus far and time to provide the scientific basis for action. The great achievement of those who pioneered the UNFCCC and its companion treaties the Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on Biological Diversity (CBD), the Convention to Combat Desertification (CCD) and the Convention on Wetlands of International Importance (known as the Ramsar Convention), was to have both alerted the world's politicians and the general public to the need to address these issues and to do so by way of international cooperation. Their greatest weakness, however, was a failure to distinguish between the arguably necessary rhetoric and realistic methods of implementation. Exaggeration of the available scientific evidence, commonly disguised by invocation of the precautionary principle, disregard of the economic and human costs involved in radical change, and distrust of markets and the private sector, often combined either to frustrate their goals or to lead to unintended and sometimes perverse consequences. The WSSD in 2002 did, at least, publicly acknowledge the failure of governments to deliver and the need for partnership with the private sector, but we must go further and abandon the thought processes of the past that lead to that failure.

The issues of carbon sequestration and emissions trading present all of these elements. The case made here for the maximum use of terrestrial carbon sinks, particularly in the developing world, is overwhelming. The benefits of such a strategy to the rural poor, indigenous people, habitat preservation, biodiversity, watershed protection and the climate as a whole is revealed here in persuasive detail. That such a strategy is also, particularly when combined with emissions trading, the lowest-cost approach makes it hard to understand why some environmentalists and policy-makers involved in the negotiations have chosen to do their utmost to prevent it. A sober reassessment of what they have wrought so far is clearly called for. The ultimate goal, in the context of climate change as elsewhere, must be the adoption of those strategies and techniques that will result in genuinely sustainable economic growth and development; in other words, an approach that successfully combines humankind's need for human development and a need for a healthy environment that conserves biodiversity in perpetuity.

The signing of the UNFCCC in 1992 marked not only the foundation of the world's concern with climate change, it also marked its abandonment of command and control as methods of human organization. The human as well as the economic costs of central planning were demonstrated beyond doubt to be too high to be sustained by any society for very long. The year 2002 was supposed to be the year when the same lesson was to be learnt and taken to heart by those concerned with the environment. Neither humankind nor the natural environment for which it is responsible can afford further such experiments. Unless the enormous value of the biosphere and the services it provides can be made tangible to all through free markets and prices, we are all too likely to continue to squander them. What everyone owns, no one owns; and no one conserves it.

Ian Swingland is emeritus Professor at the University of Kent and is the founder of the University's Durrel Institute of Conservation Ecology - DICE.

IEEM Scottish Section Report: Ecology And Remote Sensing "Bridging The Gap"

Crona O'Shea, AIEEM

This seminar evening was hosted by the University of Stirling on 29th April 2004 and was a collaborative event between the IEEM Scottish Section and the Remote Sensing and Photogrammetry Society (RSPSoc). Following the success of the first evening seminar on 'Environmental Economics' last spring at ERM in Edinburgh, the IEEM Scottish Section intends to organise one evening seminar in spring every year, preferably with collaboration from other professional bodies, organisations or academic institutions to forge links with the membership.

The aim of the evening was to introduce the many varied ecological applications of remote sensing to professionals working as ecological consultants and environmental managers and to students of both disciplines. The organisers were particularly keen to provide a forum for discussion between academics in the field of remote sensing and the potential 'end-users' in the environmental sectors.

Kathy Dale, Convenor of IEEM Scottish Section, opened the evening with a brief introduction to the aims of IEEM and the benefits of membership. Sandy Winterbottom, from the University of Stirling, then gave a comprehensive introduction to remote sensing and a few tasters for potential applications in environmental studies. Mark Cutler (Dundee University) followed this with a presentation on recent work carried out in the southern Pennines. Mark highlighted the importance of blanket bogs as an environmental resource and introduced ways in which remote sensing can add to the understanding of the biochemical composition of peat and provide clues as to rates of erosion and vegetation change. Dave Gilvear, from the University of Stirling, gave the penultimate talk presenting work from a number of different projects that each exploited the use of remotely sensed data to successfully map the complexity of riverine systems and in particular riparian habitats. Lastly, Andrew Tyler, also from the University of Stirling, presented a long history of work on quantifying lake phytoplankton blooms using satellite imagery and the success of sub-pixel classification methodologies.

A lengthy and informal panel discussion was had after the talks as many of the delegates engaged in questioning the speakers on some practical issues. It was felt that many came away with a useful insight into how remote sensing can and should be a part of the ecologist's 'tool-kit' and many delegates used the evening as a valuable opportunity to network between individuals from each of the disciplines. Overall, the evening was well attended with 23 delegates with a good mix of experience and interests and feedback was very positive.

For further information on the application of remote sensing in ecology contact Crona O'Shea at co2@stir.ac.uk or on (01786) 466550. For further information on the Scottish Section of IEEM contact Christine Welsh at Christine.Welsh@virgin.net or on (01397) 704716.

Crona O'Shea is a Research Student at the University of Stirling.

Biological Recording, Survey and Monitoring: Addressing the Skills Gap - Meeting Report

Report from Andrew Pullin (BES) and Nick Jackson (IEEM)

Background

• The first BES/IEEM workshop on Biological Recording, Survey and Monitoring was held at The University of Birmingham on April 3rd 2003.

• Both the BES and IEEM identified biological recording, survey and monitoring as an area that has been neglected in mainstream education and training and consequently the growing demand for these skills is not being met.

Outcomes from the first workshop

• It was widely agreed that the first workshop was a scoping session to try and agree on future actions for both organisations and their partners.

• Problems in education and training provision were identified at all levels from early school through to professional training. There was unanimous agreement that a serious skills shortage exists and that this is likely to get worse.

• The employers reported that an increasing number of job vacancies are being advertised in the environmental sector but that these jobs are proving hard to fill as applicants generally lack the appropriate skills.

• Many participants involved in training pointed out that a substantial number of training courses already exist but that there is a need to match up employer requirements with training provision.

• It was recognised that considerable work has already been undertaken by the BES Education Group and other organisations on problems of lack of field-based learning in School and University Undergraduate Curricula. The newly appointed BES Education Officer should be encouraged to continue with this work.

• The problem of the current shortage in field skills and the need for appropriate training courses at Postgraduate and Continuing Professional level should be the focus of future workshops.

Consequently the second workshop focused on the perceived mismatch/ shortfall between skills required by employers and skills exhibited by graduates and/or provided through postgraduate training.

Workshop Objectives

• To produce a list of critical skills shortages from an employer's perspective

• To compare this list with the training opportunities available

• To propose mechanisms for provision of training needs at postgraduate level

Workshop Output

The following is the output of the meeting organised into two main themes that arose from initial discussion; 'training provision' and 'guidance and mentoring'

Training provision

Post Graduate Courses

The Issues:

There is a broad range of courses available for graduate students covering a multitude of different aspects of ecology. The level of skill gained by students in identification and pure and/or applied taxonomy varies tremendously with each individual course. It is important to realise that it is the quality of the process involved in the training which is important as well as the end product. In other words it is more important that the students are confident and competent with the process of identification itself rather than for example, being able to name 20 species of chalkland plants from memory. If ecologists understand the identification process, the spontaneity of being able to identify organisms on the spot will increase with experience. University courses should act as a spring-board and lead on to further experience and skill expansion in identification, probably in a limited number of taxonomic groups and/or habitats. This can be achieved by taking further short courses which are designed to deliver the end-product rather than the underlying processes involved.

Different post graduate courses have different emphases and so an individual course cannot deliver everything that a student will possibly need to know in practice. In the outside world, many areas of ecological work actually start off as rather messy problems that need to be solved as opposed to neat, custom made projects handed out on a plate. There is a need for students who are able to carry out and manage surveys as well as understand the survey report and employers are looking for people with a prepared mind in terms of problem solving. However, many students are rarely given the opportunity to experience the problem solving side of ecological work and their skills in this area tend to be weak. It is better that students learn how to do this in a supportive environment rather than making an irreversible mistake later on during their employment. It might be the case that some of the more vocational flexible / distance learning packages offer a more applied model that is more appropriate in terms of producing competent practical ecologists.

Some students are offered training placements with organisations as part of their course and this is seen as a very positive step forward in theory. However, in some cases there are a number of practical issues which mainly revolve around host organisations not being informed about the expectations and intended outcomes of the work placement experience. In some cases, there seem to be very few guidelines and a general lack of communication can exist between the universities and the host organisations. Training placements could potentially be a very effective way of helping to prepare students for a job but greater co-ordination is needed if students and host organisations are to gain the most benefit and least frustration from these schemes.

Although the focus of the discussion group was on identification skills, it was felt very strongly that the development of inter and intra personal skills should not be ignored. To be a successful ecologist all of these things are needed and are absolutely essential for maximising employment prospects. In addition to the skill of identification, the other supporting fundamental competences recognized included:

a) data interpretation,
b) data evaluation,
c) effective communication,
d) negotiation,
e) diplomacy,
f) general awareness about current legislation and policy and
g) statistical testing.

There should also be a recognition that the employers themselves will need to support the delivery of more specific professional skills since any Masters' course will only have a limited timescale. Continuing professional development (CPD) then becomes applicable and employers should

be encouraged to provide the necessary on-going training (in-house or external) for their own employees. It was noted that with the current trend in short-term temporary contracts, there was not a great incentive for employers to invest in this and that the situation would improve if the terms of employment were offered on a longer basis.

Recommendations

• Masters Level courses need to provide a basic delivery of how to identify – including resources, use of keys etc in addition to limited practice in at least one given named group and/or habitat.

• Students should be encouraged to get involved in practical ecological work in non-contact time as part of the university course. This could be voluntary work at the weekends or a structured work experience placement.

• Where training placements are offered, it would be helpful if all universities appointed a work experience co-ordinator who is responsible for laying down expectations and intended outcomes and communicating these clearly to the host organisations.

• Problem solving activities and development of thinking skills should specifically be incorporated into courses wherever possible.

• Courses should identify opportunities for developing intra and interpersonal skills to help students interact more effectively both with their employer and their clients.

• Students should be taught about the current legislation pertaining to their area of ecology and know how they can gain access to further information if necessary.

• All Masters students should have at least a sound understanding of basic statistical techniques before they graduate from the course, up to and including multivariate analysis.

• All students looking for jobs would do well to enquire about the level of provision offered for further professional training in order to persuade employers to provide it as a matter of course.

Short Courses

The Issues:

There is a recognised series of providers offering a range of courses across the spectrum of expertise. Some of these courses are accredited by academic bodies, some are recognised as offering appropriate cpd and others are designed for interest and enjoyment as opposed to professional training. For the employers – the range was described as very thorough yet the information is not always easy to access – particularly from the smaller providers who only offered one or two training events in any one year. It was also noted that quality was not always consistent. The FSC was cited as a major player in identification training courses and the group welcomed other techniques such as surveying, recording, vegetation classification etc as being valuable – offered by some other short course providers. It was felt that the courses did not always link up to give a balance and that some courses booked a long way in advance can lead to potential disappointment. It was also recognised that Losehill Hall had a good reputation in delivering the management and interpretation training courses – which were thought to be slightly outside the range of skills that BES/IEEM were interested in at present. The issues are therefore fourfold:

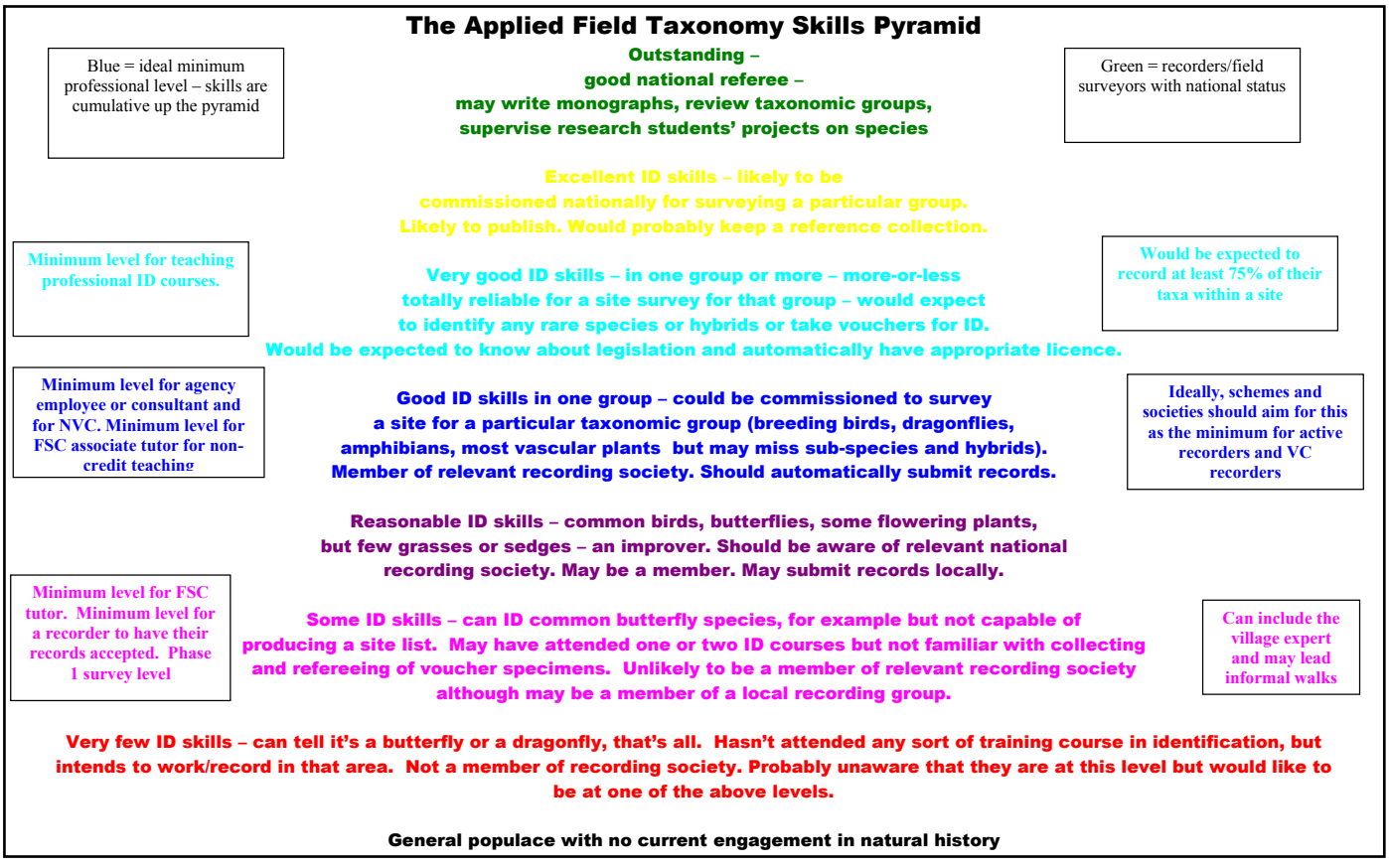
a) Access to training information for employers
b) Quality control
c) Integration of the training package
d) Appropriate number of training courses

Recommendations

Some of the above issues have been partially addressed through the FSCs partnership with the University of Birmingham in offering a certificate programme in biological recording and species identification.

There are many other providers in addition to FSC (although not on the same scale) and it was thought to be helpful if an annual listing were available on the same lines as the old English Nature/|Countryside Commission training booklet. Evidently, there is an embryonic website being developed by David Mount through the Countryside Agency and Losehill Hall and John Hopkins felt he might be able to access this and add to it to help the dissemination of training events to employers.

Fig. 1



In summary the suggested ways forward are:

- The example of the FSC/University of Birmingham partnership
- To identify gaps (and tutors) where appropriate
- To seek to publish availability from a central point eg through English Nature/Countryside Agency
- To seek a forum where employers could post training needs and providers could therefore develop appropriate courses.

Guidance and Mentoring

Background

The general view was that there is adequate breadth of provision of training for biological recording, survey and monitoring. However, what both employers and prospective students find a major stumbling block was how to pick their way through a mass of courses at different levels by different providers, and most importantly choose courses that met with their learning aims.

A 'Skills Pyramid' (Fig. 1) was presented and it was generally agreed that this could provide a framework for assessing skills and determining appropriate levels of courses. From this it was suggested that guidance through course provision would be a valuable start for employers and employees alike. Mentoring was also recommended, whereby field biologists would have a friendly technical expert to turn to, to help with ID and survey design.

The main points raised in the discussion are listed below

Guidance on courses

There is a vast range of courses available but little guidance to employers or prospective students on learning outcomes and appropriate levels. Guidance could be provided on where courses fit into the Skills Pyramid. Courses cannot provide a student with a level of skill, but the guidance could indicate what level of skill the student should be at in order to take a particular course. Identification courses can provide a student with the 'tools of the trade' in terms of naming of parts and familiarity with keys, but a course cannot confer identification skill, just a systematic approach to identifying a particular taxon or habitat group.

It should be recognized that all course providers are essentially competing for cash.

How do you gauge identification skills?

Identification tests, either lab or field-based are the best way to gauge ID skills. It would be useful to give an indication to new practitioners as to how much time and commitment they would be required to put in to moving up through the skills pyramid to the next level.

The taxonomic societies (BSBI, BBS, BLS etc) should be engaged by the BES to take this forward, but there are funding implications. Taxonomic recording groups are the only organizations that can give an unbiased expert view. Such a partnership could provide and informal framework for trainers and employers in order to assess the skills of students/employees.

Mentoring

It was generally acknowledged by the recorders in the group that informal mentors provide a huge boost to acquiring ID skills. Often, taxonomic recording societies can provide this through vice-county recorders or local recording groups, on an informal basis.

On a professional level, the Environment Agency has developed a system of technical advisers within its regions, who can act as mentors to other staff and can pass on technical knowledge such as ID and field skills. This could be a good model for other employers to adopt as it values the technical skills and acknowledges the requirement to disseminate these skills throughout the team.

Recommendations

- Provision of a 'one-stop-shop' for recording, surveying and monitoring courses, preferably web-based, but note the political minefield that this opens up (Why isn't my course listed? Is there any quality control? Is it just a directory?) and make it clear BES/IEEM is not providing accreditation of courses listed.
- BES to engage with the recording societies (long overdue in the opinion of many of the group members!)
- Consider revision of Rooting for Careers, making it more prescriptive.
- Encourage professional and society-based mentoring.
- Work with current practitioners to develop identification tests that link in to the Skills Pyramid

Hope for the Bird of Paradise

Urs Dräger

Environmental organisations in Guatemala want to put money from industry to use to protect the country's cloud forests. Their idea is as follows: to have downstream water users such as companies and communities compensate the forest conservation efforts of those upstream. This novel water project is being supported by Swiss Re.

Quetzal in the mist: The Maya's revered bird of paradise is on the verge of extinction

Water drips from the fronds of the ferns; the loamy soil is slippery in places. Caesar Tot, Q'eqchi Indian and Director of the Sierra de las Minas Biosphere Reserve, points out a massive oak tree through the mist: "I've seen quetzals there before" . But we won't be seeing any of the shy birds today. "They are hiding from the rain," Tot explains. But even in good weather, the quetzal is becoming an increasingly rare sight. If we continue to destroy the quetzal's habitat at the present rate, we will soon be seeing the bird spread its wings only on Guatemalan bank notes. If nothing is done to protect this species, which is shrouded in legend, it will soon be heading for extinction.

The Sierra de las Minas is the largest remaining habitat of the Maya's revered bird of paradise. Since 1990 the mountain chain has been a protected biosphere reserve. The national environmental organisation, Defensores de la Naturaleza, manages the reserve. Caesar Tot, who is guiding us through the cloud forest, is a dedicated conservationist. "This forest is home to the most diverse range of species in Central America," he says. "It houses more than three-quarters of all the flora and fauna to be found in Guatemala and Belize. A lot of these species do not exist anywhere else in the world."

But it is not only the flora and fauna that depend on the cloud forest for their survival; so too do the peoples who live in the foothills of the mountain chain. Living in one of the driest regions of Central America – the Motagua Valley – their very existence depends on the precious resource that comes from the more than thirty streams that have their source in the cloud forest. Rain is so extremely rare here that the future of almost half a million people – most of whom are farmers – is fully dependent on the water that flows down from the Sierra mountain range. Around 500 villages, factories and the agroindustry that produces melons for Del Monte compete for this scarce natural resource. And not without consequences: the Motagua carries less and less water each year and the water table sinks lower and lower.

Too many forest fires

Experts believe one reason for the dwindling water supply to be the overexploitation of water by the companies and communities in the area. However, the root of the problem is a lot deeper – or higher – because even the streams that cascade untouched from the mountains carry less and less water each year. The main reasons for the reduction in water supply is the indiscriminate use of slash and burn techniques to clear away forest. "Less forest means less water," is how Director of Defensores de la Naturaleza, Oscar Nuñez, sums up the problem. The exposed soil cannot retain the rainwater and thus loses its water-retaining function.

The evening wood-collecting caravans are a depressing sight for Oscar Nuñez. But they aren't his greatest worry: "What is a lot worse are the forest fires that people lay on purpose to make way for new areas for planting and grazing." "The fire-ravaged expanses of former forest where farmers proceed to plant corn and coffee are already exhausted five years later." explains Nuñez.

Once money flows upstream

Prompted by the close connection between fire devastation and dwindling water resources, a couple of years ago Oscar Nuñez had the idea of establishing a link between water usage downstream and the protection of the cloud forest. Defensores and their partners from the WWF Central America have since worked on the idea and come up with a so-called water fund (see box): Companies and communities located downstream are to be given the opportunity to make voluntary contributions for using the water downstream to finance the forest protection measures being taken by those living upstream. For the first time in the region, someone will finally compensate for the damage wrought to the environment and for the social consequences of the overexploitation of forests and water. Melissa Edwards, Freshwater Program Officer at the WWF, believes: "Once money flows upstream, enough water will flow downstream."

The water fund project is soon to be realised and the environmental organisations involved have completed the extensive planning phase. The project has also received support from Switzerland: reinsurer Swiss Re conferred its ReSource Award on the project, a prize for sustainable watershed management worth USD 70,000. The initiative has a firm foundation as it involves a lot of contact with companies, local governments and the local population. Those responsible for the project now want to open the fund during the course of the next few months.

Coffee pickers: the water fund will provide them with urgently needed additional income

Counting on people's own interests

A number of municipalities have already shown interest in supporting the water fund. One example being the Mayor of San Augustin Acasaguastlán, who is responsible for 22 villages and who has high hopes for this unique initiative: "We would like to work with Defensores de la Naturaleza. With their help, we can find a solution to our own problems. This is why we are willing to contribute to the water fund."

Besides the communities, there are hopes that the major water consumers – i.e. industry and businesses – will get involved in the project. The chances of their involvement look extremely good because their key resource, water, is becoming an increasingly scarce commodity for most of them in the Motagua Valley. By contributing to the water fund, they can make a contribution to conserving this resource.

"Factory managers such as Najera are very much aware of the importance of water," says Melissa Edwards. "They understand how important it is to do something. But not all companies can warm to the idea of having to pay for the water which they have always drawn from the river or pumped up from the water table for free." Defensores and WWF are in the process of providing an incentive to companies to participate in the water fund. They are to benefit from the services of the Cleaner Production Centre, which advises companies on how to manufacture their goods more efficiently,

ecologically and thus more cheaply. A portion of the money saved will flow into the water fund.

Ferns and thousand-year-old oak trees: the cloud forest of the Sierra de las Minas is home to the most diverse species of flora and fauna in Central America.

Better living conditions

One of the potential beneficiaries of the water fund is Carlos Alvarez. This old mestizo lives in Albores, a village located in the centre of Sierra de las Minas. Like most farmers in Albores he is ready to do his part. "That is if someone helps us and pays for the additional work involved." Projects that draw on the proceeds from the water fund such as the production of environmentally friendly organic coffee could represent an urgently needed source of income for farmers. They can barely scratch a living from coffee today as the price of coffee has plummeted on the international market.

Defensores de la Naturaleza aims to work out alternatives to exploiting the cloud forest. Experts working in this well-established environmental organisation are advising farmers on switching to a more environmentally friendly method of cultivation known as "agroforestry," which combines sustainable forestry with agricultural practices.

Just as important as preventing slash and burn techniques is reforestation. Using the proceeds from the water fund, conservationists want to compensate farmers for the planting of trees and train them in how to fight forest fires.

All of the measures that are to be financed by the water fund have one thing in common: they not only protect the cloud forest but also offer its inhabitants a source of additional income. This is sorely needed as the fate of the cloud forest and the quetzal is intrinsically linked with the well-being of those living in the region. The chances of the real quetzal surviving will only improve once people in the Sierras have a few more Quetzal notes in their pockets. Thanks to the water fund, the little bird's prospects of survival have improved.

Sierra de las Minas Biosphere Reserve

The Sierra de las Minas in southeast Guatemala was decreed a biosphere reserve by the Guatemalan government in 1990. Biosphere reserves, which are a preservation concept developed by the UN, do not only serve a conservation function but also foster appropriate sustainable development in a large portion of their territory.

The Sierra de las Minas occupies approximately 240,000 hectares. The cloud forest is at the core of the reserve, occupying a quarter of its area. Here, human intervention is prohibited in any shape or form. The forest is home to almost 900 species of mammals, birds and reptiles. Experts have designated the Sierra de las Minas as one of the world's most important genetic banks for tropical conifers.

Caring for trees: reforestation projects are to be financed by the Water Fund.

Urs Dräger works for Locher, Schmill, Van Wezemael and Partner AG, Communication and Care, which provides services to Swiss Re.

The relevance of captive breeding as a successful component in water vole translocation projects.

Derek Gow, AIEEM, Kathy Holder and Carly Jeffrey

Introduction

The legal protection of the water vole *Arvicola terrestris* under schedule 5 of the Wildlife and Countryside Act - section 9(4) - in 1998 led to a direct requirement to mitigate for the presence of this species on development sites. For projects which will result in the loss of habitat or burrows, 'reasonable effort' is required to relocate water voles into suitable unaffected areas prior to works commencing, and restore the habitat following development, create new habitat or enhance existing habitat (Dean. 2003).

Although clear in intent, accurate quantification of how water vole populations actually respond to development induced mitigation projects has historically been difficult to define with assumptions of the success or failure of a technique being commonly based on little hard evidence. This situation has arisen due to a historic paucity in our understanding of the species itself, an inadequacy of follow-up monitoring and a suite of complications associated with the general conservation of this species in the wider countryside.

Although gaps still remain in our knowledge a welter of recent research now affords a fuller picture of this species' requirements. There is little doubt that water voles are more complex than was initially perceived and it is therefore important to apply this advanced understanding to development mitigations to avoid the infliction of casual damage to this vulnerable species.

The authors of this paper although initially involved in a large scale captive breeding project for conservation reintroduction have to date assisted a significant number of translocation projects with a development led mandate. These projects have focused on captive breeding wild founders to establish substantial release populations of known age, sex ratio and health status. To date this technique has proven verifiably successful in the majority of sites where it has been applied and could prove to be a tangible component of successful translocation practice.

Captive breeding water voles

In 1994 A Red Data Book For British Mammals (Morris. 1993) was published and the first alarm bells signalling the plight of the water vole rang. Their clarion was swiftly corroborated by a series of national surveys funded by the Vincent Wildlife Trust (Strachan & Jeffries. 1993), which identified a serious constriction in the national range of the species. To date subsequent repeat surveys (Strachan, Strachan & Jeffries. 2000) suggest that the water vole may have incurred an overall national range decline in excess of 90% since the beginning of the 20th century.

This loss of range was principally due to the intensification of agriculture resulting in the widespread loss of wetlands and a significant diminution of riparian fringe habitat due to either overgrazing or the extension of arable production. This situation was further complicated by the successful colonisation of introduced North American mink *Mustela vison* – a species that is capable of hunting water voles much more effectively than any native predator – and an associated range of incidental factors linked to population fragmentation (Strachan. 1998).

It is a fundamental error in any recovery process for an endangered species to leave the development of a captive breeding component until individual founders are in short supply. Genetic diversity will by this stage be extremely low and if husbandry protocols have to be developed from scratch any resultant human errors can be critical to the survival of the species (Durrell. 1992). For this reason captive breeding as a component of an overall conservation package is best refined when an initial threat is perceived as part of a process of general biological research.

The first large scale conservation breeding project was initiated by Derek Gow in 1994 at the New Forest Nature Quest with the express aim of developing a sustainable methodology for reproducing the species consistently and in sufficient numbers to render future reintroduction possible. Captive breeding had been recorded before in a study population maintained for Dr Barbara Blake at Queen Mary and Westfield College (Blake. 1982). Although her animals bred sporadically in a laboratory environment this project was prompted by a behavioural rather than conservation motivation and there was no imperative to refine a consistent breeding regime.

The first breeding attempts at Nature Quest were with animals captured from fish farms on the river Itchen. These were contained in large landscaped pens 30ft in diameter with pools, vegetation and burrowing banks. The retaining walls of these enclosures were constructed of 4ft high sheet tin and they were under-wired to a depth of 2.5ft with half-inch pet-mesh. Despite this last adaptation voles readily burrowed out and on one occasion a female which escaped in late summer and survived outside over-winter returned of her own volition to breed in the spring.

Although these pens were stocked with various combinations of animals we now know that they will only successfully contain a single breeding pair and their resultant offspring. Any other combination of breeding adults confined together inevitably resulted in severe fighting to the point of disability or death. This negative experience of mixing unrelated groups of adult individuals was replicated in a trial release project developed by the Wildfowl and Wetlands Trust at Slimbridge where severe aggression resulted in the swift collapse of a substantial confined population (C. Strachan. Personal communication). As an initial project objective was to maximise potential reproduction this enclosure design was eventually abandoned for all purposes excepting public display.

Slide 1 – Breeding pen with runs in straw bale

A further series of smaller breeding pens were trialled before the final prototype that is currently employed emerged. These are wooden framed cages (6ft long by 4ft high by 4ft broad) with solid wooden floors. They are meshed throughout with half-inch pet-mesh and have half opening front lids and doors to allow easy access. The floor substrate consists of forest bark with a bale of straw at the back covered by a waterproof roofing sheet to create an artificial banking. The voles will readily burrow into this feature creating runs, nests and chambers. Swimming water is provided via a shallow garden seed tray at the front of the pen, which is changed

daily in the summer time. As summer breeding pens these facilities work extremely well and groups of sibling litters have successfully over-wintered in these enclosures.

Breeding regime

The breeding regime consists of pairs of voles bred the previous year being introduced simultaneously to each other from February to March. Mates are selected to ensure relatively even weights and most females will produce a litter by mid May. Reproduction generally averages another three subsequent litters annually (Holder. K and Jeffrey. C. Unpublished) although up to seven litters have been recorded from an individual pair. The average number of juveniles produced from a breeding pen is around twenty. Providing a stable food supply is maintained water voles in these large family groups are very tolerant of each other although occasionally odd individuals have to be removed. These animals typically start to emerge for long periods during the day, sit in a hunched position with scruffy fur and may have obvious bite marks or move in a lethargic fashion. When isolated from the main group they will generally recover quickly from any superficial wounds and can on occasion survive significant injuries.

When the breeding pens are checked for juveniles any early litter offspring are removed. Although both the straw bankings and floor substrates are replaced at this time careful disturbance of nests of tiny, naked juveniles rarely results in casualties as their parents will readily remove them by carrying them in their mouths to a new nest site. This high natural fidelity to their offspring is unusual in small mammals but has been historically recorded in the wild (Paxman. 1994) and might be a behavioural adaptation to short term rises in water level. Stephanie Ryder who studied water voles in the 1960's (Ryder. 1962) recorded males assisting females in this process.

Adult captive females at the end of a single breeding season are commonly so physically exhausted from reproductive exertion that despite additional feeding their body condition rapidly fades and they either die or lose the use of their hind limbs. Occasionally adult males in captivity will survive to mate again after a second winter but their breeding performance is generally poor. Having worked with approximately 2000 animals to date for various reintroduction and translocation projects we have never had a known age individual survive for over 2.5 years although a 3 year old has been recorded (Ryder. 1962). A study in 1971 suggested that few wild water voles ever attained the age of 2 (Stoddart. 1971) and the average wild lifespan is therefore likely to be at least 50% less than the maximum captive figure (G. Law. Personal communication). Wild population survival may therefore be largely dependant on a series of swiftly reproducing generations.

At the end of the breeding season any remaining adults are over-wintered in standard laboratory rodent cages with larger groups of sub-adult juveniles being wintered outside. Breeding between individuals in these sibling groups is extremely unusual even if they are left together until well into a potential breeding season.

Captive diet consists of commercial rabbit food, apples, carrots, greens and other vegetables. Chewing fruitwood is provided to curtail tooth growth although in older animals malformations may occur which require regular treatment.

Disease

A full health assessment protocol has been developed for screening release populations (Sattisfield et all. 2002). This combined process involves regular weighing and physical assessment, faecal screening, post mortems of dead animals and blood sampling. As an additional caveat approximately 2.5% of substantial released populations are post mortemed to check for abnormalities or disease. Although to date no significant conditions have been identified it is important that this process is applied in order to

- Expand our knowledge of water vole disease
- Ensure that released populations are healthy in the first instance
- Avoid the transmission of any obvious deleterious pathogens to linking wild populations.

Infestations of what are probably endemic mites are relatively common in over-wintered animals. When extreme these can result in an individual losing the fur around its eyes – forming noticeable pink spectacles – and genitals. Generally these occur at high densities in old or otherwise stressed individuals and can be easily treated by using domestic veterinary products.

Slide 2 – Old female with mite infestation around her eyes

Some animals exhibit respiratory conditions which to date appear to be individually specific and non-contagious. Simple stress situations such as handling for short periods can occasionally produce an onset of prolonged wheezing. In our long-term captive population these conditions are generally confined to individuals in excess of 2 years old.

In the longer term inbreeding could potentially prove to be a much more significant problem for isolated populations. The reproductive rate of this species is extremely rapid and it is clear from review of various populations drawn from different sources that small isolated founder groups seldom breed as well as stocks drawn from large vigorous populations when subjected to the same regime of captive care. As a population becomes more inbred the incidence of white tail tips and feet together with head or chest spots becomes more common. Historically populations of completely cream animals have been recorded. Coupled with this phenomenon is the rising incidence of health problems including abnormalities, the most extreme example being a male that lived a full lifespan with a twisted foreleg and 16 additional toes.

Reintroduction

The first monitored reintroduction of water voles was trialled at the Barn Elms Wetlands Centre in 2001. Although a few older animals were utilised for this project the bulk of the released population of 147 were captive bred juveniles in their year of birth. These animals were all fitted with individual microchips and were selected to ensure an average release weight of around 108 grams. Dispersing juveniles in Scotland have been recorded at 50 grams (Lambin. X. Personal communication) and under a suite of good habitat conditions water voles can gain weight extremely rapidly thus attaining breeding condition in a single season. Animals released at Barn Elms in July and recaptured in late summer had more than doubled their body weight and one female released at 90 grams produced a litter in a trap when captured in October (R. Strachan. Personal communication).

Juvenile water voles were released on both a hard (straight into areas of tall vegetation with no subsequent support) and soft (from release pens dug into the ground with food support for a time) release basis. Preliminary results from this and subsequent projects suggest strongly that the latter option is more effective. (R Strachan. Personal communication). If maintained together juveniles can be released in sibling groups of up to four animals. Various different styles of release pens have been trialled successfully from large tin enclosures to more compact folding aluminium pens developed for Severn Trent Water. These operate on the principal that

the water voles dig to freedom through an open earth floor whilst providing initial protection from likely predators. Release cages must be provided with abundant bedding material and chopped apples for both food and moisture. They should be dug well into the ground immediately adjacent to the waters edge and screened from the sun with dense vegetation. Water voles will commonly continue to utilise well-sited release pens as latrine and feeding areas for some time following release.

The timing of release for juveniles should coincide with late spring/early summer vegetative food and cover abundance. Failure to achieve this threshold in their year of birth is best remedied by holding them again over winter and releasing as prime breeding adults in spring. Both techniques have been trialled and both age groups have worked well as release candidates. Care should be taken that water level stability is guaranteed in potential release sites as severe fluctuations either way can be a critical factor in the success or failure of a colony (C. Strachan. Personal communication) Water voles are a very robust species but in common with most riparian mammals they have an extremely dense fur coat. If subjected to movement or handling stress during periods of extreme heat they can die rapidly and chopped apple – a quarter per animal – must always be included for consumption to provide moisture during transport.

Translocation

Some commonly employed water vole mitigation techniques, which are part of standard practice are based on assumptions, which may be incorrect.

A recent study by Cresswell Associates (Dean. 2003) highlighted for example that the standard displacement methodologies of vegetation strimming and scraping do not always result in water voles revoking their original territories. Radio collared animals within a scraped and strimmed development footprint chose to remain in their own burrow systems whilst moving further afield to forage in adjacent remaining cover. They returned to their burrows via underwater entrances and during this process left few field signs of their presence. Another recent study of microchipped individuals which were translocated out of a development foot-print to an unaffected area of adjacent habitat emphasised this territorial fidelity with a single female crossing a 'football pitch' sized building site to return to her original place of capture on three separate occasions (A. Best. Personal communication).

Although both these studies involved small numbers of individuals they challenge common perception and highlight a real requirement for active research to address the effectiveness of commonly applied techniques.

The national water vole guidelines stress that population translocation should be the least preferable alternative for development led mitigation (R. Strachan. Personal communication). Developers are instead encouraged to focus on the creation of fresh receptor habitat adjacent to existing populations, which can then be encouraged to migrate by using techniques such as dewatering or seasonal habitat removal. In projects where this strategy is not applicable and translocation is the only alternative it is extremely important that the following factors are considered.

Water voles seldom exceed the age of two and a half in captivity. This maximum lifespan is unlikely to be attained by most wild individuals. The capture and successful re-establishment of un-aged wild individuals – even if their territorial fidelity is ignored – is therefore problematic. Due to natural winter mortality spring captures before the breeding season are likely to yield low numbers of mainly young breeding adults while autumn captures can result in a mixed bag of small juveniles, old adults past their active reproductive life, and early litter juveniles coming into their prime. Such populations can be skewed in percentage depending on external seasonal factors – i.e. droughts when juvenile survival can be extremely low – and can although numerically robust be productively redundant. It is possible by over-wintering in captivity to separate by weight and condition most old adults from mature juveniles, as these animals even when captured in good condition will naturally start to loose weight rapidly while juvenile weight gains increase. Other age indicators such as fur mite infestations, respiratory conditions and overgrown teeth or claws assist this process.

Translocations of significant numbers of known age breeding animals – at least 40 on a 50% sex ratio, into extremely good habitat – should be timed to coincide with an abundance of natural vegetative food and cover. Such releases must occur in either late spring or very early summer in order to allow individual animals time to settle, breed and establish territories before the onset of winter. Failure to achieve this threshold will result in poor seasonal breeding results and a much greater likelihood of population failure as a result. Water voles are known to be predated by a range of species such as red foxes (Vulpes vulpes), stoats (Mustela erminea), pike (Esox lucius) and grey herons (Ardea cinerea) (Strachan. 1997). The average seasonal mortality of wild water vole populations has been estimated to exceed 70% (Jordan. 1996) and releases of wild captured populations of a few individuals are on a genetic, numerical, age and sex ratio basis unlikely to form viable founder populations. If removed from a development footprint they are best combined with other unrelated animals to form larger more diverse release groups.

Slide 3– Juvenile vole

Female water voles exhibit a high fidelity to their dependent young in captivity. This factor has been recorded in the wild. If the abandonment of litters of juveniles underground is to be avoided as an aspect of a translocation project then capture should only commence before either the onset of breeding or at its seasonal end. In reality – depending on weather – this means trapping in late March/early April or from mid September until the end of October using competent staff who can accurately assess lactation and sex. Trapping through the adjoining months of winter is complicated by the seasonal predilection of this species to develop winter food stores and thence become less physically active and more difficult to capture.

Animals should be released using a soft release methodology – slowly through a predator proof pen with bedding and food support – with subsequent population dispersal monitored by the assessment of microchipped animals. For significant projects consideration of longer term monitoring through founder gene lineage may be appropriate.

Water voles captured in a development footprint and translocated to immediately adjacent wetland may readily return to their initial territorial areas. If these original territories are scraped and strimmed this could result in an enhanced risk of predation (Dean. 2003). They are capable of undermining standard exclusion mitigation fences.

Water vole populations typically expand to exploit a wider availability of seasonal summer habitat and retract in winter to occupy features such as elevated or scrub-covered banks above normal flood levels. Deep summer pools are an equally significant feature as refugia in times of drought. The inclusion of these key, seasonal landscape features in receptor selection is significant. Receptor sites should possess a seasonal abundance of vegetative food and cover species with potential colonisation corridors to allow both future population expansion and genetic interchange. Care should be taken that North American mink are either absent or can be effectively controlled in the long term.

Conclusion

In response to the above criteria the authors have focused on a strategy of capturing wild founder individuals, which are then over-wintered in captivity to eliminate old or diseased animals. Breeding individuals in their reproductive prime are then captive bred to produce large release populations. These populations although not life skilled have no territorial fidelity, are of known age, sex composition, health status and are sufficient numerically to ensure a successful take despite significant predation. As a final consideration should a release fail for whatever reason a retained captive surplus can allow for a subsequent restocking or supplementation when the causes of initial failure have been assessed and remedied.

To date this process has been employed for 9 translocation/reintroduction/ supplementation projects involving the breeding of over 2000 animals. At the time of writing 1 release has failed, 6 have successfully established vigorous populations some of which are expanding rapidly, 1 is indeterminate and 1 is still too early to assess. Animals provided historically from this captive breeding programme have established an additional 2 low-level populations (R.Strachan. Personal communication) which are still extant and a similar captive breed and release project run by Bristol Zoo on a site near the Royal Portbury docks (S. Eyre. Personal communication) has been highly successful.

The smallest release population that is known to have established as a result of this process derived from 50 (24.26) individuals released into excellent recreated habitat on the river Don (Best. 2003).

Summary

If water vole translocation/reintroduction projects are to succeed it is critical that suitable mink free receptor sites, which are sustainable in the long term, are either identified or designed. These must afford an abundance of suitable seasonal food and cover vegetation and should additionally incorporate features, which ensure that a released population cannot readily be compromised by either flooding or drought. For future success there must be reasonable chance of integration with other water vole colonies. Animals should not be translocated during their breeding season.

The age of a translocated population should be determined by over-winter separation of breeding adults from older non-breeding animals, which should be eliminated from release. If spring capture is attempted it is likely that the population will comprise low numbers of breeding adults with a strong territorial fidelity. Autumn populations will be larger with a greater diversity of age groups. Translocations involving significant populations of wild animals may be viable if mature juveniles are released in the spring following capture. This timing is essential to maximise the chances of their initial breeding generating offspring, which can themselves reproduce before the onset of winter. For smaller populations or groups, which cannot attain this release threshold, a captive breeding project component should be considered to ensure a sufficiently large release population of known breeding age, equal sex and clear health status.

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Derek Gow, Kathy Holder and Carly Jeffrey all work for the Derek Gow Consultancy.

Monitoring Avian Movement using Radar – Its application in baseline monitoring for coastal wind farms

Richard Walls, AIEEM

This article outlines projects undertaken and ongoing research carried out into avian movements as detected by the Central Science Laboratory (CSL) bird detection radar around the UK in 2003 and 2004. Radar ornithology has proven to be a useful tool for the detection, monitoring and quantification of bird movements in the atmosphere (Eastwood, 1967; Gauthereaux & Belser, 2003). Radar has provided information about daily and seasonal patterns of bird migration, important questions about how birds orientate during migration and their relationship with weather. In the last two decades, radar ornithology has played an increasingly important role in the conservation of species that are migratory, endangered, threatened or of concern (Gauthereaux & Belser, 2003).

Fig 1. CSL, Bird Detection Radar Unit

The Bird Management Unit, CSL is currently using radar for monitoring and analysing bird movements in differing habitats across the UK landscape. We have been investigating, with radar, gull flight lines around Queen Mother Reservoir, Heathrow Airport and landfill sites in West London. We have also monitored inland waterfowl movements around Cotswold Water Park, Gloucestershire and the Trent Valley, Nottinghamshire. Monitoring has also included coastal movements of waders and seabirds at Gibraltar Point NNR, The Wash and Blyth wind farm, Northumberland and farmland birds around York, North Yorkshire.

Windfarm Development

The UK government has made a commitment to source 15% of electricity from renewables by 2015 and has an aspiration to source 20% from by 2020 (RSPB, 2004). This has meant the very rapid development of the wind energy industry and other renewable technology to meet these goals. Throughout round one and increasingly for round two of development offshore a large amount of discussion has taken place around the environmental impact assessment process. Specifically in relation to the methods of ornithological assessment utilised.

Identifying the best method of standard ornithological monitoring for wind farms either boat-based surveys or aerial surveys has been well debated (Kees et al, 2004; Dean et al, 2003). Much has been made of the advantages and limitations of individual assessment techniques as yet though no single technique provides a definitive answer. So far radar ornithology has been under-emphasised in its application to remote bird monitoring. The key to monitoring therefore will not necessarily be which technique to use but rather can we use a range of complimentary techniques on differing scales to ensure we monitor thoroughly, effectively and scientifically?

How ornithological assessment is conducted for environmental impact assessment, and at what scale, is key in correctly assessing wind farm locations. The statutory conservation agencies as well as the RSPB, have stressed from the outset the need for appropriate and standardised assessment of wind farm sites in respect of bird species. Ornithological assessment has focused on four specific issues in respect of wind farm development:

1.	Collision risk	(Birdstrike to turbines)
2.	Disturbance	(Impact of the construction of wind farm & turbines on species behaviour)
3.	Displacement	(Causing bird species to utilise Alternative feeding and roosting habitat)
4.	Barrier effect	(Creating a barrier to migrating species)

The impact of a wind farm on birds will vary according to species-specific behaviour, season, geographic location and surrounding habitat quality. The behavioural habits of different bird species make them more or less likely to become either a casualty of birdstrike or have their usual behaviour (foraging, feeding, breeding, roosting) modified by the turbines construction or operation.

Birds do collide with a whole range of man-made structures from aircraft, vehicles, electricity wires and pylons, telegraph wires, fencing, windows, buildings and wind turbines. Bird mortality on European roads is estimated at anywhere between 350,000 and 27 million birds (Erritzoe, Mazgajski & Rejt, 2003).

Fig 2. Blyth wind farm, Northumberland

The Crown Estate through COWRIE (Collaborative Offshore Wind Research into the Environment) have provided considerable impetus in round one in ensuring standardised data collection for environmental impact assessments. The planning and construction of large numbers of offshore wind turbines over the next decade and beyond has highlighted our lack of knowledge, uncertainty and research needs relating to the distribution, abundance and habitat requirements (foraging ecology) of marine birds (Camphuysen et al, 2004; SNH, 2004)

Gaps In Our Knowledge of Seabird Movements

As part of the environmental impact assessments for offshore wind farms, the need for detailed knowledge on spatial and temporal patterns in seabird distribution has been highlighted as a key area. Dedicated monitoring to sample the numbers and distribution of seabirds isa basic requirement for developers, to describe bird densities within, and in the immediate vicinity of, the construction area. Boat-based survey work, aerial surveys and sea-watching are all standard qualitative techniques allowing small repeatable transect samples. Large-scale radar studies have not yet been included in assessing areas over many square kilometers continuously through 24hrs

and in periods of low visibility. Radar in terms of quantitatively monitoring movements across an area has a considerable advantage over standard snapshot techniques.

As highlighted recently at the 19th IEEM conference by speakers Victoria Copley (English Nature), Rowena Langston (RSPB) and Bill Band (SNH) and stated in the Camphuysen (2004) report, monitoring studies need to be targeted at some greater area studies, in order to assess the relative and the actual importance of the construction area for seabird movements. Monitoring of arbitrary areas defined by a wind farm's physical size at Round One sites and at the larger offshore Round Two sites does not necessarily address the fact that these wind farms may have a cumulative effect on bird populations throughout the seasons through the three strategic key areas of the Wash, Thames Estuary and the North-west (Liverpool Bay).

Large Scale Monitoring of Sites

The use of radar to acquire strategic information about large-scale bird activity across a particular area would appear to be the next logical step. This would provide an additional and valuable quantitative monitoring technique to compliment the standard smaller-scale qualitative survey techniques. This would add much needed spatial and temporal scale to our patchy knowledge of seabird movements if we are to be able to properly assess the ecological impact on birds as developments become larger and more numerous.

Fig. 3 Gull species in flight

It is therefore key to develop large scale monitoring techniques in advance of the continued development of sea-based renewable energy technology both wind, wave and tidal around the UK. The Camphuysen (2004) report states that migration routes, direction or height of flight, detailed spatial and temporal distribution require intensive radar and direct observation in the vicinity of a proposed wind farm development to determine bird use of the area and to predict collision impact probabilities under a range of differing temporal (day/night) and weather conditions.

Radar as a Census Tool

Radar data is similar in essence to all standard ornithological techniques currently employed. It simply records the birds present in the area as viewed by the radar beam as opposed to a human observer with optics. Its single and most important advantage is however that it allows continuous sampling of bird movements over a large area. It can therefore provide a measure of movement rates through a particular area. This provides a very valuable complimentary method to the standardised ornithological techniques in use at present. Radar has the advantage of supplying a continuous sample of data that covers a larger area than traditional techniques. Radar signal data is recorded about bird activity across the radar range all of the time, it is unaffected by darkness or low visibility, it is objective (not biased by subjective recording ability); mathematical algorithms and radar technology does not differ in their recording effort from location to location. This leads to scientifically objective datasets and robust conclusions due to the continuity and objectivity of the equipment.

Sampling frequency for estuarine waterbirds (shelduck, Eurasian wigeon, oystercatcher, dunlin, Eurasian curlew and redshank) utilising inter-tidal sites has recently been assessed by Burton et al, (2004). This work indicates that an effective sampling frequency in some cases needs to be undertaken as often as one hourly interval for an effective estimation of numbers. Seabird activity and movement is fluid and complex at times and fluctuates across the seascape. An effective sampling frequency would therefore seem to be one which is as continuous as possible to avoid missing significant seabird movements at any given location. Radar provides an important and significant advantage over standard techniques as it operates continuously.

As with all sampling techniques it has advantages but also some disadvantages. It is limited by rain, which blinds its detection of avian movements, its range is fixed at a maximum of 6NM/11.1km but can be reduced by topography and it does not at present immediately identify different species. It does, however, record a range of radar signal characteristics describing the targets' reflectivity, size and speed that have been used in other studies to separate radar targets into species groups.

Cooper (1995) indicates that with a local marine radar system it is often possible to separate targets into "songbirds", "raptors", "shorebirds", and "waterfowl", based on flight speed, target strength, target size and flight behaviour. In areas where a particular species has unique flight characteristics, it is possible to identify targets to species (Burger, 1997; Harmata et al 1999; Cooper, 2002).

CSL Radar System

The CSL Bird Detection Radar System utilises two marine radars. An S-Band surveillance antenna detects birds in the horizontal plane, and an X-Band is mounted in the vertical plane. The S-Band surveillance radar covers a circular area with a radius of up to 11.1 km (6 nautical miles) and the X-Band altitudinal radar scans above the unit to 1.4 km (0.75 nautical miles) and to the same distance either side. These ranges are thought to be the limits of this equipment in tracking bird movements effectively and are based upon the known radar performance characteristics and the radar cross-sections of individual birds (Eastwood, 1967; Rinehart, 1996).

Fig. 4 CSL Bird Detection Radar Unit

Radar Data

At CSL we have been analysing radar data using GIS tools to identify prominent movements across the landscape or seascape. These data are post-processed to identify the best quality tracked avian movements. The GIS analysis subsequently allows the complexity of avian movements to be summarised for specific periods for visual presentation and statistical analysis.

Gibraltar Point, NNR, The Wash, Lincolnshire

Over the winter period of 2003-2004 we undertook a radar study of avian movement at Gibraltar Point, NNR, The Wash, Lincolnshire. We were present during November 2003 and February 2004 during which we operated both our S-Band surveillance radar and X-Band altitudinal radar.

Specifically during 4 days between the 24th and the 28th of November 2003 it was located adjacent to the Gibraltar Point Visitor Centre at OS grid reference: TF555 579. The X-band radar was aligned north to south, parallel to the coast. The radar was run continuously for 4 days. However, for the purposes of this analysis, two 1 hour time periods; 00.00 to 01.00 hrs and 07.00 to 08.00 hrs on 27th November have been chosen to illustrate how radar data can be used to measure bird movements, to display them visually,

and to compare different areas, or different times intervals in the same area, statistically if required.

Altitude data
Altitude data from the X-band radar are presented as scatter plots of targets at different distances from the radar (see Figures 5 and 6). The vast majority of the targets occur in the lower 500 feet of the air column.

Distribution and movement data
Data from the S-band radar can be presented in 3 formats. Firstly, as the AVI moving images recorded from the screen. A still image of all of the targets detected (without any post processing) is presented (Figs 7 and 8). This is shown to illustrate the difficulty in interpreting the huge quantity of data gathered by the radar system. The post-processed target tracks are summarised in Figures 9 and 10, with coloured tracks showing different directions of movement. Finally, the data are summarised into a grid format, with arrows representing the direction of bird movement within each grid square and the thickness of the line arrow indicating the number of birds moving in that direction in that square (see Figures 11 and 12).

Data Analysis

Altitude data
Altitude data are summarised into distance intervals of 500 m from the radar along the axis of the radar beam. The number of targets in each 100 foot altitude band within each distance interval are counted. Target abundance in the two time periods is analysed by comparing the total count within each distance interval irrespective of altitude using a G-test. The overall altitudinal distribution of targets or the altitude at different distances from the radar is analysed by comparing the mean value of altitude using a Mann-Whitney U-test.

Distribution and movement data
Bird distribution and bird movement for the two 1 hour periods were also compared statistically using G-tests. The comparisons need to be performed separately for distribution and for movement, the latter relying on a comparison of arcsine transformed percentages for the number of tracks in each grid square rather than on the total number of tracks moving in each direction. This is because the G statistic will determine whether there is an overall difference in the number of tracks moving in each direction, but does not differentiate between whether the difference is due to a change in direction between the two time periods or simply a change in the total number of tracks in the square.

Results

Bird altitude
The altitudes of all targets detected in the two time periods are shown in Figures 8 and 9. As expected the majority of the targets are detected below 500 feet either by night or day, but between 07.00 and 08.00 there are proportionately more targets between 1000 and 3000 feet. These are probably flightlines of gulls moving off roost sites in The Wash to feed inland. Statistical comparison shows that the number of targets detected does differ significantly between 00.00 to 01.00 and 07.00 to and 08.00 ($G_{adj} = 1648$ 27 d.f., $p<0.001$). This is confirmed by the S-band data that also shows greater abundance of targets in the morning compared to at midnight (see 3.2.1 below). The altitude of targets also differs significantly between midnight and morning, with birds at higher altitudes during the day (Mann-Whitney $U = 5421895$ $p< 0.001$).

Examining the altitude data in more detail also shows the influence of terrain masking on the data obtained by radars. In Figures 8 and 9, where only the data for the lower 1000 feet of the air column are shown, the targets detected to the south of the radar, over the Wash mudflats (positive distance values on the x-axis), are numerous right down to ground level. In contrast, the targets to the north of the radar (shown as negative values on the x-axis) are relatively sparse below 100 feet. This is because the radar signal propagation to the north is blocked by a number of small woods and banks adjacent to the site. This shows the importance of careful positioning of the radar and the need to consider terrain-masking effects when evaluating the results obtained.

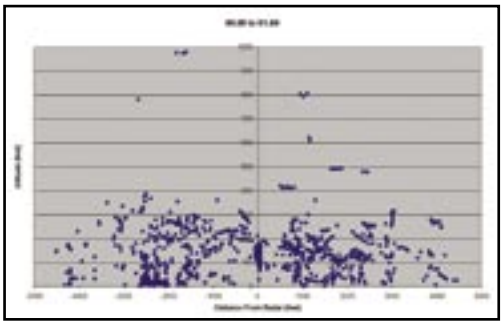


Fig 5. Scatterplot of bird targets detected between 00.00 and 01.00 showing targets in the lower 1000 feet only. Negative distances from the radar are to the north and positive distances to the south.

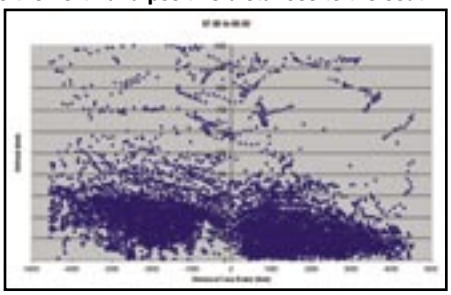


Fig 6. Scatterplot of bird targets detected between 07.00 and 08.00 showing targets in the lower 1000 feet only. Negative distances from the radar are to the north and positive distances to the south.

Bird distribution and movement
Figures 7 and 8 show the total number of targets detected by the S-band system over the two 1-hour periods. It is clear that without some processing of the data, analysis is extremely difficult, even with the lower number of targets detected at midnight.

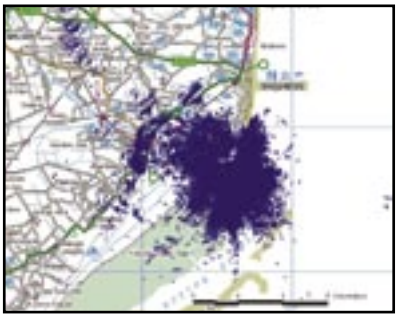


Fig. 7. All plot of all targets detected between 00.00 and 01.00.

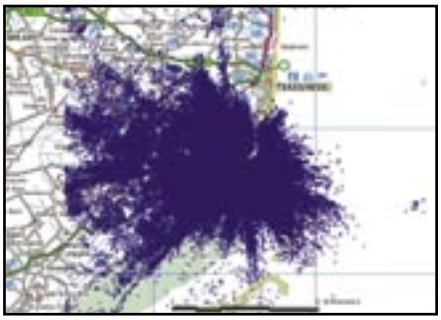


Fig. 8. Plot of all targets detected between 07.00 and 08.00,

Figures 9 and 10 show the S-band data after post-processing to leave reliable data. The coloured lines provide an indication of movement direction and the number of lines indicates the magnitude of the movement, but it is still difficult to gain an overall impression of the bird movements and abundance.

Fig. 9. Plot of cleaned data showing reliable bird tracks 00.00 to 01.00.

Fig. 10. Plot of cleaned data showing reliable bird tracks 07.00 to 08.00

Figures 11 and 12 show the same data summarised into grid squares with numbers of targets moving in each direction represented by the thickness of the line in each square. This presentation permits a visual comparison of bird movements to be made between the two periods. At midnight the majority of movement was out to sea whilst in the morning there is more movement northward and inland.

Statistical comparison of the total bird abundance between the two time periods shows a highly significant difference (Gadj = 58697, 41d.f, $p<0.001$). This is to be expected, as a number of bird species (corvids, pigeons etc.) are thought to move very little at night. The movements detected between 00.00 and 01.00 are therefore likely to be waterfowl, waders and possibly gulls, whose movements are more influenced by factors independent of the diurnal cycle such as tide height, wind strength, wind direction etc. Ground truthing was not possible in darkness, however.

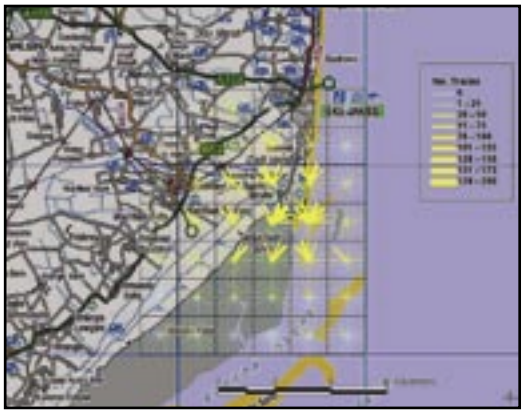


Fig. 11. Grid data showing summarised bird abundance and direction of movement in each square 00.00. to 01.00.

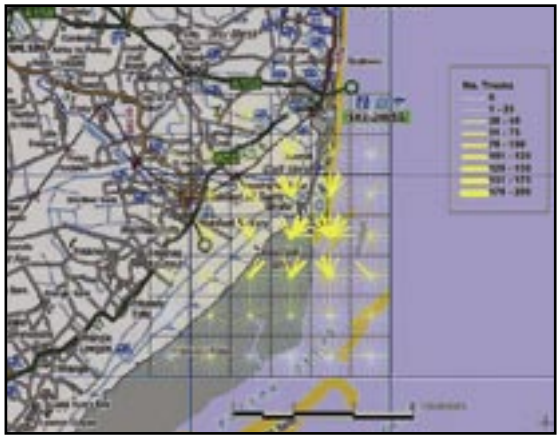
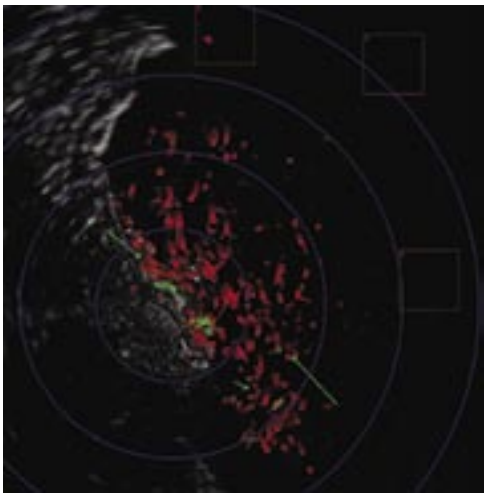


Fig. 12. Grid data showing summarised bird abundance and direction in each square 07.00 to 08.00.

The direction of movement is also statistically different between the two time periods (Gadj = 119, 671 d.f. $p<0.001$). The majority of movement between 00.00 and 01.00 is out to sea, whereas between 07.00 and 08.00 much of the movement is to the north, along the coast, or inland. This movement was checked by ground truthing and the majority of the northward and inland movements were gulls moving off roost sites in the Wash to feed on fields and the local landfill. Movements along the coast were of a mixture of gulls, waterfowl and waders.

Blyth Wind Farm, Northumberland

We operated the CSL radar unit at Blyth from 10th –12th May 2004. The image below from 12.05.2004 at 05:15hrs highlights the coast from Blyth North to Newbiggin-by-the-Sea (White permanent clutter features). The bird movements are shown in red trails with the brightest red being the current position and a trail history shown in fading red. This image shows bird activity increasing after sunrise at around 4am and increasing predominantly in a southward direction up to 4km offshore past the Blyth wind farm. During this period the main species moving were mixed gull species, cormorants and common scoter at less than 2km range and Gannets beyond 2km.



Predominant bird activity heading south up to 4km offshore S-Band display at Blyth Wind Farm 05:15hrs 12.05.2004.

Summary

This article illustrates both the advantages and limitations of bird detection radar as a tool for surveying the spatial and temporal distribution and movement of birds. Providing that the limitations are recognised, radar provides an opportunity for large scale, long term objective monitoring of seabird populations, especially at night, that has not been previously available. The use of these techniques will make a significant contribution to resolving the debate concerning large-scale wind farm developments, and their impact on bird populations.

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RSPB Publication (2004) Feb. Wind farms and birds. The Lodge, Sandy, Bedfordshire, SG19 2DL.
SNH – Scottish Natural Heritage (2004). Marine Renewable energy and the natural heritage: An overview and policy statement. 1-38pp.

In this issue of In Practice, Basil O'Saurus, Professor of Tauro-Scatology at the University of Neasdon, is going to tell us about an innovative new environmental consultancy enterprise that he has helped to set up. Over to you, Basil.

Thank you. I'm very excited by this project which breaks new ground on a number of different fronts… but most especially because it is the first existentialist environmental consultancy …

Meaning what, Professor?

Meaning that we approach all our contracts from an existentialist perspective.

What does that mean?

It means that we question the material basis of all kinds of reality. This makes us very attractive to developers. If they wish to develop a site that is chock full of rare plants, butterflies and birds then there is a strong likelihood that the local authority, English Nature and the local wildlife trust will all object and that there will have to be a public inquiry. And that is where we come in …

How?

Well, we would not, of course, question the substance of an Environmental Impact Assessment that recorded the presence of these valued receptors. That, of course, would be contrary to the IEEM's Code of Professional Conduct. No, our approach would be subtly different. Let's take a lady orchid as an example. Let's assume that the Environmental Impact Assessment recorded a regionally-significant population of lady orchids at a site that our client wished to develop.

Okay. What would your approach be?

We would simply question whether the lady orchid had any material existence outside the consciousness of the surveyor. For example, in Being and Time, Jean-Paul Sartre discusses the concept of nothingness and he uses the example of entering a café to meet a friend, Pierre, and discovering that he is not sitting at his usual place. Sartre talks of Pierre's absence as 'haunting' the café. In other words, Satre experiences a 'nothingness' which is more than just a negative. It is not the same, for example, as saying that there is no rhinoceros in the café. That would be a purely logical construction revealing nothing about the world, whilst Pierre's nothingness is produced by Satre's consciousness. So, to go back to our example, we would simply argue that the presence or absence of a lady orchid was dependent, to some extent, upon the consciousness and experience of the surveyor. This, in turn, raises the awful spectre of subjectivity.

But surely, these arguments are rather abstruse?

All we are doing is widening the debate out from a discussion of the existence of one species at one site to a much broader questioning of the extent to which the qualities by which we define a lady orchid are, in fact, sensations produced by the observer's mind rather than fundamental properties of lady orchids. If the planning application had to go to a public inquiry, then both sides would have to call expert witnesses who would spend days and days debating the subject of consciousness. This would mean that the cost of the inquiry would escalate. Many objectors would simply pull out rather than face the bill.

Isn't this a rather cynical approach to a very serious issue?

Absolutely not. A statement is meaningful if, and only if, it can be proved true or false, at least in principle, by means of empirical experiences. We call this assertion the 'verifiability principle', and I doubt that any IEEM members would have any problems with this. Deep down, we are all logical positivists without really realising it.

Hang on, I thought you were an existentialist?

Actually, I'm a logical positivist, but existentialism has so many romantic associations with bohemian life in Paris that I was prepared to stretch a point. We have even decided to base ourselves in Paris, to underline our philosophical principles.

And where in Paris is your office?

Well, we don't have an office as such. Instead, like all good existential philosophers, we base ourselves in a café on the Left Bank. Actually, being based in a café, with no telephone and no e-mail has many advantages, from the point of view of running a successful consultancy.

Is this because your overheads are low, meaning that you can offer your services at highly competitive rates?

No, it means that any developers who wish to avail themselves of our services have to catch a Eurostar to Paris in order to discuss their needs with us. We even work on Saturdays and Sundays. Show me a developer who would miss an opportunity to write off a weekend trip to Paris with their secretary as a business expense. And we are not just making ourselves available to developers either: we are thinking of offering one-day workshops for IEEM members on the same principle. Soon everyone will be able to write off a trip to Paris at their employer's expense.

And how do we avail ourselves of your expertise?

Simply cover my subsistence expenses.

Meaning?

Mine's a glass of absinthe, if you're offering.

In the Journals

Compiled by Jim Thompson and Joel Bateman

British Ecological Society

A. J. Gray.
Ecology and government policies: the GM crop debate - TWELFTH BES LECTURE.
Journal of Applied Ecology 2004, **41**: 1 - 10.
In an ecellent and highly relevant review, Gray discusses some of the key elements in the GM debate, and traces the growing importance of ecological questions within the regulatory and advisory system in the UK. He notes the need to understand, and predict. Some of the potential wider environmental impact of genetically modified (GM) crops has both driven changes in the regulations and led directly to farm-scale evaluation of herbicide-tolerant crops.

Several examples illustrate how ecological science is being used, and abused, in the public debate and in the provision of advice to regulators. In particular, short-term or laboratory studies identifying possible hazards or impacts often receive widespread media attention but the thorough ecological field-based studies which either evaluate exposure to a hazard or assess fitness over several generations are rarely carried out, or, in the classic case of the impact of Bt maize on the Monarch butterfly, pass almost unnoticed.
He concludes that It is increasingly important that trained ecologists become involved in the public debate. The challenge of dealing with the problems of variability, complexity and uncertainty, and of developing the necessary predictive tools for risk assessment, bring with it a huge responsibility, not only to be clear about the limitations of our science, but to recognise and acknowledge the boundary between science and informed opinion.

Correspondence: Alan J. Gray, Centre for Ecology and Hydrology, CEH Dorset, Winfrith Technology Centre, Dorchester DT2 8ZD, UK.

T. Ticktin.
The ecological implications of harvesting non-timber forest products.
Journal of Applied Ecology 2004, **41**: 11 - 21.
This is an interesting review of the harvest of wild non-timber forest products (NTFP), which represents an important source of income to millions of people worldwide. Despite growing concern over the conservation of these species, as well as their potential to foster forest conservation, information on the ecological implications of harvest is available only in disparate case studies.

Seventy studies that quantify the ecological effects of harvesting NTFP from plant species were reviewed, with the aims of assessing the current state of knowledge and drawing lessons that can provide guidelines for management as well as better directing future ecological research in this area.

The case studies illustrated that NTFP harvest can affect ecological processes at many levels, from individual and population to community and ecosystem. However, the majority of research was focused at a population level and on a limited subset of plant parts that are harvested.

In order to withstand heavy harvest, specific management practices in addition to gathering are necessary for many NTFP species. Management practices can be carried out at different spatial scales and some are highly effective in fostering population persistence.

Substantial advances have been made towards identifying the ecological impacts of NTFP harvest. Researchers and forest managers need to work with local harvesters in designing and evaluating management practices that can mitigate the negative effects of harvest.

Correspondence: e-mail Ticktin@hawaii.edu

D. Baines, R. Moss, and D. Dugan.
Capercaillie breeding success in relation to forest habitat and predator abundance.
Journal of Applied Ecology 2004, 41: 59 - 71.
The capercaillie *(Tetrao urogallus)* is widely valued as a game bird and an indicator of forest ecosystem quality. In Scotland, its numbers have declined since the 1970s, due primarily to poor breeding success. The authors investigated whether differences in breeding success among forests are related to predator abundance or to aspects of forest structure, with a view to identifying beneficial management practices.

Capercaillie breeding success was estimated in 7-14 forest areas in Scotland each year during 1991-2001. Forest habitat, including ground vegetation, and indices of predator abundance were assessed in each of the 14 areas in 1995. Breeding success increased with increasing bilberry (*Vaccinium myrtillus)* ground cover, but did not improve further above 15-20% cover. The main predators were carrion crow (*Corvus corone)*, fox *(Vulpes vulpes)* and raptors. Capercaillie breeding success was negatively related to the combined abundance of crows, foxes and, to a lesser extent, raptors.

A management trial in one forest showed that capercaillie bred better when most crows and some foxes were killed than when they were not. An index of pine marten abundance was related neither to the other predator indices nor to capercaillie breeding success.

Capercaillie reared more young in forests with more bilberry and fewer predators. Management to improve the breeding success of capercaillie should aim for at least 15-20% bilberry ground cover, and legal control of crows and foxes.

Correspondence: e-mail rmoss@ceh.ac.uk

L. Barrios and A. Rodríguez.
Behavioural and environmental correlates of soaring-bird mortality at on-shore wind turbines.
Journal of Applied Ecology 2004, **41**: 72 - 81.
This is a useful paper in relation to the recently held IEEM conference on alternative energy where the risk of bird mortality in wind farms was considered. The authors measured bird mortality, analysed the factors that led birds to fly close to turbines, and proposed mitigation measures at two wind farms installed in the Straits of Gibraltar, one of the most important migration bottlenecks between Europe and Africa.

Bird corpses were surveyed along turbine lines and an associated power line to estimate mortality rates. Mortality caused by turbines was higher than that caused by the power line. Losses involved mainly resident species, mostly griffon vultures (*Gyps fulvus)* (0·15 individuals turbine1 year1) and common kestrels (*Falco tinnunculus)* (0·19 individuals turbine1 year1). Mortalities were not associated with either structural attributes of wind farms or visibility.

Vulture collisions occurred in autumn-winter. The absence of thermals in winter forced vultures to use slopes for lift, the most likely mechanism influencing both their exposure to turbines and mortality.

Kestrel deaths occurred during the annual peak of abundance in summer. Carcasses were concentrated in the open habitats around a single wind farm and risk may have resulted from hunting habitat preferences.

The authors concluded that bird vulnerability and mortality at wind power facilities reflect a combination of site-specific (wind-relief interaction), species-specific and seasonal factors. Despite the large number of migrating birds in the study area, most follow routes that are displaced from the facilities. Consequently, only a small fraction of birds on migratory flights was actually exposed to turbines. New wind installations must be preceded by detailed behavioural observation of soaring birds as well as careful mapping of migration routes.

Correspondence: e-mail alrodri@ebd.csic.es

W. McDonald and C. C. St Clair.
Elements that promote highway crossing structure use by small mammals in Banff National Park.
Journal of Applied Ecology 2004, **41**: 82 - 93.
Corridors provide important structural connectivity in habitats that have been fragmented by human activities, but more empirical work is needed to identify the attributes of effective corridor design under a broad range of ecological conditions.

The authors tested the efficacy with which small rodents in Banff National Park, Alberta, Canada, used crossing structures constructed across the Trans-Canada Highway. They studied the effects of size, vegetative cover at entrances, and distance from home ranges as determinants of crossing structure use with potential relevance to other corridor types.

They also translocated animals across underpasses and overpasses. Translocated animals returned with higher success across smaller crossing structures than across larger ones, perhaps because these structures afforded more overhead cover from predators. Adding overhead cover to crossing structure entrances further improved return success and correlated with more tortuous movement of translocated animals. Animals translocated further (60 m) from crossing structures returned with lower success than those translocated closer to them (20 and 40 m).

There were also differences between the species studied. Ideal crossing structure characteristics will often be species-specific. The results imply that wildlife corridors, more generally, need to offer sufficient cover and be placed with a frequency that corresponds to the spatial scale over which targeted species move.

Correspondence: e-mail cstclair@ualberta.ca

P. Caley and J. Hone.
Disease transmission between and within species, and the implications for disease control.
Journal of Applied Ecology 2004, **41**: 94 - 104.
Although the majority of IEEM readers are unlikely to be concerned with the specific animals studied in this paper from New Zealand, the link to the Badger TB debate in the UK is intriguing.

There is concern in New Zealand that feral ferret *(Mustela furo)* populations may be acting as a reservoir of infection for domestic livestock, similar to the role played by brushtail possums *(Trichosurus vulpecula)*.

They found substantial possum-to-ferret transmission of M. bovis, and controlling possum populations is the logical first step to managing M. bovis infection in ferret populations, especially at sites with low ferret density. Intra-specific transmission is virtually absent in low-density ferret populations though evident at higher densities.

The results have management implications for other multiple-host diseases around the world, such as bovine tuberculosis and rabies. Control of within-species transmission may not be as effective for disease control as a reduction in between-species transmission. The management decision should be based on empirical estimates of the magnitude of each form of transmission.

Correspondence: e-mail peter.caley@csiro.au

T.P.Crowe, E.L. Smith, P. Donkin, D.L.Barnaby and S.J. Rowland.
Measurements of sublethal effects on individual organisms indicate community-level impacts of pollution.
Journal of Applied Ecology 2004, **41**: 114 - 123.
Due to the cost and complexity of sampling biological communities, surrogate biological measures or concentrations of toxic contaminants are often used to indicate environmental impacts. Mussels are widely used as bioindicators of environmental contamination. Physiological measurements on live mussels form the basis of scope for growth (SFG), an integrated indicator of environmental stress. However, the effectiveness of SFG as an indicator of community level effects has rarely been tested in the field.

In this study of six sites on the west coast of the UK, the diversity of macrofaunal communities associated with mussels was reduced at sites with low SFG compared with those with high SFG. At smaller scales, variation in community structure was related to biomass of mussels, mass of coarse sediments and the fractal dimension of the surface of the mussel bed.

Hydrocarbon contaminants were measured as a first step in identifying contaminants that might underpin the relationship between SFG and diversity. The authors generally found good accordance between hydrocarbon contaminant (unresolved complex mixtures) concentrations in mussel tissues, SFG and diversity, but other pollutants are also likely to be involved.

The findings illustrate the complexity of relating changes in diversity to synoptic or sublethal measures of environmental stress in the field. Mussels as indicators may be of particular value in the implementation of the European Union Water Framework Directive in Europe and similar environmental legislation elsewhere.

Correspondence: e-mail tasman.crowe@ucd.ie

H. Bennion, J. Fluin, and G.L. Simpson.
Assessing eutrophication and reference conditions for Scottish freshwater lochs using subfossil diatoms.
Journal of Applied Ecology 2004, **41**: 124 - 138.
The Water Framework Directive requires reference conditions to be determined for all water body types including lakes. The authors examined the role of the diatom record, as a tool for assessing eutrophication and for defining lake reference conditions and ecological status.

Sediment cores (representing c. ad 1850 to present day) were taken from 26 Scottish freshwater loch basins. Radiometric dating techniques established a chronology for each core. Two levels of diatom analysis were employed: a relatively high resolution (15-20 samples) at 21 lochs considered of high interest, and a lower resolution (four to five samples) at the remaining sites.

Through analysis on the diatoms, reconstructed total phosphorus (TP) concentrations were used to evaluate eutrophication. Nineteen lochs had increases in TP of $> 5\ \mu g\ l1$ (five of these $> 20\ \mu g\ l1$), six lochs had no change or negligible increases in TP ($< 2\ \mu g\ l1$), and there was evidence of a decline in TP in one loch over the period represented by the sediment cores.

The data indicate that it may be difficult to find minimally impacted waters to act as reference sites, particularly for shallow, lowland lake types. The derivation of site-specific reference conditions from the sediment record is a particularly valuable approach in such cases.

Correspondence: e-mail hbennion@geog.ucl.ac.uk.

W. J. Peach, , M. Denny , P. A. Cotton, I. F. Hill, D. Gruar, D. Barritt, A. Impey, and J. Mallord.
Habitat selection by song thrushes in stable and declining farmland populations.
Journal of Applied Ecology 2004, **41**: 275 - 293.
Declining farmland bird populations have become a major conservation issue in both the UK and Europe. Song thrush (*Turdus philomelos)* experienced a rapid decline in lowland Britain between the mid '70s and the early'90s; however, since that time they have experienced a period of stability. The decline has been most felt on farmland and lowland woodlands. Breeding densities are now low on arable farmland and the majority of song thrush breeding is associated with gardens or woodland.

This paper considers breeding season habitat usage and food resources available to song thrushes in both stable and declining farmland populations.

The authors found that field boundaries, woodland and gardens provided most sites in the mixed study area and were preferred over other habitats. Gardens provided the most nesting sites in the arable study area. Both gardens and field boundaries were heavily used in the study areas, but woodland and gardens accounted for 53% of fixes in the mixed study area compared to just 1% in the arable study area.

The results from this study strongly suggest that the availability and the quality of key foraging habitats were lower in the arable landscape, and seasonal declines in the availability of key prey sources were more pronounced in the arable landscape.

The practical relevance of this study shows that new farm woodlands created under the Farm Woodland Premium Scheme and the Woodland Grant Scheme have been shown to be attractive to song thrushes during summer and winter. New policy initiatives are needed to encourage mixed farming, damper soil and small, uncropped features across significant areas of UK lowland farmland.

Correspondence: e-mail will.peach@rspb.org.uk

P. Laiolo, F. Dondero, E. Ciliento and A. Rolando.
Consequences of pastoral abandonment for the structure and diversity of the alpine avifauna.
Journal of Applied Ecology 2004, **41**: 294 - 304.
The farmlands of Europe are diverse and reflect the ancient history of human settlement. The intensity of land use, and consequently the composition and distribution of habitats has changed greatly over time especially in the Alps where there has been a long-term trend of depopulation of rural areas and pasture abandonment.The ecological consequences are evident mostly below the timberline where shrubs and forest gradually succeed grassland.

The breeding birds of the Gran Paradiso Natural Park in northwestern Italy were surveyed. Bird diversity, abundance of grassland, ecotone, woodland and shrub species were analysed in relation to a set of variables including elevation, local habitat variables, landscape variables and grazing intensity.

This study found that grazing importance differs markedly depending on whether the focus is avian diversity or grassland bird abundance.

It was found that in the montane belt grazing maintained open habitats by limiting tree and scrub encroachment, thus grassland bird species prospered. Pastoral abandonment, where succession occurs, leads to an overall increase in avian diversity, but most species invading abandoned pastures are already common.

The conservation implications of this study are that the abandonment of grazing in the Alps has significant effects on bird species diversity and abundance, especially below the timberline where pastoral decline leads to significant changes in vegetation structure. Overall, this study found that in terms of bird conservation objectives; large-scale abandonment of long-established pastoral habitats, which are replaced with scrub, or even forest, is likely to be detrimental.

Correspondence: e-mail paolo.laiolo@unito.it

J.Grace.
Understanding and managing the global carbon cycle. Presidential address.
Journal of Ecology 2004, **92**: 189 - 202.
In this wide ranging and interesting lecture, the usual difficulties of providing an adequate summary become obvious. There is probably no substitute for reading the original.

Biological carbon sinks develop in mature ecosystems that have high carbon storage when these systems are stimulated to increase productivity, so that carbon gains by photosynthesis run ahead of carbon losses. This stimulation may occur through elevated CO2 concentration, nitrogen deposition or by changes in climate.

Sinks also occur during the 'building' phase of high carbon ecosystems, for example following establishment of forests by planting.

New methods have been developed to identify biological carbon sinks.There is broad agreement among the results from these methods: carbon sinks are currently found in tropical, temperate and boreal forests as well as the ocean. However, on a global scale the effect of the terrestrial sinks (absorbing 2-3 billion tonnes of carbon per year) is largely offset by deforestation in the tropics (losing 1-2 billion tonnes of carbon per year).

The Kyoto Protocol provides incentives for the establishment of sinks. Unfortunately, it does not provide an incentive to protect existing mature ecosystems which constitute both stocks of carbon and (currently) carbon sinks. Incentives would be enhanced, if protection and nature conservation were to be part of any international agreement relating to carbon sinks.

Correspondence: e-mail jgrace@ed.ac.uk.

M. Henry, H. Stevens, D. E. Bunker, S. A. Schnitzer, and W. P. Carson.
Establishment limitation reduces species recruitment and species richness as soil resources rise.
Journal of Ecology 2004, **92**: 339 - 347.
At local spatial scales, species richness tends to fall as productivity rises. Most explanations have focused on increased extinction, but the authors tested experimentally whether increased soil fertility reduces recruitment. Was variation in recruitment due to source limitation, germination limitation or establishment limitation, and how did litter accumulation and seed predation contribute to these processes?

They worked in a perennial-dominated early successional plant community over 3 years and added seed of 30 species, manipulated access by selected seed predators, removed litter and added slow release fertilizer at four levels (0, 8, 16 and 32 g N m^{-1}).

Seed additions increased seedling density at all fertilizer levels, and seed predation appeared to have no influence on seedling densities. In spite of high seedling densities at all fertilizer levels, final stem density declined by 70% as fertilizer increased. A strong stem density-species richness relationship suggests that declines in final stem density caused more than half of the decline in species richness along this fertility gradient.

These results suggest that establishment limitation, i.e. the reduction of growth and survival from seedling to adult, controls species recruitment in highly fertile sites.

Correspondence: e-mail HStevens@muohio.edu

L. A. Wauters, E. Matthysen, F. Adriaensen and G. Tosi.
Within-sex density dependence and population dynamics of red squirrels *(Sciurus vulgaris).*
Journal of Animal Ecology 2004, **73**: 11 - 25.
Social organization and dispersal of red squirrels (*Sciurus vulgaris* L.) differ between sexes, and intrasexual competition is intense. The authors tested whether density-dependent factors will be more strongly related to density of the same sex than to density of the opposite sex. They studied the relative importance of within- and between-sex density-dependent factors and of density-independent factors on different demographic parameters, in two populations in northern Belgium.

Spring density of males was positively correlated with tree-seed abundance in the previous year, but this was not the case for females. Within each sex, they found several demographic parameters that were dependent on the densities of the same sex; however, none of these parameters was found to be dependent on the density of the opposite sex.

Reproductive rate increased with food abundance and decreased with female density. Adult survival of females decreased with female density in autumn-winter, while in spring-summer, survival of adult males increased with the size of the previous year's seed crop.

The immigration rate of males was higher in spring than in autumn, Seed crop size positively affected red squirrel densities through increased reproduction, immigration and adult survival of males, but density-dependent reproduction and within sex-density-dependent recruitment of locally born juveniles and dispersing sub adults limit the fluctuations in numbers and regulate densities in winter-early spring, as well as in summer.
Correspondence: email: l.wauters@libero.it

J. Gurnell, L. A. Wauters, P. W. W. Lurz and G. Tosi.
Alien species and interspecific competition: effects of introduced eastern grey squirrels on red squirrel population dynamics.
Journal of Animal Ecology 2004, **73**: 26 - 35.
Throughout much of Britain, Ireland and north Italy, red squirrels *(Sciurus vulgaris* L.*)* have been replaced by alien grey squirrels (*S. carolinensis* Gmelin), introduced from North America. The authors studied squirrels in two mixed woodlands in north Italy and two conifer forests in north England. In both countries, red squirrels occupied one of the sites and the other site was occupied by both species.

They previously showed that grey squirrels caused reduced body growth in juvenile and subadult red squirrels, and compete for tree seeds cached by adult red squirrels in spring. The paper reports on the effects of grey squirrels on three fitness components in red squirrels that have consequence at the population level: fecundity, residency and recruitment.

Litter production peaked in the spring and summer, but fewer females bred in the summer with grey squirrels present. In addition, fewer individual red squirrel females produced two litters per year in the sites with grey squirrels. Moreover, red squirrel recruitment rate and, in the mixed broadleaf sites, red squirrel juvenile residency, decreased with increasing grey squirrel density.

Fecundity of individual female red squirrels was lower in red-grey than in red-only sites because they had a lower body mass in sites with grey squirrels.

Overall, there was no significant effect of grey squirrels on residency of adult red squirrels or on population turnover rate. However, the presence of grey squirrels resulted in a reduction in red squirrel fitness, which was evident by lower population summer breeding and a lower recruitment. Over time, this will result in a decline in population size and eventually population extinction.

E. B. Nilsen, J. D. C. Linnell and R. Andersen.
Individual access to preferred habitat affects fitness components in female roe deer *(Capreolus capreolus).*
Journal of Animal Ecology 2004, **73**: 44 - 50.
In this study the effects of differences in home-range quality on individual fitness were investigated in a roe deer population in an agricultural-woodland mosaic landscape in central Norway.

Woodland was the most preferred habitat: its availability was therefore used as an index of home-range quality. It was found that the quality of the does' winter home range affected fawn production in the subsequent spring, as females with greatest availability of preferred habitat during winter produced the larger litters the subsequent spring.

Furthermore, the winter weights of the fawns seemed to be affected by home-range quality in a complex way. First, home-range quality in the prenatal winter seems to influence the birth date and in turn the weight of the fawns in August. Also there was an immediate effect of the quality of the home range that the fawns occupied during the postnatal winter.

Correspondence: e-mail erlend.nilsen@bio.ntnu.no

J. L. Quinn and W. Cresswell.
Predator hunting behaviour and prey vulnerability.
Journal of Animal Ecology 2004, **73**: 143 - 154.
Models of how animals manage predation risk have begun to describe predator responses to prey behaviour as opposed to measures of prey abundance relatively recently. Prey vulnerability, however, may improve our understanding of predation because predators could maximize foraging success by selecting prey on this basis.

The authors tested the hypothesis that sparrowhawks *(Accipiter nisus* L.*),* a typical generalist predator, hunt redshanks *(Tringa totanus* L.*)*, a favoured prey species on coastal shores, primarily on the basis of their vulnerability rather than their abundance.

Five direct measures or indicators of redshank behaviour predicted sparrowhawk attack success and therefore serve as measures of redshank vulnerability. These and other vulnerability measures influenced whether sparrowhawks decided to hunt redshanks on saltmarsh habitat. A model that included most of these measures predicted correctly whether sparrowhawks hunted redshanks (attack decision) 90% of the time and accounted for up to 75% of variation. Prey abundance accounted for no additional variation.

Thus the hunting behaviour of some predators can only be predicted well by several highly dynamic and interacting factors related to prey vulnerability. These results mean that, theoretically at least, the management of prey populations may sometimes be achieved best by manipulating prey vulnerability, rather than by culling their predators.

Correspondence: e-mail john.quinn@zoo.ox.ac.uk

Institute News

In Practice
The new format of the last edition of In Practice was generally well received so we will be keeping to this for the foreseeable future. It certainly helps a great deal with the illustrations for the articles.

Conferences
The Spring Conference on Renewable Energy - is it ecologically friendly? passed off very well. Hamilton House in London was a new venue for IEEM and it proved very successful. A full report will follow in the next edition of In Practice

The Autumn Conference on Restoration Ecology is now starting to make progress and it promises to be a very interesting event indeed. Offers of papers are still welcome.

Obituary
The Institute is sorry to report the death of **Professor John Benson**, MIEEM of Newcastle University, a founder member of IEEM. As one of the early local authority ecologists he was very much involved with the establishment of nature reserves and emerging environmental agendas of the early 1970s. He then became lecturer in Landscape Design at the University of Newcastle teaching ecology and took a particular interest in Environmental Impact Assessment.Recently he had been particularly concerned with the impact of wind turbines on the landscape. He was appointed to a personal chair at Newcastle University in 2003. Prior to his death had been working on editing the proceedings for the Newcastle Conference on Urban Ecology.

News of Members
The Institute is pleased to note that **Sarah Fowler, MIEEM**, of the Nature Bureau, Secretary and Trustee of the Shark Trust, has been awarded an OBE in the Queens Birthday Honours, for Services to Marine Conservation – Congratulations.

President Elect, **Dr Chris Spray, MIEEM** currently Environmental Director for Northumbrian Water has been appointed as Director of Environmental Science for the Scottish Environment Protection Agency. He is expected to start his new appointment in July. Following on from Sue Bell in November, Chris will see that the Presidency stays in Scotland for another two years.

Council Member, **Dr Tim Bines, MIEEM** has been appointed as the new Chief Executive of the Society for the Environment with effect from 1st June.. As the first staff member of the new organization, Tim has the responsibility to plot the way forward for the new organisation and we wish him well.

Looking to the Future – the IEEM Business Plan
Over the last few months, Council and the Committees have been developing a business plan to take us forward for the next few years. This is a vital part of any organisation. The exercise is expected to be completed by the June Council, having taken into account various submissions and the membership survey of three years ago.

IEEM Finances
The financial year 2003 – 2004 proved to be another period of steady advance for the Institute with a further useful addition to the reserves. This should allow us to expand further our services to members, most particularly in the areas of Professional Development and maintaining standards.

CPD
It is the hallmark of a Professional Institute that all members undertake CPD. The IEEM programme has been in existence for 2 years now but acceptance of this fundamental concept seems to be far from complete by the membership. For those who did not heed the warning in the last edition, evidence of having completed CPD will be required for all members seeking to become Chartered Environmentalists. A further 10% sample of the membership will be taken shortly and enquiries made. Although there was a welcome increase in the uptake form the previous year it seems that a number of members who completed their CPD record in the first year, failed to do so in the second year. Remember having to produce a record of 20 hours CPD in a year is not onerous - think about it and you will be amazed at how easy it is .

Ask yourself – did you attend an IEEM or other relevant conference? Did you attend an IEEM workshop or other appropriate sessions? Did you actually read articles in In Practice or other publications ? Have you acquired a new skill during the course of the last year? – well of course you did!

EFAEP
The European Federation of Associations of Environmental Professionals is developing at an active pace and, through various working parties is now starting to formulate ideas for European wide environmental issues. Mike Barker (MIEEM), Chair of the External Affairs Committee, and Joel Bateman (External Relations Officer) attended a meeting organised by EFAEP Working Group 1 on the 10th June. The meeting comprised 11 members of EFAEP who met with a representative from the DG Environment in Brussels; to discuss how EFAEP could be involved with the Environmental Technologies Action Plan (ETAP).

Unfortunately the outcome was not as constructive as was hoped at the premeeting brief; however, it is very positive to note that EFAEP now has influence in Brussels and is widely known throughout the DG Environment.

At the Annual meeting on the 11th June, attended by Mike Barker and Joel Bateman with their IEEM hats on and Dr Tim Bines as an observer for SocEnv, many items of interest were discussed. Special mention should be given to four items, one: the development of a European wide database of environmental professionals, two: the need to expand the influence of and size of membership of EFAEP, presently 13,000 individual members, three: the development of issue driven working groups which will proactively seek European partners to discuss legislation and topics of relevance to their organisation, and four: the Environment and Health Conference to be held at Pollutec in November.

Launch of SEA guidance
Jim Thompson and Joel Bateman attended the launch of a new guidance document by the Royal Society for the Protection of Birds, Environment Agency, Countryside Council for Wales and English Nature on **Strategic Environmental Assessment and Biodiversitry: Guidance for Practitioners**. It was good to see so many IEEM members either involved with or ready to use the guidance. A special thanks should be given to Zana Juppenlatz of ADAS who organised the event. We look forward to seeing the impact of this guidance now that it is available. For further information please contact English Nature website: www.english-nature.gov.uk

Membership Subscriptions
Council will shortly be considering a proposal to introduce a modest rise in membership fees from this October. These have remained constant since 1994. There are likely to be financial advantages introduced for paying by Direct Debit so now would be a good time to sign up. Apart from inflation being considerable over 10 years, a rise will allow us to accelerate some of the services to members.

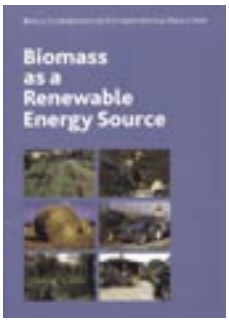
Contact Points
We are now starting to build up contact points in the Statutory Agencies and other large bodies. These are the people to contact about membership or any issues which you think the Institute should be pursuing. The list will be expanded in time but the contacts so far are:
English Nature: Rob Cooke: Rob.Cooke@english-nature.org.uk
Scottish Natural Heritage: Christine Welsh: christine.welsh@snh.gov.uk
Countryside Council for Wales: David Parker: d.parker@ccw.gov.uk

Notice of AGMs
The main Institute AGM – Wednesday, 10th November at 17.30 at the Royal Clifton Hotel, Southport.

The Scottish Section AGM – Thursday 7th October at 12.45 at the Village Hall in Nigg, (Nr. Cromarty).

The North East Section AGM – Friday, 8th September at 18.30 at he Northumberland Wildlife Trust Garden House, St. Nicholas Park, Gosforth, Newcastle-upon-Tyne.

Recent Publications



Biomass as a Renewable Energy Source
Royal Commission on Environmental Pollution
Available from: Royal Commission - www.rcep.org.uk or Tel: 0207 799 8972
Cost: Free

The Royal Commission on Environmental Pollution has been producing reports since 1971 and this is the latest in the series.

The report is well set out and has chapters covering the different types of biomass fuels, the generation of electricity and heat, environmental implications, economics and a staged approach for the immediate and long-term future.

The report calls for a new renewable heat obligation that would bring encouragement to the generation of heat rather than just electricity; the formation of a new government/industry biomass forum and Biomass fired Combined Heat and Power (CHP) in all new-build developments.

This report will be of interest to all who attended the IEEM Renewable Energy conference in May 2004 and refers to an earlier publication "Energy – the Changing Climate" which may also be of interest.

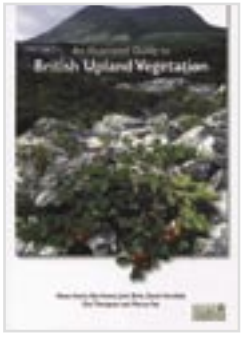
Dictionary of Environment and Ecology

Author: S.M.H. Collin
Available from: www.bloomsbury.com
Cost: £9.99
ISBN: 0747572011

This book, the fully revised edition of the bestselling Dictionary of Environment and Ecology now includes over 9,000 terms from all areas of ecology and the environmental sciences. Topics covered range from soil science, climatology, agriculture (including GM and organic foods), NGOs, pollution, waste management, environmental protection and endangered species.

This book also contains useful facts about disasters, organic cycles and other interesting bits of information. The Dictionary is most certainly aimed at students of ecology or the environmental sciences, but may form a practical reference for environmental professionals.

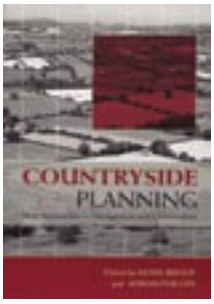
An Illustrated Guide to British Upland Vegetation



Authors: Alison Averis, Ben Averis, John Birks, David Horsfield, Des Thompson (MIEEM) and Marcus Yeo
Available from: Natural History Book Service (www.nhbs.com) or phone +44 (0) 1803 865913.
Cost: £25 plus post and packing (£15 with proof of student status)

An Illustrated Guide to British Upland Vegetation published by the Joint Nature Conservation Committee (JNCC) has been written by a team comprising some very experienced upland field ecologists. The book describes the range of plant communities found in the British uplands, providing detail on why our uplands are so important globally. The authors paint a good overview of upland ecology (with many illustrations and up-to-date distribution maps); before tackling 99 different upland habitiat types in more detail. This book also contains a useful key which leads the reader onto the various habitats.

In each section the habitat type is described with synonyms and shown how it differentiates from other similar habitats. The ecology, conservation value and management is then discussed. This guide will be of real interest to upland ecology managers, and should be read by all who have dealings with upland ecology. It is exceedingly helpful, provides an invaluable resource and is therefore highly recommended.



Countryside Planning
New Approaches to Management and Conservation
Editors: Kevin Bishop and Adrian Phillips
Available from: www.earthscan.co.uk
Cost: £21.95
ISBN: 1853838497

Countryside Planning, New Approaches to Management and Conservation is a timely book focusing on the new tools which have been developed for planning and managing the countryside.

With the increasing amount of European and International legislation becoming the drivers of countryside management and conservation within the UK, there have been numerous responses at the national and local levels within the UK.

In this book, a wide range of scholars and practitioners review the international drivers affecting countryside policy and practice. Case studies help to assess the value of national and local responses. The book is a coherent volume that provides a fully up-to-date review and analysis of the pressures on the countryside, the policies for the future and the keys to successful implementation.

Countryside Planning is broken up into well organised digestable sections:

Part 1: The International Context for Countryside Planning and Management which deals with issues such as the Development of Biodiversity Action Planning, European Frameworks for Nature Conservation: The Case of the Birds and Habitats Directives, Our Landscape from a Wider Perspective and Policy Context for Community Involvement in Countryside Planning.

Part 2: New Concepts and Tools featuring sections on: Development and Application of Landscape Assessment, Guidelines in Ireland (Case Studies using Forestry and Wind Farm Developments), Historic Landscape Characterization, Connecting the Pieces (Scotland's Integrated Approach to the Natural Heritage), LANDMAP (A Tool to Aid Sustainable Development).

Part 3: From Theory to Practice addresses: Applications of Landscape Character Assessment, The Link Between Landscape, Biodiversity and Development, Plans (A Move Towards 'Positive Planning'?), A New Way of Valuing Land in the Countryside: Are We Lost Without a Map? and Community Involvement in Countryside Planning in Practice.

Countryside Planning will be a useful overview for planners, local authorities and rural organizations, and others interested in the developments of countryside planning within the UK.

Guidelines for Assessment of Ecological Impacts of National Road Schemes
National Roads Authority (Republic of Ireland)
Available from: The National Roads Authority
Tel: +353 1 6602511
Cost: Free

This document aims to provide guidance on the assessment of impacts on the natural environment during the planning and design of national road schemes in Ireland. It elaborates on the references to ecology contained in the National Roads Project Management Guidelines (2000), which provides the overall framework for managing the planning and design of national road schemes. In particular, the guidelines expand on the ecological work to be undertaken at the Constraints Study phase, Route Corridor Selection phase and the subsequent preparation of the Environmental Impact Statement (EIS).

The guidelines include nine appendices. These set out the designated conservation areas in the Republic of Ireland (1), the legislation pertaining to legally protected species (2), a site evaluation scheme (3), criteria for assessing impact significance for terrestrial and aquatic sites (4), useful sources of information (5), the Heritage Council habitat classification codes (6), the optimum periods for ecological survey work (7), criteria for evaluation of hedgerows (8) and a glossary of terms (9).

These guidelines are not mandatory but are recommended to achieve appropriate consistency and standards when assessing and reporting on the ecological impacts of road schemes in the Republic of Ireland.

News in Brief

Red Kites @ Rockingham
For the fourth successive year the webcam is up and running following the progress of a pair of red kites in Rockingham Forest. As usual, the pair has built a new nest several hundred metres away from the nest they used last year. Three eggs were laid in early April and all have recently hatched. While the chicks are still small and vulnerable one of the adults will stay with them on the nest almost all the time, brooding them to keep them warm. As they grow and develop over the next few weeks the adults will spend more time away from the nest, hunting for food to keep the young well fed.

You can visit the Red Kites @ Rockingham visitor centre, open every day from 10am-5pm (weekends till 6pm), just off the A43 between Stamford and Corby.
Please visit englishnature.gov.uk for further information

Chairman Reappointed
IEEM members will be pleased to know that Sir Martin Doughty (a patron of the Institute) has been re-appointed for a second term as Chairman of English Nature.

Virtual Nature
English Nature have been developing their website further with the introduction of virtual tours.

The first concentrates on Lathkill Dale National Nature Reserve. The tour allows you to transport yourself to the sunny, flower-filled slopes of one of England's finest nature reserves, take in the sights, smells, sounds and feel of Lathkill Dale NNR. Second is the Lundy Marine Nature Reserve where you get to travel around Lundy MNR, experience the island from its cliff tops to its underwater depths, without getting wet. Finally 'Nature in the garden'. This tour shows you can creat a wildlife haven in any garden and you don't have to be a naturalist or a scientist to do it!

There are also plans to have the reserve of Chippenham Fen online soon which will include the small herd of Asian water buffalo that roam the site. The tours are great fun with all the whizzes and bangs that you could possibly want from a website.
Visit englishnature.gov.uk to take your virtual tour.

House Sparrows in Great Britain
A new guidance leaflet "House Sparrows in Great Britain" has been produced by Defra in partnership with the RSPB and the BTO. This heralds the start of an initiative to encourage people to create suitable habitats to increase the numbers of the treasured British house sparrow.

The leaflet, which is aimed at reversing the current trends in the population of the house sparrow, will provide individuals and communities with information on ways to enhance the habitat in their local area to make it suitable for house sparrows to breed. This will begin to redress the balance and subsequently allow these birds to be more successful in those areas where previously they have had little success.
For futher information please visit www.defra.gov.uk/wildlife-countryside/resprog/findings/sparrow/

Highland nature reserve wins two interpretation awards
Beinn Eighe National Nature Reserve in Wester Ross has won two major national awards for the outstanding way it informs and involves the public.

The Interpret Britain and Ireland Awards are given each year by the Association of Heritage Interpretation (AHI).

This year, the awards gave special recognition to sites that attract and involve children and young people. In addition to this special award, Beinn Eighe received a second award for the overall quality of the interpetation in its visitor centre and on its all ability trails.
For more information please visit snh.gov.uk

CCW adopts new strategy to care for Wales' best wildlife sites
The Countryside Council for Wales is shifting its emphasis from designating new sites of special scientific interest (SSSI), to concentrate on bringing existing sites into better condition.

The announcement reflects CCW's concern for the condition of Wales' SSSIs – notified over the last 50 years as the best wildlife habitats and geological features in Wales. They cover more than 12% of the land area of Wales.

Over the last few months, CCW's locally based staff have undertaken a rough assessment of the condition of Wales' SSSIs. The picture is not a rosy one – the exercise suggests that, while 47% of sites are in a favourable or recovering condition, 52% are in an unfavourable and worsening condition, with the remaining one per cent having been partially lost in recent years.

CCW's proposals for strengthening its working relationship with landowners will include plans for a SSSI newsletter, more face-to-face contact between CCW staff and landowners, and reader-friendly paperwork.
For more information please visit ccw.gov.uk

White and wild increases wildlife acreage
The wildlife friendly milk, celebrates its 1 year anniversary with partners Sorn Milk. White and Wild is a Wildlife Trust branded product with the aim of encouraging wildlife friendly farming practices while raising money for much needed conservation work. Since the 47 Sorn Milk farmers invested £250,000 in the milk over 1700 acres of their farms have been dedicated to habitat management. Each of the White and Wild farmers has been following a FWAG biodiversity action plan especially for their farm.
For mor information please visit wildlifetrusts.org

Management Plans of AONBs
England's Areas of Outstanding Natural Beauty (AONBs), nationally recognised as some of its finest countryside, finally come of age with the completion of management plans to conserve and enhance their spectacular landscapes, announces the Countryside Agency.

England's 37 AONBs cover some 15% of England, more than twice the land area in national parks, and are recognised in law as being of equivalent landscape quality. The management plans, produced by local authorities in consultation with residents, landowners and businesses, should ensure that the environment, economy and community in these areas will be protected and enhanced. The plans recognise that in these nationally important landscapes, emphasis must be placed on maintaining their natural beauty. Ideas from the plans include restoring and conserving key landscape features, maintaining famous viewpoints, improving information for visitors and encouraging them to enjoy the landscape and, in some cases, the food produced from it.
For more information please visit countryside.gov.uk.

Sustainable Watershed Management Award
Swiss Re's ReSource Award is designed to recognise projects that preserve the ecological, social and economic value of water resources. The winning project was submitted by the Vietnamese provincial government of Quang Nam in association with WWF Indochina. Working together, the two parties want to curtail the overexploitation of forests and rivers in this central Vietnamese province. The allocation of land rights by the state to the local population is at the centre of the project, which was launched in February 2004. This allocation of land delegates responsibility for the conservation of this vital natural resource to those directly affected. The land reform is accompanied by training, awareness-building and performance-related incentives to ensure that the local communities actually acquire the skills they need to manage their forests, land and water resources with due care. Dao Nguyen Thi of WWF Indochina received the award. She had recently obtained an MSc from the DICE the Durrell Institute of Conservation Ecology at the University of Kent. The DICE lecture appears elsewhere in this edition.
For more information please visit www.swissre.com.

New Chair–elect for IUCN UK Committee
Dr Andy Brown, Chief Executive of English Nature has been voted chair-elect of the UK Committee of IUCN . The Committee is currently chaired by Dr Jane Smart, Chief Executive of Plantlife International. Dr Brown will formally succeed Dr Smart at the AGM of the UK Committee in spring 2005, when the current chair's three year term expires.

Symposium on Ecological Impact Assessments: Science and Best Practice

Bath Spa University College: 12-13th July 2005

1st announcement and call for papers

Environmental Impact Assessments (EIAs) are an important tool for conserving ecosystems and biodiversity in the wider environment. Recent national and international legislation has increased mandatory requirements for EIAs, their scope and standards. However, standards of ecological assessment have often been deficient and current ecological principles and scientific methods overlooked or poorly applied.

The BES (Conservation Ecology Group) and IEEM are therefore organising a joint meeting, the aim of which is to complement the Guidelines for Ecological Impact Assessment that are being prepared by IEEM by focussing on raising the standards of ecological science in EIAs.

The conference is primarily aimed at ecological scientists undertaking research applicable to impact assessments, EIA clients and practitioners, and others involved in the EIA process, including developers, consultants, planners, government development agencies, local authorities, conservation agencies, lecturers and trainers in EIA and non-governmental conservation organisations.

The meeting will consist of presentations reviewing key issues, and workshop sessions to produce agreed practical recommendations on best practice. The symposium presentations and the workshop recommendations will be fully published as edited and peer reviewed proceedings.

Proposals are now invited for papers and presentations on the following topics:
Surveys and evaluation of ecological importance, e.g.
• Design and analysis of ecological surveys and the probability of detecting species of conservation importance.
• Identification of valued ecosystem components and sensitive receivers.
• Evaluating and reporting on the importance of habitats and species.
• Evaluating the importance of a species' population (e.g. biogeographical importance, the role of metapopulations and migration staging posts).
• Evaluating ecosystem functions and services.

Predicting impacts and their significance, e.g.
• The application of risk theory to ecological impact predictions.
• Modelling impacts of habitat loss and change.
• Quantifying disturbance impacts.
• Predicting cumulative impacts.
• Reporting on the significance of impacts.

Mitigation techniques, e.g.
• The effectiveness of translocations and the factors that promote success.
• Habitat restoration, enhancement and creation; predicting the likelihood of success and the value of habitats in the short and long-term.

Presentation proposals should initially assume a 40 minute presentation.

Proposals for presentations should be made by submitting a detailed abstract together with a CV to the conference coordinator Graham Tucker g.tucker@ecological-solutions.co.uk (Tel. 01480 498395). Details about the conference can be found on the BES website (www.britishecologicalsociety.org) and IEEM website (www.ieem.org.uk).

The deadline for submission of proposals is 1st November 2004.

LIFE Goes On...

Robbie Craig, MIEEM

The LIFE programme, the financial instrument for the environment, was started in 1992 to fund innovative projects and help develop the environmental policy of the European Union. It is likely that you will have come across a LIFE project without knowing it; there are 36 active projects in the UK. In London, LIFE helped set up the London Walking Network , 'Car free days' grew out of a French LIFE project and LIFE is currently funding conservation of the Capercallie in Scotland. Since 1992 €100m has co-financed 149 projects in the UK and across Europe as a whole, around 2000 projects have been co-financed. The programme has been reviewed and updated every 5 years since it started and was due to come to an end in 2004. However the European Parliament has voted to update and extend it again until 2006, making €150m available this year and next year for new projects.

A call for new proposals will be posted on the Commission's LIFE website soon and bidders will have to submit their completed proposals to Defra by the beginning of October. The call will give the specific guidelines for the types of new project they want. The guidelines for new projects will be based on current EU environment policy and the four priorities of the 6th Environmental Action Programme (EAP) in particular. There are 3 elements to the LIFE: LIFE Nature (LN), LIFE Environment (LE) and LIFE third Countries.
• LN funds projects that support the Nature and Biodiversity priority of the 6th EAP, in particular the Natura 2000 network, the Birds and Habitats directives.
• LE supports projects in Climate change, Environment and Health, and Natural Resources and Waste, priority areas. In particular by demonstrating and developing new methods for the protection and the enhancement of the environment. It also funds projects that update specific EU directives or policies.
• LIFE-Third countries funds capacity building projects in countries bordering the EU and only absorbs around 6% of LIFE funds.

Projects normally last between 18 and 36 months and the total cost is usually between €800,000 to €1.5m, but projects costing €5m can be considered. Up to 50% of the total cost can be met by an award from programme funds. Only one call is made each year.

Projects have to disseminate information about their activities, set up a website and pass on the knowledge and experience they have gained, with the idea that the information can be used by anyone in Europe who needs to tackle similar issues. The IPR for any innovation remains with the beneficiary, it is the environmental impact of the approach that is disseminated. Information about all projects funded since 1992 can be accessed online, and copies of reports can be requested from the Commission. In the commercial sector and for SME's, the programme is the best way to develop applications from the results of research and development work.

In the new call there is interest in projects that improve a BAT (best available technology) that reduces the environmental footprint of industrial processes ; for new approaches that re-use, recycle, sort or prevent, difficult waste streams; and for new approaches to reduce diffuse pollution.

By the time the Commission publishes the call it will be quite late in the year and applicants will need help to fully develop a robust project by the October deadline. If you have a project that might meet the criteria please contact Defra urgently so that we can advise you on the best way to proceed.

LIFE Environment, contact Robbie Craig on 020-7028 8562. www.defra.gov.uk/environment/life/home.htm or email Life.env@defra.gsi.gov.uk
LIFE Nature, contact Tim Andrews on 0117 372 8558 or email tim.Andrews@defra.gsi.gov.uk

Prospective members of IEEM

IEEM is pleased to welcome applications for membership from the following:
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 30th July, 2004. 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.

Full Membership Applications
Mr Julian C. Balson, Miss Anna E. Bendall, Mr Paul R. Benyon, Mr Richard N. Birch, Dr Marion J. Bryant, Mr Peter J. Burston, Miss Karen J. Butterworth, Miss Rachael H. Carrie, Miss Lucy V. Cash, Mr Paul M. Collins, Miss Clare E. Crane, Mr John E. Crossley, Mr Neville Davey, Mr Ian F. Davidson-Watts, Mr Paul J. Derbyshire, Miss Helen C. Doe, Mr Michael Drury, Mr Justin Gillett, Ms Anna L. Gundrey, Dr Richard J. Handley, Dr Jesse C. Hillman, Mr Simon R. Johnson, Mr Richard N. Jones, Dr John Knight, Miss Sharne E. McMillan, Mr Angus M. Proctor, Mr Derek J. Richardson, Mr Stuart Silver, Mr Richard J. Snow, Mr Glyn D. Stewart, Dr Jim R. Thompson, Dr Stewart Thompson, Dr Peter I. Webb

Associate Membership Applications
Miss Elizabeth D. Allen, Mr Timothy P. Allen, Mr Robert C. Aquilina, Mr Russell J. Barber, Miss Sarah A. Bassett, Mr Joel C.I. Bateman, Mr Steven J. Bater, Miss Carly J. Bawdon, Dr Edward J. Bodsworth, Miss Catherine J. Born, Dr Benjamin O. Brilot, Mr Austin C. Brown, Mr Ben Cattermole, Miss Victoria Chapman, Miss Joanna E. Clarke, Mr Howard Colmer, Mr Adam J. Denard, Miss Lois K. Gregory, Miss Tanja A. Hofmann, Mr Martin D. Holt, Mr Nicholas Jackson, Mr Thomas E.R. Kellett, Mr Peter M. Lawrence, Miss Fiona J. Lawson, Miss Claire F. Long, Miss Helen Marchant, Miss Imogen M. Morris, Mr Daniel Neill, Dr Susannah O'Hanlon, Miss Jennifer Preston, Mr Ian D. Rees, Miss Lynne F. Richards, Miss Emma-Jane Riley, Dr Lynsey J. Robinson, Mr Andrew J. Russell, Mr David C. Sweeting, Dr Robert E. Souter, Miss Raffaella Tentindo, Miss Claire E. Wilmer

New admissions to IEEM

IEEM is very pleased to welcome the following new Members:

Full Membership
Mr Michael T. Atkin, Dr Andrew J. Barker, Mr Alan M. Bell, Mr Jonathan A. Bennett, Mr Anthony C. Blunden, Mr Cain Blythe, Mr Daniel Bright, Mr Jonathan A. Burney, Mr James P. Byrne, Miss Phillippa A. Caswell, Mr Ian Crosher, Mrs Angela M. Darwell, Dr Philip A. Eades, Miss Lyn Eccles, Mr Frederick E. Edwards, Mrs Roberta M. Epps, Dr Philip M. Fermor, Mr Christopher Formaggia, Mr Owain D. Gabb, Mr John M. Gallacher, Mr James A. Garry, Miss Drusilla Hall, Mr Robert P. Harley, Mr Neil R. Harvey, Mr Nicholas E.J. Heasman, Miss Amy J. Hinks, Dr Katherine L. James, Miss Suzanne M. Jones, Mr Shane G. Larkin, Mr David MacArthur, Mr Cameron M. MacIver, Mr Edward C. Mackey, Miss Joanna Marshall, Mr David Martin, Mr Patrick McKenna, Miss Helen S. Miller, Dr Catharine H. Mordaunt, Ms Fleur M. Oliver, Mr Richard W. Parkinson, Ms Sarah Pemberton, Miss Emma J. Pollard, Mrs Diana L. Pound, Mr Stuart H. Priestley, Mr Oliver Prudden, Dr Katy E. Read, Mr Matthew D. Saxon, Mr Keith Seaman, Miss Victoria J. Sibley, Dr Hilary S.C. Thomas, Mr Peter J. Wells, Mr Stephen Wilson, Mr Graeme M. Worsley, Mr Daniel H. Wrench

Associate Membership
Mr Jon B. Allen, Miss Alison F. Aldous, Miss Angela K. Bond, Miss Sarah J. Bristow, Mr David A. Broughton, Miss Katherine E. Brown, Miss Sarah H. E. Brown, Mr Frank Burke, Miss Jennie Caddick, Mr Henry M.N. Campbell-Ricketts, Miss Elizabeth J. Cartwright, Mr Gary Cole, Miss Janet H. Collins, Miss Rebecca Collins, Mr Paul Cottington, Miss Ruth E. Cove, Miss Emma Coverdale, Mr Simon Curson, Miss Melanie J. Durant, Miss Kym C. Edwards, Miss Emma N. Green, Dr Wendy M. Hinks, Mr Jeremy J. Ison, Miss Eleanor P. Jones, Mr Paul D. Keeling, Miss Melanie C. Knight, Mr David A. Knox, Miss Katharine J. Land, Dr Glenn J. Langler, Miss Sarah L. Mansbridge, Mr Anthony A. Marshall, Mr Noah T. A. Mims, Miss Alison Nasta, Miss Catherine O'Riordan, Miss Emma R. Ogden, Mrs Anna L.Outlaw, Mr Rhys D. Owen-Roberts, Mr Stuart Parsons, Mr Lee Penrose, Miss Sarah F. Ryan, Mr David T. Scholefield, Mrs Susan M. Searle, Mr John Simmons, Miss Sarah C. Simons, Miss Camilla H. G. Smith, Mr Adrian R. Spankie, Miss Tracy Stanley, Miss Debra A. Stickley, Miss Harriet Vaight, Miss Eleanor Weir, Miss Rhiannon L. Whitworth, Dr Andrea Wilcockson, Ms Suzanne A. J. Wilkinson, Miss Rebecca S. Willetts, Mr David J. Williams, Miss Lorraine Wilson, Miss Lisa R. Wright

Affiliate Membership
Mr Simon M. Benson, Mr Iain Hysom, Miss Jenette Howard, Mr Barry Johnson

Student Membership
Miss Jenny Alarcon, Mr Martyn D. Catlow, Mr Nicholas D. Childs, Miss Harriet H. Dennison, Miss Marie S. Evans, Mr Kenneth N. Hodgson, Mr Christopher J. Kettle, Miss Sabina Kuntner, Mr William Lever, Miss Samantha J. Lyme, Mr Simon P. Maher, Mr Christopher McPake, Mr Roger A. Middleton, Miss Eva Norberg, Mr Paul Seaby, Ms Helen M. Woods

The following have successfully upgraded their Membership from Associate to Full
Miss Katharine H. Fisher, Miss Emma Goldberg, Mr Fraser Maxwell, Miss Joanne Myers, Miss Jane Orr, Miss Victoria A. Smith, Mr Christopher Vine, Mr Richard Wilson, Miss Sandie Wilson

The Course programmes for 2004 for the Centre for Alternative Technology, Field Studies Council, Losehill Hall, Plas Tan- y- Bwlch and BTCV are all now available. Each offers a wide range of courses that might be of interest to IEEM members. Information from:

Centre for Alternative Technology: Further details about each course can be obtained from Joan Randle.
Tel: 01654 703743, Fax: 01654 703605, E-mail: joan@cateducation.demon.co.uk.

Field Studies Council: For a copy of the FSC Courses 2004 brochure, contact FSC head Office, Preston Montford, Montford Bridge, Shrewsbury, Shropshire, SY4 1HW. Tel: 01743 850 674, Fax: 01743 850 178, E-mail: fsc.headoffice@ukonline.co.uk.website www.fieldstudiescouncil.org

Losehill Hall: Details from Losehill Hall, Peak District National Park Centre, Castleton, Hope Valley , Derbyshire S33 8WB Tel: 01433 620373, Fax: 01433 620346, E-mail: training@losehill.u-net.com.

Plas Tan-y-Bwlch: Details from: Plas Tan-y-Bwlch, Maentwrog, Blaenau Ffestiniog, Gwynedd LL41 3YU. Tel: 01766 590324, Fax: 01766 590274, E-mail: Plastanybwlch@compuserve.com.

BTCV Courses: – practically based. Details from: BTCV Training Programmes Unit, Red House, Hill Lane, Great Barr, Birmingham B43 6LZ. Tel: 0121 358 2155, Fax: 0121 358 2194, E-mail: ETN@ukgateway.net

8 July. Japanese Knotweed – Critical issues for developers, builders and their consultants. A major national seminar with two professional workshops on 21 July and 23 September.
Details from www.ikeconet.co.uk or 0114 2724227

14 July. How to Develop a Community Local Seeds Initiative. Sheffield. The Sheffield Wildlife Trust has set up a project involving the community to grow and propagate locally sourced native trees and wild flowers, using allotments and open spaces.
Details from www.floralocale.org

19 - 20 July. FBA Annual Scientific Meeting. University of Plymouth. In the Association's 75th Anniversary year, our invited speakers will focus on various aspects of the use of long-term data in understanding freshwater ecosystems, reflecting the FBA's long-standing commitment to this area of research
Details from www.fba.org.uk

21 - 23 July. Climate Change and Aquatic Systems: Past, Present and Future. University of Plymouth.
Details from Ronni Edmonds-Brown email: v.redmonds-brown@herts.ac.uk

1 September. Bringing back the meadows and wild flower grasslands. Settle, N. Yorkshire. This day will look at methods for restoring wild flower diversity to agriculturally improved grasslands.
Details from www.fba.org.uk

8 Sept. IEEM N.E. Section Meeting. Does the environment have to cost? Northumberland Wildlife Trust, The Garden House, Gosforth Newcastle. Time 5.30pm AGM 7.00pm
Details from Steve.Pullan@virgin.net

7 - 9 September. BES Annual Meeting. University of Lancaster. As well as the usual sessions there will be thematic topics on invasive species, practical applications of tropical ecology, putting a value on nature and the ecological effects of nitrogen deposition, all with invited keynote speakers.
Details from www.britishecologicalsociety.org

7 - 9 September. 8th National Heathland Conference. University of Sussex, Brighton. Themes include: the value of heathland as social and cultural landscapes, management techniques and many more.
Details from the Weald Heathland Initiative T: 01580 879958 or their website www.highweald.org.

8 - 10 September. Working with Crayfish, STAGE II: Mitigation of Development Works and Control of Crayfish Plague & Non-natives. Settle, North Yorkshire This residential course will provide more advanced training in aspects of working with both native and non-native crayfish species in a range of situations.
Part of the IEEM CPD programme

9 September. Lake and Reservoir Management. Carsington Water, Derbyshire. Looking at wetland ecology, habitat design and creation, recreational zoning and the impacts of fluctuating water levels.
Part of the IEEM CPD programme

15 September. Controlling Japanese Knotweed - the Swansea Experience. Swansea, South Wales An informative, interactive and informal day to learn about Japanese knotweed and how the problems of the UK's most invasive plant have been dealt with in Swansea, the country's knotweed capital.
Part of the IEEM CPD programme

16 - 17 September. Managing trees and woodlands as Habitat for Bats. Bournemouth University
Details from Dr Adrian Newton 01202 595670 or email anewton@bournemouth.ac.uk

19-23 September 13th International Conference on Aquatic Invasive Species. The Institute of Technology, Ennis, County Clare, Ireland.
Details from their website www.uni-giessen.de/gfoe2004/

22 September Reedbeds, Bitterns and Biodiversity. Hertfordshire The Rye Meads complex in the Lee Valley has been the subject of considerable habitat creation and enhancement over recent years, primarily for reedbeds in response to both the Bittern and Biodiversity Action Plans.
Part of the IEEM CPD programme

7 October – Scottish Section Meeting 'Integrated Coastal Zone Management. Nigg. 10.00-16.00. AGM 12.45.

13 October. Techniques for the use of Vegetation to assess Grazing Pressure on Moorlands. Dartmoor. This workshop will cover the range of vegetation survey techniques that can be used to assess grazing impacts on moorlands.
Part of the IEEM CPD programme

9 - 11 November. 20th IEEM Conference and AGM – The Royal Clifton Hotel, Southport. 'Restoration Ecology'.

For Details of all IEEM Workshops contact Nick Jackson
Tel: 01962 868626 ; Email: nickjackson@ieem.demon.co.uk