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GUIDELINES FOR ECOLOGICAL EVALUATION AND IMPACT ASSESSMENT

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1. INTRODUCTION

The significance of an ecological impact may be treated as a function of the value of the feature being affected and the magnitude of the impact (Morris and Therivel 1995). The following explanatory text adopts this approach. It is designed to be used in conjunction with Tables 1 - 3 (attached at the end of the text) and provides guidance in their use.

It must be emphasised at the outset that this text is for guidance, and should not be regarded as rigidly constraining an evaluation or impact assessment. The guidelines are, however, applicable to a wide range of situations and where a particular aspect of an assessment requires departures from them, an explanation of the departure should be given.

The three aspects of i) value of feature, ii) magnitude of impact and iii) impact significance are dealt with separately below.

2. VALUE OF FEATURE

For a site which has been given a nature conservation designation, it is normally possible to establish the level of value without ambiguity provided the site still meets the criteria under which it was designated. So, for example, a RAMSAR site is considered to be of international value, a SSSI of national value and a SINC (or equivalent designation) of high local (County) value. In cases where the criteria adopted by a Wildlife Trust or other ecological organisation are either not available or do not exist, reference should be made to published guidance given by Collis and Tyldesley (1993) and Hawkswell (1994). In most cases, the criteria used for evaluating a site are based upon the 'Ratcliffe criteria' (Ratcliffe 1977). These criteria are:-

- Size (extent)
- Diversity
- Naturalness
- Rarity
- Fragility
- Typicalness
- Recorded history
- Position in an ecological/geographical unit
- Potential value
- Intrinsic appeal

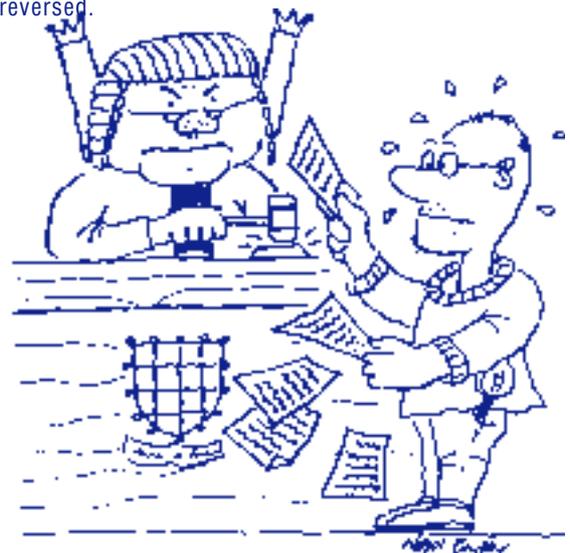
In urban situations, however, greater emphasis is generally placed upon the amenity and educational value of features and less emphasis on factors such as naturalness or diversity.

It should be noted that the ecological value of a site (whether designated or not) is likely to vary depending on the part of it which is under consideration. It may therefore be necessary to make allowance for this when determining the significance of an impact.

Not uncommonly, an otherwise unpromising (and undesignated) site may support species highlighted as being of conservation interest or concern in one of a number of published lists. In such cases, it becomes necessary to consider the value of the site on the basis of its more noteworthy species and this can be problematic.

Reasons for species appearing on 'conservation priority' lists of one kind or another generally fall into two categories:-

- 1) The species is either rare or localised in distribution and, as a result, is considered to be of conservation concern (small or scattered populations are particularly liable to extinction).
- 2) The species has undergone a substantial decline in abundance, and although not necessarily rare at the time of producing the list, is considered to be of conservation concern because extinction (or great rarity) may result if the decline is not reversed.



The evaluation of a site on the basis of noteworthy species may be substantially affected according to whether the species is/are listed for reason 1 or 2 above. Species which are listed as being of conservation concern on account of a decline in abundance pose particular problems for site evaluation, because many are highlighted as being of conservation concern in the International context, whilst

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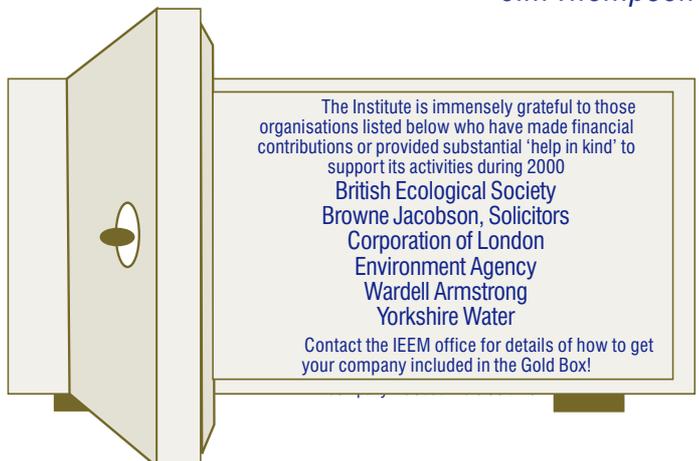
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In the last edition of *In Practice* we had the contributions from John Box and James Calow on the general theme of what to measure and how to evaluate. This edition, with the substantial contribution from Karen Regini is intended to take a related debate further and to stimulate thought and discussion. To be able to have an agreed approach, appreciated by all especially in the wider world of the public enquiry would be valuable indeed. The issues are not simple which is why agreement will be elusive. This paper is also intended as background to a **Seminar to be held in the morning on 28th September** where members views will be sought on an informal basis. Those unable to attend are strongly invited to send in their views by E-mail - see Institute News.

On a recent visit to the northeastern USA, I watched quite a bit of the evening reporting of the Republican Convention which saw the selection of Governor George W. Bush as candidate for the President and Dick Cheney as Vice President. What a spectacle it was, with the closing ceremony ending in party-like mood and the release of thousands and thousands of red white and blue balloons. It was the time to hear good news with conspicuous absence of any concern for global environmental issues. Increases in petrol prices, more restrictions on travel use, extra burdens for industry - you can't be serious! The American per capita use of energy and contribution to climate change gasses far exceeds any other country on earth yet many Americans and, more importantly, many politicians either do not accept or refuse to accept that there is a problem. To many Americans these are issues a million miles away from their everyday lives and, in fairness, it may all seem quite a puzzle. Three years ago the west had abnormally high summer rainfall, the Rockies were drenched and cool and the full effects of El Nino were being felt. This year the west is baking hot with numerous naturally occurring fires while the northeast, because of a blocking high in the Atlantic has been cooler and wetter than for many years. True car and engine sizes have decreased greatly, true many individual Americans are very environmentally aware, true healthy life styles and the great outdoors feature in many of the adverts etc. Not only that, there are plenty of examples of energy generation from hydro-electric schemes, wind farms, solar panels and relatively little dependence on nuclear sources especially following the 3 mile Island calamity not more than 100 miles from Washington DC. But it is not enough. It seems that the Democrats too, although with a better profile on environmental issues are unlikely to feature a topic in the run up to the election where long term gain would appear to rest on short term pain. Currently they appear to be ahead in the polls but the campaign has only just begun in earnest. With the Kyoto agreement not yet ratified and a great question over whether it ever will be, there are many questions to be asked - don't look for answers this side of the November election! But are the two sides of the Atlantic that different? – the events of this week in Britain have surely highlighted the pitfalls of energy regulation by price – especially for politicians.

Jim Thompson



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often being still comparatively common even at a local level. An example is the skylark which is listed (UK Biodiversity Action Plan) as being of unfavourable conservation status in Europe and having undergone a decline of at least 50% in numbers/range in GB over the last 25 years, whilst still being present in about 70% of a random sample of 1 km squares surveyed in a recent breeding bird survey (BTO, 1998). There is therefore a high likelihood of encountering such 'internationally important' species during a site survey. When such species are encountered, site evaluation is a matter of judgement. Key questions which must be addressed prior to evaluation include:-

- Does the site represent prime habitat for the species?
- How critical is the site for the survival of the species at the local, regional, national and international scales?
- Is the habitat upon which the species depends easily re-creatable?
- How large a population of the species does the site support?
- Why is the species declining in abundance?
- At what stage of the life-cycle or season does the site support the species (eg are skylarks present there only in the winter or do they breed there)?

If the site does not represent good habitat for the species, or few individuals are present, then the site will typically be regarded as being of only **Local** value (see 'Levels of Ecological Value' below) for the species, even if it is highlighted as being of international conservation concern. The spatial scale at which the site is critical for the continued presence of a species also assists in judging the level of value. If a site is considered to be critical to the continued presence of the species in the County context, for example, then it will be judged to be of **High Local** value (see 'Levels of Ecological Value' below). The reasons for the decline(s) in abundance are also relevant. If, for example, the decline in abundance is expected to continue as a result of large scale processes (eg unsuitable agricultural regime across Britain and Europe), then unconnected local issues (such as a proposed development on agricultural land) are likely to have a negligible effect on the species. In such cases, the site will generally be considered to be of **Local** importance for that species, although impact mitigation and habitat creation measures will normally be directed towards such species where appropriate.

In many cases, it will be most appropriate to divide a site into a number of smaller, ecologically coherent units and consider each of these separately (eg an area of woodland surrounded by arable land may best be treated as two individual units).

Reference is made below to 'viable areas' of habitat. It is not possible to give an objective measure of area for different habitat types, because it will depend upon various factors such as the current condition of the habitat, the shape of the habitat (for some habitat types, a long narrow strip is less likely to remain viable than a more-or less circular area, for example) and surrounding land use. Important considerations used in judging the viability of habitats include:

- Area needed for management purposes. Management of most habitats is usually best carried out on a rotational basis, and the management cycle needs to be considered when judging viability.
- Species requirements. Some habitats are of key importance in maintaining populations of organisms. Mammals and birds in particular may require a substantial territory size, but the area will depend upon the species involved and the habitat quality. Many organisms have different habitat requirements at different stages of their life-cycle, and the viability of a heathland site for adders, for example, is not just a matter of area but also the presence of suitable hunting, basking and hibernation sites etc.



International Value: The Triglav National Park in Slovenia

LEVELS OF ECOLOGICAL VALUE

The levels of ecological value are listed below. A site which meets the criteria set out below at more than one level is allocated to the highest level for which it qualifies.

INTERNATIONAL VALUE

Most sites of **International** value have already been designated as such or have at least been given another high-level designation such as SSSI. Candidate areas for an international designation are treated as if they are in fact designated.

Also normally included in the category of **International** value are viable areas of key habitat identified in the European legislation, **or** smaller areas of such habitat which are **essential** to maintain the viability of a larger whole.

If a species is listed (even provisionally) in one of the **UK Red Data Books** (excluding scarce species - see below) **and** it is listed as being either of **unfavourable conservation status** in Europe, of **uncertain conservation status** or of **global conservation concern** (see UK BAP), then the species is considered to be of conservation importance in the **International** context. A site supporting a viable breeding population of such a species or supplying a critical element of their habitat requirements is considered to be of **International** value.

If a species is not listed in one of the **UK Red Data Books** but is listed as occurring in 15 or fewer 10km squares in the UK (categories 1 & 2 in the UK BAP) and **is also listed** as being either of **unfavourable conservation status** in Europe, of **uncertain conservation status** or of **global conservation concern** (see UK BAP), the species is generally considered to be of conservation importance in the **International** context. A site supporting a population of such a species is generally considered to be of **International** value.

NATIONAL VALUE

If an area of land meets the selection criteria for a national designation (eg SSSI selection criteria), then it is regarded as being of **National** value irrespective of whether it is designated or not.

Also normally included in the category of **National** value are viable areas of key habitat identified in the UK Biodiversity Action Plan, **or** smaller areas of such habitat which are **essential** to maintain the viability of a larger whole.

If a species is listed (even provisionally) in one of the **UK Red Data Books** (excluding scarce species - see below) but is not listed as being either of unfavourable conservation status in Europe, of uncertain conservation status or of global conservation concern (see UK BAP), then the species is considered to be of conservation importance in the **National** context. A site supporting a viable breeding population of such a species or supplying a critical element of their habitat requirements is considered to be of **National** value.

If a species is not listed in one of the **UK Red Data Books** but is listed as occurring in 15 or fewer 10km squares in the UK (categories 1 & 2 in the UK BAP), then the species is generally considered to be of conservation importance in the **National** context. A site supporting a population of such a species is generally considered to be of **National** value.

REGIONAL VALUE

There is no nature conservation designation which operates specifically at the regional level, and regional status is reserved for those sites which comfortably exceed the selection criteria for County-level designations but fall short of SSSI selection criteria. If there is a Regional Biodiversity Action Plan (eg Action for Biodiversity in the South-West'), viable areas of key habitat identified in the Action Plan, or smaller areas of such habitat which are essential to maintain the viability of a larger whole are identified as being of **Regional** value. Additionally, viable areas of key habitat identified in the appropriate Natural Area Profile are identified as being of **Regional** value.

If a species is listed as being nationally scarce, occurring in 16-100 10km squares in the UK (category + in the UK BAP), or is listed in a regional Biodiversity Action Plan **on account of its regional rarity or localisation**, then the species is generally considered to be of conservation importance in the **Regional** context. A site supporting a population of such a species is normally considered to be of **Regional** value.

If a species is listed in a Regional Biodiversity Action Plan **on account of its regional rarity or localisation**, then the species is normally considered to be of conservation importance in the **Regional** context. A site supporting a viable breeding population of such a species or supplying a critical element of its habitat requirements is normally considered to be of **Regional** value. A site supporting a viable breeding population of a species listed **on account of its regional rarity or localisation** in the relevant Natural Area Profile or supplying a critical element of its habitat requirements would also normally be considered to be of **Regional** value.

LOCAL VALUE

This is divided into three categories as discussed below. In cases where an environmental capital exercise has been undertaken, due account will be taken of the results and features evaluated at the appropriate local level.

High local value

This category includes ancient semi-natural ancient woodland and undesignated sites of County quality or, in urban situations, of Metropolitan site quality. Also included are viable areas of habitat identified as ecologically valuable in a County Biodiversity Action Plan.

If a species is listed in a County/Metropolitan 'red data book' or Biodiversity Action Plan **on account of its regional rarity or localisation**, then the species is considered to be of conservation importance in the **County** context. A site supporting a viable breeding population of such a species or supplying a critical element of its habitat

requirements is normally considered to be of **High Local** value. Other sources (eg County bird report or flora) may be used to ascertain the rarity of species in the County context.



High Local Value – The Lee Valley Regional Park

Moderate local value

Included within this category are viable areas of habitat identified as ecologically valuable in a Biodiversity Action Plan operating at a sub-county (eg District or Borough) level, or if the relevant Natural Area is fully contained within the District or Borough, viable areas of key habitat identified in the appropriate Natural Area Profile. Also included are sites or features which are considered to be scarce within the Borough or District or to otherwise appreciably enrich the habitat resource within the Borough or District. A hedgerow network which is particularly diverse or ecologically interesting may also qualify as being of **Moderate Local** value. In many cases, such hedgerows may qualify as 'important' under the Hedgerows Regulations, but the ecological criteria adopted by the Regulations.

Sites which have an educational or amenity function generally have a higher value than they otherwise might, and are typically recognised as being of **Moderate Local** value.

If a species is listed in a District or Borough Biodiversity Action Plan **on account of its rarity in the locality**, then the species is considered to be of conservation importance in the **District or Borough** context. A site supporting a viable breeding population of such a species or supplying a critical element of its habitat requirements is normally considered to be of **Moderate Local** value. A site supporting a viable breeding population of a species listed **on account of its regional rarity or localisation** in the relevant Natural Area Profile or supplying a critical element of its habitat requirements is also normally considered to be of **Moderate Local** value, if the Natural Area does not extend beyond the boundaries of the District or Borough. Other sources (eg County bird report or flora) may be used to ascertain the rarity of species in particular Districts or Boroughs within the County.

Low local value

Included within this category are areas of habitat considered appreciably to enrich the habitat resource within the context of the Parish or neighbourhood. Typically, habitats such as moderately species-rich hedgerows fall within this category.

Negligible value

Low grade and widespread habitats such as intensively farmed arable land, re-seeded grassland and species poor or very gappy hedgerows are considered to be of negligible value. Such habitats may, however, constitute features worthy of ecological enhancement.

Table 1: Value of Resources

(Where species or habitats occur in more than one category above, the highest value is applicable).

Level of Value	Examples
International	Internationally designated or proposed sites such as Ramsar Sites, Special Protection Areas, Biosphere Reserves and Special Areas of Conservation, or otherwise meeting criteria for international designation. Sites supporting populations of internationally important species.
National	Nationally designated sites such as SSSIs, or non-designated sites meeting SSSI selection criteria, NNRs, Marine Nature Reserves, NCR Grade 1 sites. Those containing viable areas of any key habitat identified in the UK Biodiversity Action Plan. Sites supporting viable breeding populations of Red Data Book species (excluding scarce species), or supplying critical elements of their habitat requirements.
Regional	Sites containing viable areas of threatened habitats listed in a Regional Biodiversity Action Plan (or some Natural Areas), comfortably exceeding SINC criteria, but not meeting SSSIs selection criteria. Sites supporting viable breeding populations of Nationally Scarce species or those included in the Regional Biodiversity Action Plan (or some Natural Areas) on account of their rarity, or supplying critical elements of their habitat requirements.
High Local	Sites meeting the criteria for a county or metropolitan area designation (such as SINC or SMI), which may include amenity and educational criteria in urban areas. Ancient semi-natural woodland. Designated Local Nature Reserves. Sites containing viable areas of any key habitat type identified in the County Biodiversity Action Plan (or some Natural Areas). Sites supporting viable breeding populations of species known to be county/metropolitan rarities (eg featuring in a county 'red data book' or included in the county/metropolitan Biodiversity Action Plan or some Natural Areas), or supplying critical elements of their habitat requirements.
Moderate Local	Undesignated sites, or features considered appreciably to enrich the habitat resource within the context of the Borough or District, or included in the Borough or District Biodiversity Action Plan or some Natural Areas. Amenity and educational functions will be recognised in urban areas. Sites supporting viable breeding populations of species listed as rare in the District or Borough Biodiversity Action Plan or some Natural Areas, or supplying critical elements of their habitat requirements.
Low Local	Undesignated sites, or features considered appreciably to enrich the habitat resource within the context of the Parish or neighbourhood. (eg a species - rich hedgerow).
Negligible	Low grade and widespread habitats.

3. IMPACT MAGNITUDE

Guidelines for judging the impact magnitude are given on Table 2. In cases where an area of land is of sufficient quality to have been awarded a nature conservation designation (or to qualify for such a designation), then the following guidelines are comparatively easy to follow because the 'site' under consideration will have been defined on ecological grounds, and it is possible to identify what would (for example) constitute a 10% loss of its area. When considering habitats or features of lower ecological value, however, the 'site' boundaries may not be drawn on ecological grounds. A planning application site on intensively farmed arable land may, for example, occupy a 10 hectares of a habitat which occurs extensively throughout the Parish, District, County and Country, and defining the 'site' as a 10 Ha area may be ecologically arbitrary because it is continuous with extensive areas of identical habitat. Identifying the extent of the site in such cases is a matter of judgement. Typically, the habitat will not be of higher than moderate local value, and the percentage loss of habitat would be assessed at a spatial scale of between the Parish and the District. The impact significance would also be expressed at this scale (eg an 'impact of negligible significance in the District context').

It is normally quite straightforward to determine the loss of area arising from a proposal such as a development. It is usually harder to determine the magnitude of other types of ecological impact such as disturbance. The approach adopted here is to estimate the magnitude of the impact by comparing its ecological consequences to direct habitat loss. A simplified and fictitious example follows. A site is designated as being of High Local Value on the grounds that it regularly supports the only remaining breeding pair of grasshopper warblers within a county. The site is the subject of a proposal resulting in disturbance that will cause the birds to abandon the site. In this example, the ecological consequences of the disturbance are equivalent to the loss of the entire site and would therefore be classed as being of high magnitude.

Table 2: Impact magnitude

<p>High magnitude: Loss of most of the site¹ (ie > 50% of the site area). Other effects (eg disturbance or damage arising from pollution) including indirect impacts having an adverse impact equivalent in nature conservation terms to a loss of > 50% of the site area.</p>
<p>Medium magnitude: Loss affecting 20-49% of the site area. Other effects (eg disturbance or damage arising from pollution) including indirect impacts having an adverse impact equivalent in nature conservation terms to a loss of 20-49% of the site area.</p>
<p>Low magnitude: Loss affecting 4-19% of the site area. Other effects (eg disturbance or damage arising from pollution) including indirect impacts having an adverse impact equivalent in nature conservation terms to a loss of 5-19% of the site area.</p>
<p>Very low magnitude: Loss affecting up to 4% of the site area. Other effects (eg disturbance or damage arising from pollution) including indirect impacts having an adverse impact equivalent in nature conservation terms to a loss of up to 4% of the site area.</p> <p>1. For discussion of the term 'site' in circumstances where there is no ecological designation, see accompanying text.</p>

In addition to judging impact magnitude, impacts are also classified according to their temporal extent as follows:-

- **Permanent Impacts:** ie impacts continuing indefinitely beyond the span of one human generation (taken as approximately 25 years), except where there is likely to be substantial improvement after this period, for example in the replacement of mature trees by young trees (ie a *Very Long Term Impact*).
- **Temporary Impacts:**
 - Long Term, ie 15-25 years or longer (see above)
 - Medium Term, ie 5-15 years
 - Short Term, ie up to 5 years.

4. THE SIGNIFICANCE OF ECOLOGICAL IMPACTS

The impact matrix (Table 3) enables the significance of an impact to be determined. The impact significance depends both on the value of the feature being affected and the magnitude of the impact, and it is therefore necessary to assess these two aspects first (see above).

Table 3 divides impact significance into five categories ranging from critical to negligible. Some cells in the impact matrix occupy an intermediate position between two categories (eg Moderate or Major). In such cases, the impact should be determined as falling within one significance category or the other. The actual significance category chosen will depend upon:

- How close the feature and impact magnitude lie to the upper and lower category limits. The significance of an impact only just qualifying as 'High' on a site judged only just to qualify for 'Regional importance' will be Moderate rather than Major, for example.
- The value of that part of the site being impacted, given that most sites contain areas of variable quality. eg: the loss of the 5% of an SSSI which supported one of the species for which it had been designated would be of major significance, whilst the loss of the 5% which had only been included in the designation because it falls within the field boundary would be of moderate significance.

It is possible to relate the impact significance categories to legislation and planning policy. The five categories are discussed below.

Critical. If the residual impact is of critical significance, the only circumstances in which the impact should be permitted are those in which human health would otherwise be threatened (priority species

or habitats) or if there are reasons of over-riding European social or economic importance. Under these circumstances, it is necessary to demonstrate that all alternatives have been examined and the proposed option has the least adverse impact. The 1994 Habitats Regulations and the 1992 Habitats Directive are likely to be relevant. Compensation of equivalent value will be required.



Critical Impact: Gentianella ciliata – an endemic of the Triglav National Park

Major. If the residual impact is of major significance, the only circumstances in which the impact should normally be permitted are those of over-riding national social or economic importance. Under these circumstances, it is necessary to demonstrate that all alternatives have been examined and the proposed option has the least adverse impact. The 1982 Wildlife and Countryside Act is likely to apply. Compensation of equivalent value will normally be required.

Moderate. If the residual impact is of moderate significance, the impact will normally only be permitted if there are circumstances of over-riding county or metropolitan social or economic importance and there is no viable alternative which has less significant adverse impacts. Structure Plan or UDP policies are likely to apply. Compensation of equivalent value will normally be required.

Minor. If the residual impact is of minor significance, the development should not normally be constrained by ecological issues. Compensation of equivalent value will normally be required.

Negligible. If the residual impact is of negligible significance, the

Table 3: Impact significance matrix.

Impact magnitude	Value of feature					
	International	National	Regional	High Local	Moderate Local	Low local
High	Critical	Major	Major or Moderate	Moderate or Major	Minor or Moderate	Minor
Medium	Critical	Major	Major or Moderate	Moderate	Minor or Moderate	Minor
Low	Critical	Major or Moderate	Moderate	Moderate or Minor	Minor	Negligible or Minor
Very Low	Critical or Major	Moderate	Moderate	Moderate or Minor	Negligible	Negligible

development should not normally be constrained by ecological issues. Compensation of equivalent value will not normally be required.

Cumulative Impact. If a project is found to have greater than negligible residual impact on more than one ecological feature, it will be necessary to consider the cumulative residual impacts. This will vary depending on the significance of the impacts and the relationship between the ecological features.

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New Articles Needed

Articles for *In Practice* are always needed. Each page takes about 1,200 words and papers are welcome up to 4 pages, preferably in 1-page units. It helps to have articles with good quality illustrations, photos or slides.

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BIODIVERSITY and THE NATURAL HISTORY MUSEUM



Tony Weir

Biodiversity: Definition and Important Points

“Biodiversity n. the existence of a wide variety of plant and animal species in their natural environments, which is the aim of conservationists concerned about the indiscriminate destruction of rainforests and other habitats.”

In this definition from Collins English Dictionary, there seems to be a lingering implication that interest in biodiversity remains the sole preserve of people with ‘Save the Rain Forests’ t-shirts. It isn’t; it is now on the political, social and business agendas of most countries. (Although it is possible that it would not be so high on these agendas if these t-shirts were not worn in the past.)

The conservation of biodiversity is not important simply because of the loss of a certain number of species. The loss of these species can mean the loss of associated ecosystem functions (many with an economic value e.g. agricultural and fisheries productivity, pharmaceuticals, tourism). In the Serengeti, for example, grasslands with a more diverse range of species are able to maintain a higher average level of primary production, with consequent higher liveweight of grazing stock (op. cit. Perrings et al., 1995).

Another important point to remember is the fact that biodiversity conservation should not simply be about maintaining as many species in a single geographic space as possible. If all land managers across the world did this then the global biodiversity would be poorer; some ecosystems are relatively poor in species, yet the species they contain may occur nowhere else. Similarly, species move around to a natural rhythm, populations of species go in cycles; biodiversity conservation needs to maintain a temporal aspect. Environmental conditions vary from year to year and species respond differently to this fluctuation. In the Serengeti example above, in some years different grassland species have a higher biomass; by maintaining a diverse community the grasslands can produce a higher productivity over time. One final related semantic quibble is the extent of time that should be considered. Enter the Museum from the Life Galleries and you are reminded of how diversity has changed over evolutionary time; enter through the Earth Galleries side and you realise not only that this is actually a small part of the life of the earth as a whole but also how important geological processes have been in shaping and supporting the diversity of life on earth.

The Political, Social and Business Agendas

In 1992, at the Earth Summit in Rio de Janeiro, 150 Heads of State, including the UK Prime Minister, underlined the importance of conserving wildlife by signing the Convention on Biological Diversity (CBD). The CBD has brought biodiversity to international, national and local political agendas, with many associated initiatives. In the UK, this has been translated into a Biodiversity Action Plan (1994), which builds on the commitment of individuals and organisations at all levels. The implementation

of UK’s commitments includes the National Biodiversity Network (see below) and DETR’s Darwin Initiative; this funds science and other projects in situ which support such international commitments. IEEM members will know that biodiversity is on the business agenda, I am sure many have been asked to provide advice to businesses on planning procedures or EIAs. Similarly, many will have been asked to advise on the sustainable management of species with economic potential.



Natural History Museum Surveys in Antarctica for possible biodiversity in meteorites

Biodiversity is also of immense interest to the public. Here is a (somewhat subjective) demonstration. On a recent search of the Internet (using altavista.com), using a selection of what I guessed would be popular items of interest biodiversity came close to the top of this table in terms of number of pages found;

INTERNET SEARCH TERM	NUMBER OF PAGES FOUND
Bill Clinton	387,046
Biodiversity	325,115
Relativity	110,385
Tony Blair	102,112
Biodiversity (www.nhm.ac.uk site alone)	319

However, to put this in more context, a search for ‘Microsoft’ returned over 8 million web pages.

Taxonomy, Research and Exhibitions

The Natural History Museum (NHM) is extremely well-placed to contribute to all aspects of biodiversity with;

1. in excess of 68 million examples of the diversity of the natural world are held behind the scenes at the Museum;

2. taxonomic and natural history expertise of more than 350 scientists is regularly called upon by both governments and businesses (for clients such as the EC, World Bank - Global Environment Facility, UK Environment Agency, English Nature, Countryside Council for Wales, Scottish Natural Heritage, Texaco, Rio Tinto, Corporation of London, etc.);
3. over 1.8 million members of the public come through the doors of the Museum each year.

Indeed, our Mission is to;

“... maintain and develop its collections and use them to promote the discovery, understanding, responsible use and enjoyment of the natural world.”

International Collections: International Projects

Taxonomic science must underpin an understanding of the numbers and distribution of species; the Museum's collection is vital to this understanding. Last year 17,000 international scientific visitors accessed the collection and staff responded to over 85,000 scientific enquiries.

The specimens at NHM have been collected from all around the world for over 300 years. This has enabled us to become involved in a diverse range of projects;

- Flora Mesoamerica: the development (with Universidad Autonoma Nacional de Mexico and the Missouri Botanic Garden) of a concise guide to the 18,000 species of flowering plants and ferns in tropical Middle America.
- IUCN Molluscan Action Plan for Arabia: NHM staff have been involved in assessing the state of taxonomic knowledge, and conservation status of land and freshwater slugs and snails in order to propose future conservation plans.
- Worldmap: NHM expertise has been used to source and provide data to produce a comprehensive system to identify priority areas for biodiversity.

The Darwin Centre

The Museum is developing other ways for widening access to information on natural history, including the Museum's largest development yet, heralding a breakthrough in public understanding of science. The Darwin Centre will throw open its doors to the public in new ways, on completion of the first phase of a spectacular new wing in 2002. When all phases are complete (scheduled for 2005), this revolutionary new life sciences complex will reveal, for the first time, not only the amazing organisms in its collections, but also the cutting-edge scientific research they support.

As well as physical access to our scientific research and collections for visitors, the Darwin Centre will provide global access delivered through an extensive IT infrastructure. This will enable unprecedented public access to the Museum's collections database and scientific research. It will also provide tools such as identification guides for studying the natural world and issues relating to its conservation as well as links to high-quality information sites relating to the natural sciences. This system will be available for visitors to the Darwin Centre, and also, via the Internet, to professionals, academics and general users throughout the world.



A mantis from south America

The diversity of the natural world is at the heart of the work of the Natural History Museum. If you wish more information on any of these aspects please contact Dr Antony Weir, The Natural History Museum, a.weir@nhm.ac.uk.

References

Perrings, C. et al. 1995. The economic value of biodiversity in Global Biodiversity Assessment. Edited by V. H. Heywood. Cambridge University Press, Cambridge, UK

Graduate ecologist

Terence O'Rourke plc is a multi-disciplinary consultancy specialising in land-use planning, environmental impact assessment, landscape architecture, architecture and urban design. Based in Bournemouth, we have a wide variety of work across the UK.

We wish to recruit a recently graduated ecologist for our growing environment team. A relevant qualification and proven field survey abilities are essential, with a likely emphasis on habitat mapping and botanical identification. There will be opportunity to extend the range of skills once in post.

An ability to evaluate information and to contribute to the wider environmental impact assessment function of the team will be vital, so excellent writing and communication skills will be required. Membership of the IEEM will be an advantage.

If you have a robust sense of humour and think you have an aptitude for this post, write or preferably e-mail with a full cv before 13 October 2000 to:

Andrew Mahon,
Terence O'Rourke plc.
Everdene House,
Wessex Fields,
Deansleigh Road,
Bournemouth, BH7 7DU.
e-mail: andrew.mahon@torpic.com

Terence O'Rourke plc

The North East Section

Heather Tidball, MIEEM

The inaugural meeting of the North East Section was held on 11th May and talked complete effluent! It was unfortunate that some members didn't receive information about the meeting until the following week when they received *In Practice* but those who had heard on the local grapevine all agreed that a North East Section was a good idea. Steve Pullan has put in a lot of work to get the initial programme off the ground and I do hope we will see lots of the local members at future meetings particularly those of you who have remarked that IEEM events are all held in the south!

Professor Peter Evans from the University of Durham gave an extremely interesting talk on research into the effects of cleaning up sewage discharges into the North Sea on the north east coast with particular reference to shore bird populations. This provoked a lively debate with and amongst the audience particularly those from the Environment Agency and English Nature. Those of us who work for local authorities agreed it was great to talk about ecology for a change even if this did mean we had swapped talking about dog mess for talking about sewage.

Professor Peter Evans: Towards a sterile North Sea? - a Summary

The Government is requiring water companies to provide, in the very near future, treatment of sewage to levels in excess of those required by the EU's Urban Waste Water Directive, before discharge into the North Sea. It has abolished the designation of "High Natural Dispersion" areas and so fails to recognise the existence of "Less Sensitive Areas" of the North Sea as defined and recognised by the EU. It was argued that the Government's decisions were well intentioned, misdirected and unnecessary.

Untreated sewage may contain five broad types of materials:

- (1) heavy solids which settle on the seabed near the point of discharge and smother any animals present;
- (2) suspended small particles, chiefly organic, which are moved shorter or longer distances depending on the strength of the water currents;
- (3) dissolved nutrients, chiefly nitrogen and phosphorus;
- (4) pathogens and other microorganisms; and
- (5) chemicals chiefly of industrial origin.

Conventional treatment to "secondary" level is required before UV disinfection can be attempted. UV treatment has not been proven to kill the pathogens of greatest concern to human health but does reduce levels of faecal bacteria (which are those measured to test compliance with the EU's Bathing Water Directives). The money being spent on removal of particles could be better spent on developing methods of treating raw sewage to kill the pathogens that really matter, and on ensuring the separation of industrial waste from domestic sewage.

The contributions of coastal sewage discharges to the total UK input of nutrients to the North Sea have been estimated as only 15% in the case of nitrogen and 11% in the case of phosphorus. Other more important sources include runoff from land particularly after ploughing and fertiliser applications, and gaseous wastes containing nitrogen e.g. from vehicle exhausts. Although there are local areas of concern in relation to nutrient levels in coastal waters, there is no firm evidence of general enrichment in the western North Sea. (In the south eastern parts of the North Sea, nutrient discharges from e.g. the Rhine, are more significant and have led to measurable changes in shallow water and intertidal ecosystems in the Wadden Sea). Although nutrient enrichment of British coastal waters of the North Sea is not a major concern at present, the loss of organic particulate matter (through the addition of treatment at all coastal discharge points) could remove a considerable proportion of the input to

foodwebs based on organisms that filter feed e.g. shellfish such as *Mytilus*, or feed on detritus, e.g. many marine worms and some flatfish. This in turn could lead to decreases in the abundance of coastal birds (shorebirds and seabirds) and predatory fish that depend on them for food. It is possible that the local effects could be sufficiently severe to result in birds numbers falling below the criteria required to sustain the designations of some coasts as EU Special Protection Areas.

Thus by over reacting to the requirements of the Urban Waste Water Treatment Directive, the Government may be requiring water companies to break another EU directive by causing deterioration in the productivity and capability of some coastal habitats to support significant numbers of birds.

Sterilisation of domestic sewage before coastal discharge, to remove pathogens, is necessary, but removal of nutrients and disinfected particles is not, except in specific sites where adverse effects can be shown to extend for more than a short distance around a discharge site. Removal of industrial chemicals is a separate issue.

Current research

Northumbrian Water have commissioned the team in the University of Durham to study the effects on seabirds, shorebirds and coastal invertebrates of the introduction of secondary treatment of sewage before discharge on the Northumberland coast.

It is supposed that if coastal productivity goes down, either fewer shorebirds will use the resources or they will stay for a shorter period of time during the autumn and winter. So numbers and seasonal changes in numbers are being monitored. If fewer birds can be supported, will reductions be preferentially of different ages and sexes, or of certain behavioral categories e.g. subordinates? The indications are that for one species for which the Northumberland Coast is a site of International Importance – the purple sandpiper – the smaller (Norwegian) birds are pushed out in late autumn even now by the arrival of larger (Greenland) birds.

The team are attempting to measure the present contribution of sewage derived particles to the base of the shorebird foodweb, using a stable isotope ratio technique, which determines a "fingerprint" for sewage and another for rocky shore algae. The fingerprints of particles on the shore are part way between the two, suggesting that if sewage particles are removed in future, shore productivity could well decrease.

Future Programme for the Section

5th October Time: 7.30pm Venue: Durham Wildlife Trust, Rainton Meadows, Chilton Moor, Houghton-le-Spring, Durham DH4 6PU **Professional Survey Standards – Dr David Hill FIEEM President elect of IEEM** *How as a profession we can ensure high quality survey work?* The state of play from the Practice Standards group

Date 14th November Time: 7.30pm Venue: Northumberland Wildlife Trust, The Garden House, St Nicholas Park, Jubilee Road, Newcastle upon Tyne NE3 3XT **Regional Development Agency White Knight or Attila the Hun for conservation in the region.** Tom Warburton (Government Office for the North East) With the RDA having a strategic role for development in the region how as a profession can we influence them? Will it allow a strategic view of conservation and environmental issues in the region?

30th January 2001 Time: 7.30pm Venue: Northumberland Wildlife Trust, The Garden House, St Nicholas Park, Jubilee Road, Newcastle upon Tyne NE3 3XT **Local Biodiversity Plans – The present state of play – Keith Bowey (Durham Biodiversity Partnership)** Implementation Officer for Durham Biodiversity Action Plan *What should we be doing to ensure success in our region? What are the problem species and why?* Keith will outline the present state of play and the priorities which have emerged.

For further details please contact Steve Pullan. Any members in this region who have ideas for site visits, or are willing to offer topics for discussion, please could they contact Steve. Remember as IEEM events they will count as CPD.

Steve Pullan, 20 Holystone Drive, Holystone, Newcastle upon Tyne NE27 0DH. E-mail: steve.pullan@virgin.net Tel: 0191 266 1769.

Heather Tidball is Nature Conservation and Countryside Officer for Middlesborough Council.

SCOTTISH SECTION

Post-Industrial Ecology in Practice

Kathy Dale MIEEM

Following on from the highly successful event in November 1999, the Scottish Section of IEEM organised a Spring Meeting on 17 May 2000, at Falkirk College of Further and Higher Education. Dr. Ken Thompson of Falkirk College welcomed approximately forty delegates, many of whom were environmental management students at the College. This was followed by an introduction to the work of the Institute in Scotland by Carol Crawford, Vice Convener of the Scottish Section.

Three morning talks were followed in the afternoon by linked field visits to sites in the local area. Dr. Olivia Lassiere (British Waterways) gave a highly enthusiastic, interesting and stimulating talk on the Millennium Link to get the ball rolling. This was followed by an equally enthusiastic and stimulating presentation by Helen Saddler (Scottish Wildlife Trust), on the work of the Jupiter Centre. Finally, Michael Wall (Forest Enterprise) and Connor Lanigan (Central Scotland Countryside Trust) described the work of their respective organisations in making woodlands accessible to the local communities of Falkirk. An open panel discussion chaired by Dr. Una Urquhart of Marchfield Ecology (recently honoured with a Fellowship of IEEM) gave an opportunity to question the speakers and discuss the role/work of IEEM in Scotland.

After a splendid buffet lunch, kindly provided by the College, three groups convened outside in the glorious sunshine to be taken on their respective choice of site visit:

The Millennium Link – Kathy Dale, MIEEM

Olivia took us to a section of the canal in the middle of Falkirk, where a lock flight is being restored. This entails the rebuilding of road bridges over the canal. All construction sites such as this have an environmental appraisal and often specialist supervision from an ecological consultant (such as myself!) where protected species or rare plants are affected.

Our next stop was a stretch of the canal just outside Falkirk where the sediment is being removed and decontaminated. This is a huge task and has to be done as, when boat traffic starts to use the canal, there is a risk that the contaminated sediment will be transported along it.

Finally we visited the site of the much-talked about Falkirk Wheel, where the two canals will meet. A tunnel is being built under the Antonine Wall and then a huge aqueduct will enable boats to reach the top of the wheel. At the same time, boats can access the bottom of the wheel and then it will turn to transport the boats and a gondola of water down and up respectively to the next canal. The modern design will look spectacular and there will be a viewing area under glass for the public. We all decided we should schedule the spring 2002 Members' Day in Falkirk to visit the wheel.

For the latest news on the Millennium Link why not check out the British Waterways website on www.millenniumlink.org.uk

Jupiter Urban Wildlife Centre - Carol Crawford, MIEEM

The ten acre site of the Jupiter Centre was formerly a derelict railway marshalling yard. Over the past nine years the Scottish Wildlife Trust have converted it into an educational resource, demonstrating how to 'green' a brownfield site.

We were led through areas of decreasing intervention and increasing scale, at times managing to forget the big noise of

industrial Grangemouth. First the wildlife garden plots: hedges, wildflower lawns, a sensory garden, a pond etc. with Helen describing the "gardening with nature" approach. Recycling is a major theme e.g. walls made from unwanted building materials. Then onto habitat creation: meadows with varying mowing regimes, well-established native woodlands, a large wetland with open water, reedbeds and an island. Next an area of no intervention, a wilderness of open grassland and scrub on spoil, kept in check by rabbits. Common-spotted orchids were about to display and we were bemused not to be able to enter the hide because a blackbird was nesting inside! Finally the nursery where the plants are grown from seed or "rescued" from development projects.

There has been much involvement from volunteers and the community in this project and exemplary use has been made of a small site. It is now well visited by schools, community groups and the general public.



Juniper Urban Wildlife Garden nr. Grangemouth

Woods and People in Practice - Alister Clunas, MIEEM

Callendar Wood, covering 95 hectares in the centre of Falkirk, is the former policy woodland of Callendar House and has the same boundaries as in 1595. It has been used unofficially by locals over a number of years. In late 1999 Forest Enterprise purchased the wood as a community woodland and a community ranger has been appointed. An initial meeting drew 50-60 people and community involvement continues in its management. However, vandalism, particularly the lighting of fires, is a problem. It is hoped that in the long term the woodland will be commercially self-sufficient through timber production.

Next we visited the 40 hectare Farm Road Community Woodland created 5-6 years ago with forestry grants on the outskirts of Falkirk, as part of the Central Scotland Forest by the Central Scotland Countryside Trust. The area is mostly woodland planted with mixed broadleaves but there is a small area of saltmarsh next to the river. Paths were created along 'desire' lines to facilitate public access. The community had been involved from the start and is still highly motivated, taking part in practical tasks. After winning a community award a stylish barbecue site was built within the woods. Local involvement has meant there is a strong sense of ownership locally and this is reflected in that few trees have been damaged and there is little vandalism. No doubt in time local residents will develop the same kind of identity with Callendar Wood.

For further details of the Scottish Section and events, please contact the Secretary, Kathy Dale on 013398 87407 or kd@northeacol.co.uk

Don't Forget: the AGM for the Scottish Section will be held on Friday 10th November at the Quality Station Hotel, Ayr at 13.00. All members of the Scottish Section are urged to attend. This will be over the lunch break during the second day of the Conference.

Kathy Dale is Senior Ecological Consultant, Northern Ecological Services

News in Brief

The IEEM Office receives press releases on a daily basis from a wide variety of sources. The following is a selection of some of the more recent and relevant items.

The biggest seed bank of its kind is being set up at the Royal Botanic Gardens, at Wakehurst Place in West Sussex. This includes the £13m Welcome Trust Millennium Building - a key part of the £80 million Millennium Seed Bank. The project will start with the entire UK native seed bearing flora. Through international collaboration the aim is to bank 24,000 species principally from the world's dry lands, by 2010. Further details from Trevor Butler Tel: 01444 894018; Fax: 01444 894 011; E-mail: t.butler@kew.org.

There is still time (up to 15 October) to visit a remarkable sculpture exhibition in the grounds of Kew Gardens. These extraordinary works from the Chapungu Sculpture Park in Zimbabwe have toured widely and inspired a powerful response all over the world. Over 60 large-scale works in stone, some over a ton in weight, explore the relationship between life, community, the human spirit and the natural world.

The Esso National Tree Week will take place from 22nd November - 3 December and The Tree Council have arranged that all trees planted on 24, 25, & 26 November, 2000 will count towards a new Guinness world attempt for the greatest number of trees ever planted in a 3-day period. Details from the Tree Council Hotline Tel: 020 7828 9928 or the Tree Council website - www.treecouncil.org.uk.

The RSPB has secured the future of Rainham Marshes in Essex through a £1.1m purchase from the Ministry of Defence. This has been supported by a grant of £500,000 from the Cleanaway Havering Riverside Trust. This trust is funded by 20% of the Landfill tax generated from the site at Ferry Lane, Rainham. The site will become the largest nature reserve in London.

Applications for The Winston Churchill Travelling fellowships for 2001 are now being considered. 2001 includes specifically workers in Ecological Management (including Ecotourism) and Marine Conservation and a second category of Farmers, Farm Workers, Horticulturists, Foresters and others involved in the Rural Economy and finally any subject in Australia. It would be good to have an IEEM member take up the challenge! The closing date is 24 October, 2000. Details from: The Winston Churchill Memorial Trust, 15, Queens Gate Terrace, London SW7 5PR. Tel: 020 7584 9315; Fax: 020 7581 0410; E-mail: office@wcmr.org.uk.

The National Subject Centre for Geography, Earth and Environmental Sciences in the University of Plymouth is inviting bids for Small-Scale Project Funding. £15,000 is available supporting up to six small scale projects which will enhance student learning in one or more of the three disciplines - Geography, Earth Sciences and Environmental Sciences. The closing date is 30th September, 2000. Details from: Helen King, Tel: 01752 233 532; E-mail: h.king@plymouth.ac.uk.

Ten major projects in Wales backed by the Welsh Development Agency's Land reclamation teams have been awarded the Millennium Marques by the Tidy Britain group because of their "Long term environmental excellence". The projects range from a massive 10 year long land reclamation and landscaping programme by Blue Circle Industries and the WDA at Roose point - where a former industrial site once contaminated with asbestos, heavy metals and oil has been completely transformed - to the Millennium Wetland in Llanelli, where an 80 hectare area fed by recycled water has become an important educational facility. Other

winning projects are at East Merthyr, where a partnership comprising Celtic Energy, Merthyr County Borough Council and the WDA is reclaiming and restoring 360 acres of despoiled and derelict land, a biodiversity scheme at Sirhowy Hill, urban regeneration work at Tredegar, Dyfi co Park at Machynlleth, the renovation of Welshpool station, Vicptris park at Ebbw Vale, the Swansea Vale development and Parc Bryn Bach, a country park near Tredegar.

The Northern Upland Moorland Regeneration project has announced that since its launch in October 1998, improvement and conservation of just under 75,000 hectares of heather moorland has been secured. Improvement refers to degraded moorland where sheep stocking rates have been reduced and conservation to good quality moorland where no increase in grazing will be allowed. The overall aim of the project, instigated by the Moorland Association and funded by the European Objective 5b programme, MAFF, English Nature and participating farmers and landowners is to protect and improve heather moorlands for the benefit of grouse, sheep and wildlife. The project offers technical and financial assistance to farmers and landowners to integrate agriculture, sporting and environmental objectives to enhance farm incomes, improve job opportunities in rural areas and enhance the upland moorland environment. Further details from the Northern Uplands Moorland Regeneration Project, Barningham Park, Richmond, North Yorkshire, DL11 7DW. Tel: 01833 621061; Fax: 01833 621071

The next phase of a major project to improve the upper River Kennet in Wiltshire has begun. This £450,000 scheme is lead by Thames Water working with the Environment Agency, English Nature and a local group - ARK - Action for the River Kennet. The first phase involves the planting of water crowfoot which should help to improve flow conditions as well as providing cover for trout and invertebrates such as mayfly nymphs. Three other projects, all between Mildenhall and Knighton, will involve the creation of an island in a wide section of the river to concentrate and speed up water flows and promote plant growth; enhance an important side stream by making the river bed narrower and shallower to provide a spawning habitat for wild brown trout; and install flow detectors which will encourage reed and sedge growth at the river edge, creating nesting sites and cover for fish.

On 22nd July the Centre for Ecology and Hydrology (CEH) officially opened its new laboratories at Winfrith near Wool in the site of the shortly to be decommissioned nuclear power station. The centre is the result of the merger of the former ITE Research Station at Furzebrook and the Institute of Freshwater Ecology at East Stoke (Wareham). Apart from the excellent facilities, a truly impressive range of work is currently being undertaken, a great deal of it likely to be relevant to the interests of IEEM members. It was pleasing to note that the Director, Dr Mike Roberts is a member of IEEM and addresses were given by the Earl of Selborne and the Earl Cranbrook, both of whom are IEEM Patrons. Within a short and well organised tour, it was only possible to get a brief overview of the work in progress but certainly enough to leave feeling very impressed.

Trials have begun on a new combination of techniques to accelerate the clean up of land contaminated by metals and organic pollutants - believed to be present in serious levels in around 90,000 former industrial sites in Europe. Supported by the Biffa Award Programme, EA Technology and the John Moores University in Liverpool are carrying out an 18 month project combining using plants to draw contaminants out of the soil - Phyto-remediation and applying electric fields across soil to drive pollutants to the surface - electro kinetic soil remediation. By electrolysis of the moisture in the soil, metal and organic compounds are drawn towards the cathode where they can be removed at or near the surface.

PUBLICATIONS

English Nature Annual Report - working today for nature tomorrow ISBN 1 85716 530 6

This is the new style English Nature Annual Report on which we are invited to make comment and in which we see English Nature has acquired a new slogan.

This is a well presented document with a wealth of information inside and covering a variety of topics; the Chairman's preface from Barbara Young, Special Sites, Biodiversity, Influencing Change, Scientific Development, Modernising English Nature and the administrative information which is required in any annual report. The report demands careful reading - it always used to be a source of statistics for the state of SSSI's and still we learn of an unsatisfactory picture even if lacking in consistency. Over 70% of upland calcareous grassland and over 60% of upland heathland is in unfavourable condition although in the uplands, 75% of neutral grassland is in favourable condition. There are some extremely useful maps of SAC's, SPAs NNRs and a great deal of detailed information. It is well worth making space on your bookshelf. Copies from: Publicity and marketing, English Nature, Northminster House, Peterborough PE1 1UA.

English Nature Corporate Plan 2000 - 2004

Again a well presented document with a wealth of information.

There are numerous targets extending throughout the period and a useful presentation point where the long recognised lack of resources available to English Nature is acknowledged but then expressed in the form - if we had x we could do y by z. Where English Nature has been slow or has delivered inadequately due to lack of resources, the overall cause of conservation can only be hindered. There is also a clear recognition that to meet the requirements of today and tomorrow, English Nature will have to modernise regardless of whether new funding is available. And then how are the various requirements of the new Countryside Act going to be met.

English Nature has a new Chief Executive in David Arnold-Foster and, as reported elsewhere, a new Chairman will now need to be found. Expectations have been raised and we can only hope that they will be met.

Countryside Recreation 8 (2) Summer, 2000

This is the regular publication of the Countryside Recreation Network, the purpose of which is 'Exchanging and Spreading Information to develop best Policy and Practice in Countryside Recreation' This edition includes: Right to roam - potential problems; Access Legislation proposals in Scotland; Local access Forums; The National cycle Network - ways for wildlife?; Windermere and water-skiing. The CRN also lists Countryside Recreation and Training Events and has a series of modestly priced publications.

Contact: Emma Barratt, Network Manager, Department of City and Regional Planning, Cardiff University, Glamorgan Building, King Edward VII Avenue, Cardiff, CF10 3WA. Tel: 02920 874 970, Fax: 02920 874728, Email: cm@cf.ac.uk

Environment for Europeans - Magazine of the Directorate General for the Environment No 1, March 2000

This is a new venture for the EU and if the first edition is a little thin - i.e. 8 pages less than this edition of *In Practice*, the publication has the potential to be a very useful source of environmental information. Available from DG ENV - Information and Communication Unit, 200 rue de la Loi, B 1049, Brussels or subscribe on-line at: <http://europa.eu.int/comm/environment/news/efe/order/subscribe/htm>.

Aquatic Eutrophication in England and Wales

This is an interesting publication in the Environmental Issues series produced by the Environment Agency. It is not the easiest read by virtue of its layout but has plenty of content and gives a useful insight into the many issues involved. It lists 47 action points - many for the period 2000/2001, many ongoing and many to be undertaken with a variety of partners. Overall - quite a challenge.

Available from The Environment Agency's Ecotoxicology and Hazardous Substances National Centre - 01491 828 544 or from: www.environment-agency.gov.uk

Senior Ecologist

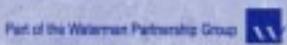
CPM is opening a London Office and needs an ecologist to work on our urban projects and throughout the south-east.

The candidate should have at least two years post graduate experience and be capable of leading projects and dealing with clients and consultees. We will offer an excellent package to the successful candidate, including top rates of pay, pension contributions, health and life insurance and opportunities for extended leave.

Freelance Ecologists

We are also seeking to expand our register of approved sub consultants. We need additional assistance from specialists and general ecologists throughout the country.

Please send C.V's to **Karen Regini** at: Versailles Court, 3 Paris Gardens, London. SE1 8ND

Recent Publications

(continued)

GM on trial

Greenpeace has been at the forefront of opposition to the planting of GM crops and the arrest of its Chairman, Lord Peter Melchett for the removal of a GM crop was much reported. The book is a serious one and it contains scientifically based contributions from 10 authors who argue the case against GM crops from various viewpoints. Available from: Greenpeace, Canonbury Villas, London N1 2PN Tel: 020 7865 8100; Fax: 0207865 8200.

Playing Safe: Science and the Environment

Jonathon Porritt, Thames & Hudson ISBN 0-500-28073-8
Playing safe confronts the question of how to assess both the benefits and risks of scientific advance and takes on three crucial topics: climate change, genetic engineering and toxic chemicals. It advises a much more cautious and sceptical approach in applying scientific knowledge and emphasises the need to take into account the complex balance and interdependence of the earth's systems.

Earth Limited 50 simple things your business can do to save the planet

The Earthworks Group, Greenleaf publishing ISBN 1-874719-10-1
Applicable to large and small concerns alike this book is what it claims to be and the 50 things are listed and developed. Though not now the most up-to-date, the book contains some fascinating statistics - in Britain we make nearly 500 billion, yes billion photocopies a year, British businesses throw out almost 2 million plastic toner cartridges each year. This is a good read and with a purpose. If you work for a small concern there are plenty of tips for how you can make a difference; if you work for a large concern but doubt your ability or clout to make a difference this book could contain just the ammunition you need.

Environmental Law A Practical Handbook 3rd Edition

John Garbutt, Palladian Law Publishing Ltd; ISBN 1 902558 24 3
Following on from the IEEM Conference on Environmental Law and Biodiversity, I was expecting a book with this title to overlap with at least some of the aspects covered in that Conference. The topics covered are Water Abstraction and Water pollution, Air Pollution and Integrated Pollution Control, Waste on Land, Hazardous substances, Noise. A second section covers applications for approvals and other procedures in relation to Statutory Nuisances, Water, Industrial Air pollution and Integrated Pollution Control, Waste on Land and hazardous substances and ends with two interesting chapters on Access to Environmental Information and Liabilities and remedies. But you will look in vain for any treatment of wildlife law. This is a very useful compendium of information for the subjects it does cover and is clearly laid out. It is likely to appeal much more to the general environmental manager than an ecologist.

The Centre for Ecology and Hydrology, Annual Report 1998 - 1999

This report makes fascinating reading if only to illustrate the vast range of highly relevant research work which is being carried out in the various CEH centres throughout the country. In 1998/99 the total output from the various programmes was nearly 1,500 items including over 500 journal papers, 29 books and 461 contract reports. The science programme is divided into 10 subject areas - Soil and Soil vegetation interactions, Land use Science, The urban Environmental, Freshwater Resources, Biodiversity and Population processes, Pest and Diseases control and risk assessment for GMO's, Pollution, Environmental Risks and extreme events, Global change and integrating generic science. The report contains details of the work carried out in each of these programmes. This work is carried out at 9 centres from Banchory in Scotland, Bangor in Wales and Winfrith close to the south coast. This latter is the newly created centre from the merger of the Institute of Terrestrial ecology at Furzebrook and the Institute of Freshwater Ecology at East Stoke (Wareham) referred to elsewhere in the news section.



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In the Journals

Compiled by Pat Rae, Peter Shepherd and Jim Thompson



British Ecological Society

recent decades, the botanical diversity of arable field boundaries has declined drastically. Nitrogen, phosphorus and crop rotation were strongly correlated with the composition of the boundary vegetation. Species richness of the boundary vegetation was negatively related to nitrogen and phosphorus inputs to the crop while total boundary biomass was negatively related to nitrogen inputs only. The boundary vegetation was characterized by a peak biomass production in the zone near the arable field. Efforts to protect field boundary vegetation need to focus on a reduction or cessation of fertilizer applications in the outer metres of crops which require high nitrogen inputs.

G.R. Edwards, G.W. Bourdot and M.J. Crawley.

Influence of herbivory, competition, and soil fertility on the abundance of *Cirsium arvense* in acid grassland.

Journal of Applied Ecology, 2000, **37**: 321-334.

Cirsium arvense is an important perennial weed of pasture, arable and conservation areas and can be a major problem since it reduces the area available for livestock grazing and reduces crop yields. It is a particularly troublesome weed as new plants can recruit from both seed and small root fragments and because once established, plants can infest large areas by producing shoots from adventitious buds on a creeping root system. In terms of its management, herbicide based control measures are becoming increasingly unpopular, either because they are ineffective or uneconomic or due to environmental concerns. One approach to control is the sowing of a competitive smother crop which might be applicable in set aside land or to manage interspecific competition through changes in the timing and intensity of grazing. Apparently the response of the species to fertilizer treatments - nitrogen has been inconsistent. Surprisingly the authors make no mention of cutting and its timing, a practice often used by farmers in permanent pasture. In an experimental situation grazing by rabbits led to a dramatic 25 fold increase in *C. arvense* cover in three months. Removal of rabbit grazing in a second experiment in permanent pasture had the opposite effect. Lime and nitrogen fertilizer application to fenced grassland increased the standing biomass of competing species which reduced *C. arvense* shoot density. Outside the fences, rabbit grazing was so concentrated on the competing species of the nitrogen fertilized and limed areas that *C. arvense* benefited from competitive release. A balanced approach seems to be the key to the control of this species.

I.G. Henderson, J.Cooper, R.J. Fuller and J.Vickery.

The relative abundance of birds on set-aside and neighbouring fields in summer.

Journal of Applied Ecology 2000, **37**: 335 - 347

This is an interesting paper which will go some way to confounding the sceptics of the value, in particular, of rotational set-aside. This was an extensive survey of birds utilizing fields, including set-aside on 92 arable farms in England during 1996 and 1997. Each farm was visited four times in each summer, habitat details were recorded, and all birds seen or heard were mapped using a standard technique. Field type preferences were examined across bird functional groups representing gamebirds, pigeons, crows, skylark, thrushes and granivorous passerines. The analysis revealed that bird abundances were significantly higher on set-aside than on winter cereals for all groups except crows which preferred grassland. Winter cereals or grassland were generally the least preferred habitat. On farms where both rotational and non-rotational set-aside were present, preferences were strongest for rotational set-aside for all groups except crows which preferred non-rotational set-aside. For the majority of species it appears that set-aside is used as a source of food and the scale of this is impressive given that most set-aside was not managed specifically for bird conservation. This has implications for future agri-environment schemes and may well be of help in reversing the decline of many farmland birds.

This section continues with recent papers in the Journal of Applied Ecology and attempts to bring reviews of papers in the Journal of Ecology up to date. We are pleased to welcome Peter Shepherd to the team of reviewers. For the first time we are including reviews of the Journal of Animal Ecology starting with papers in 1999. This fills a gap in our coverage which has been evident for some time.

J. E. Berenger. Releasing genetically modified organisms: will any harm outweigh any advantage?

Journal of Applied Ecology, 2000, **37**: 207-214.

This paper is the text of the eighth BES Lecture delivered on 21 December 1999. The topic is still as relevant as it was then. The brief answer "no, of course not" is given in the first sentence, further setting up ones interest for the substantiation of the argument.

The main points discussed are: a) the public debate concentrates on food safety and risks to the environment, but assume that existing crops are safe - a fact disputed in the paper; b) with regard to the flow of genes among species and even genera, attention is paid to the need for inherited genes to confer a selective advantage on hosts; c) the reason that so many people are critical of biotechnology and intensive agriculture is that all agricultural changes usually have an adverse impact on wildlife; d) nature and dense human populations cannot co-exist without the former suffering - a feature that requires an exploitation of our understanding of ecology. In this last point John Berenger makes the point that in the UK, the degree of impact on wildlife can be controlled by appropriate management of such crops. After all a large part of the wildlife that we wish to conserve in the UK is a result of the management practices of the past.

M.A. Pinard and W.P. Cropper. Simulated effects of logging on carbon storage in dipterocarp forest.

Journal of Applied Ecology, 2000, **37**: 267-283

This paper is written in relation to the debate on climate change and the role of forestry based options for mitigating carbon dioxide emissions. The authors developed a model to simulate changes in biomass and carbon pools following logging of primary dipterocarp forests in SE Asia. The results quoted are quite eye-catching. e.g. the effects of selective logging is more than half the biomass carbon storage up to 7 years after logging, and not returning to pre-logging levels until 120 years later—and this is against a current policy in Sabah of a 60 year cutting cycle. The discussion is very weighted to the mechanics of logging, and although the authors refer to practices and data from real forests, there is no obvious use of the word "sustainable".

D. Kleijn and M. Verbeek

Factors affecting the species composition of arable field boundary vegetation.

Journal of Applied Ecology, 2000, **37**: 256-266

This is an interesting if sobering paper on a very topical subject. Field boundaries are often upheld as vital reservoirs for wildlife which might otherwise fall prey to normal arable practices. The paper notes that in

D.G Gavin and L.B. Brubaker. **A 6000-year soil pollen record of subalpine meadow vegetation in the Olympic mountains, Washington, USA.**

Journal of Ecology, 1999, **87**: 106 -122.

This paper is of interest not so much for the location in which the research was carried out as the length of period over which it applied.

The Subalpine meadows are prominent features of high elevation landscapes in the Pacific Northwest America. These meadows are widely appreciated as sites of great biodiversity and, in the Olympic Mountains (Washington, USA) they support many endemic and locally rare species. Subalpine meadow communities are characterised by marked spatial variation related to local soil moisture, snow accumulation and snow melt dates. Climatic changes that affect soil moisture availability and snow free period should cause shifts in the distributions of plant communities within individual meadows.

The oldest soil pollen profile was from the wettest microsite, currently dominated by a snowbed *Carex nigricans* community. The site was occupied by a dry *Juniperus* community before 6000 bp (before present) when it shifted towards a more mesic community dominated by *Poaceae* and *Polemonium* . The first appearance of a snow bed community *Carex nigricans* at this site, c. 2500-1500 bp suggests a change to a cooler, and/or wetter regional climate.

High levels of *Polygonum bistortoides* at all sites indicated a shift to long snow free periods and mesic summer conditions during an interval corresponding to the medieval warm period (c.1200 - 1700 bp). After c.500bp (during the little ice Age) *Carex nigricans* re-established in the wet microsite, while relatively little change occurred at the other two sites. Overall, the greater magnitude of change at this microsite than at the longer growing-season sites indicates that, in these subalpine meadows, short growing season sites are most sensitive to regional climate change.

M. Corbit, P.L. Marks and S. Gardescu.

Hedgerows as habitat corridors for forest herbs in central New York, USA.

Journal of Ecology, 1999, **87**: 220 -232.

This paper sheds a little light on the long held and disputed premise that hedgerows can act as wildlife corridors. It looks at this concept from the plant viewpoint. They looked at three types of hedgerows. Two types were attached to forest : remnant hedgerows and regenerated hedgerows that had grown up spontaneously between open fields in the last 50 years There were no significant differences between remnant and regenerated hedgerows in the richness or abundance of forest herbs, indicating colonization of regenerated hedgerows. Such colonization indicates that hedgerows serve a corridor function. There was a distance effect within hedgerows. Richness of forest herbs and similarity of composition to forest declined with distance along the hedgerow from forest indicating colonization from the adjacent attached stand.



Yorkshire Moors – a mosaic of woodlands and hedgerows

H. J. van Wijnen and Jan P Bakker. **Nitrogen and phosphorus limitation in a coastal barrier salt marsh : the implications for vegetation succession.**

Journal of Ecology, 1999, **87**: 265 - 272.

Nitrogen and Phosphorus have been thought to be limiting in plant succession in salt marshes and the purpose of this paper was to test by means of factorial experiments, the effects of enhanced levels of both elements. In a 15 year old coastal barrier salt marsh and an older 1000 year old salt marsh, Nitrogen limited above ground plant growth in both young and old salt marshes in all years. Phosphorus limitation of plant growth was apparent in the first year in the young marsh and in the last year in both marshes. When a marsh becomes saturated with Nitrogen, phosphorus limitation then occurred in both marshes.

The plant species which were typical of Nitrogen rich habitats and late successional changes significantly increased after fertilization. After years of fertilisation, plant species composition in a young marsh was similar to the species composition in an unfertilised older marsh. Fertilization of the 100 year old marsh still resulted in a change in species composition suggesting that succession was still occurring and that overall, plants in marshes of different ages are similar in their responses to fertilization.

W. Tinner, P Hubschmid, M.Wehrli, B.Ammann and M. Conedera. **Long-term forest fire ecology and dynamics in southern Switzerland.**

Journal of Ecology, 1999, **87**: 273 - 289.

There seems to be a regular flow of papers in the journals on fire related matters, this time from an area less prominent in the fire literature. As many areas of traditional agriculture in Europe are in decline or have been neglected, so have certain areas of specialised woodland management. In this case the interest centres on the sweet chestnut, *Castanea sativa*. As with agriculture, succession and neglect of traditional forms of management leads to a build up of dead material and litter and increases the risk of fire. The number of forest fires has risen significantly so that fire is now one of the most important disturbance factors in lowland forests of the Swiss Southern Alps. The research itself is based on pollen and charcoal analysis at two lakes in Southern Switzerland which has revealed that fire has played a prominent role in changing the woodland composition of this area for more than 7000 years. The paper traces the population fluctuations in a number of species by pollen and charcoal analysis. One particular species of interest is the disappearance of the lowland *Abies alba* stands. Populations have fluctuated over the last 7,000 years but now have largely disappeared. This appears to be related to the low recovery rate of this species from fires and is dependent on seed dispersal from patches that have escaped burning.

S.E. Hartley and L. Amos. **Competitive interactions between *Nardus stricta* L. and *Calluna vulgaris* (L) Hull: the effect of fertilizer and defoliation on above- and below-ground performance.**

Journal of Ecology, 1999, **87**: 330 - 340.

Calluna dominated moorland is in decline in many areas of Scotland. Overgrazing by sheep and deer is thought to be the main cause of loss of *Calluna* cover to grass species , particularly to *Nardus stricta*, a species relatively unpalatable to sheep. The decrease in *Calluna* cover is more in some places than others. This may simply reflect uneven grazing pressures, but is also possible that herbivory has a more adverse effect on *Calluna* where soils have relatively high nutrient value because this may further favour grasses.

Young plants were grown alone and together in pots under a combination of fertilizer and defoliation treatments. In the pots that received fertilizer, the shoot nutrient content and above ground biomass of *Nardus* plants increased to a greater extent than those of *Calluna* plants. This effect was more marked for *Nardus* plants growing with *Calluna* plants than for those growing with other *Nardus* plants. In contrast, *Calluna* plants growing in competition with *Nardus* failed to respond to the addition of nutrients. However in unfertilized pots, *Calluna* gained more above ground biomass during the experimental period than *Nardus*. The authors recognise however that a note of caution has to be added to the interpretation of these results due to the experiment being carried out in pots.

The results suggest that the competitive balance between *Nardus* and *Calluna* may be altered by the addition of nutrients, and by defoliation, which may have serious implications for the future dominance of *Calluna* heathland ecosystems, particularly those where nutrient inputs are increasing significantly or where grazing pressures are high.

G.R. Edwards and M. J. Crawley. **Herbivores, seed banks and seedling recruitment in mesic grassland.**

Journal of Ecology, 1999, **87**: 423 - 435.

Though not the most accessible of papers, the practical context of the work is certainly obvious. The introduction states that there is a growing view regarding grasslands that small scale disturbances that disrupt the dominant perennial cover (e.g. animal diggings, death of perennial ramets) act as important microsites for seedling recruitment and may be central to the maintenance of plant species richness. Within these microsites, seedling recruitment may occur from seed derived from the persistent seed bank (i.e. seeds deposited at the site more than a year earlier or from seed derived from the current or previous year (i.e. seed rain or transient seed bank). Most grasslands have a large, persistent seed bank, often with a species composition that does not resemble the above ground vegetation and it is well documented that this seed can dictate the successional trends that occur following large scale disturbances. However, for relatively undisturbed grasslands, where recruitment microsites are fewer and smaller, the role played by seedling recruitment from the seed bank in the persistence of species and how important it is compared to recent seed rain is less clear. Enter herbivory: changes in plant recruitment in gaps might result from herbivores altering the number or species composition of the seeds in the seed rain and seed bank - by selective flower or seed predation, from direct, selective grazing of seedlings or from competitor release of seedlings following the defoliation of neighbouring plants.

The paper sets out to answer three questions:

1. Does any seedling recruitment into gaps occur from the persistent seed bank , and what is the relative importance of this compared to seedling recruitment from seed derived from the recent seed rain?
- 2.. What is the relative importance of insect, mollusc and rabbit herbivory undermining the size and composition of the seed bank?
3. What is the relative importance of insect, mollusc and rabbit herbivory in determining the density and survival of seedlings that emerge?

The results showed that despite a large seed bank, few seedlings emerged from the seed bank into experimentally created gaps. It also appeared that there was only a small effect on seedling regeneration in gaps when rabbits insects and molluscs were excluded.

The authors concluded that under the particular experimental conditions seedling recruitment from the seed bank was so low as to be almost undetectable. This result suggests that the successful restoration of species richness in this grassland may require larger scale disturbances (e.g. rotavation or harrowing) in combination with seed sowing of species novel to the vegetation, followed by defoliation

managements that prevent seed input from the dominant perennial grasses. K. Falinska. **Seed Bank dynamics in abandoned meadows during a 20 year period in the Bialowieza National Park** Journal of Ecology, 1999, **87**: 461 - 475.

Aspects of work in this celebrated primeval Forest were reviewed in the last In Practice but this is a story of further interest and fits in with the previous and following paper. This useful 20 year study was carried out in an abandoned *Cirsietum rivularis* meadow. The initially small seed bank had trebled by 15 years after abandonment before falling, after 20 years to approximately the initial levels. The floristic richness of the seed bank decreased during succession with the number of species falling from 38 to 25. During this period secondary scrub vegetation started to develop. The seeds of forest species did not start to appear in the soil until several years after meadow abandonment despite the meadow being adjacent to the forest. The meadow had been cut for a long period before abandonment which is believed to account for the low numbers of species in the seed bank and why these rose on cessation of mowing. It is also very likely that the mown grassland would have contributed to the delay in establishing the seed bank of woodland species.

B.L.Foster. **Establishment, competition and the distribution of native grasses among Michigan old fields.**

Journal of Ecology, 1999, **87**: 476 - 489.

The practical context of this paper relates to the problems in re-establishing native perennial grasses in abandoned agricultural fields. The results suggest that these native grasses may be restricted to low productivity habitats within the landscape because of very strong competitive interference with establishment by the existing vegetation in the most productive sites. There is an interesting reference in the paper to the critical role of accumulated plant litter in suppressing seedling establishment and colonisation in these grasslands.

B. Bossuyt, M. Hermy and J. Deckers. **Migration of herbaceous plant species across ancient- recent forest ecotones in central Belgium.**

Journal of Ecology, 1999, **87**: 628 - 638.

The Meedal forest complex in Central Belgium is a 2224ha remnant of a vast forest that once covered large tracts of Belgium. The purpose of the study was;

1. To determine whether there are species that are confined either to the ancient or to the recent parts of the contiguous forest stands;
2. To determine whether changes in vegetation patterns across ancient - recent forest ecotones can be explained by limited seed dispersal or vegetative propagation of ancient forest species or whether they are caused by limited seedling establishment of such species;
3. To model the colonisation patterns of species that are characteristically confined to ancient forest stands and to calculate rates across the ancient-recent forest ecotones.

Four species were chosen and assess along transects. Each declined across the transects suggesting that they are limited by seed dispersal. Several forest species were able to colonise the recent forest rapidly, where some of them reached a higher abundance due to the increased availability of colonisation sites with a higher nutrient content and a thinner organic layer. The colonisation rates were nonetheless very low with a maximum of 1.15m per year for *Lamium galeobdolon* followed by *Anemone nemorosa* (0.55m) *Convallaria majalis*(0.45m) and *Polygonatum multiflorum* (0.25m). It is suggested in the paper that a considerable number of species is able to colonise the recent forest quickly probably due to increased availability of suitable colonisation sites with higher nutrient levels in newly established forests. These species may well be much more successful in colonising than the adjacent ancient forest species and this clearly has significance for nature conservation.

U. Scheidel and H. Bruelheide. **Selective slug grazing on montane meadow plants.**

Journal of Ecology, 1999, **87**: 828 - 838.

As a gardener, I have frequently reflected with despair on the overnight carnage of the slug and snail population. The effects are clearly not confined to the garden. This paper tests the hypothesis that if a rare plant species shows exceedingly high acceptability to slugs it may become excluded from sites where the presence of other more abundant food plants supports high mollusc activity. Mollusc herbivory could therefore be a major factor for limiting plant geographical ranges and in particular, the restriction of montane plant species to higher altitudes may result from higher herbivory pressure in the lowlands. The paper itself involves greenhouse food choice experiments with *Arnica montana*, a rare perennial known to have high palatability and the intention was to extrapolate from green house experiments to slug-plant interactions under field conditions. Preliminary results indicated significant slug damage to *Arnica montana* in the field. A note of caution needs to be applied because, as the authors reported, although *Hieraceum laevigatum* displayed the highest palatability in of all in the food choice experiments, it was almost never eaten by slugs in the field and suffered almost no damage.

H. Bruelheide and U. Scheidel. **Slug herbivory as a limiting factor for the geographical range of *Arnica montana*.**

Journal of Ecology, 1999, **87**: 839-848.

This paper follows on with some field experiments to test the hypothesis put forward in the previous paper.

In one experiment they artificially increased the mollusc population density in plots containing native *Arnica montana* populations. Leaf loss and damage to *Arnica* increased significantly whilst damage to other plant species in the same plots were unaffected by mollusc density.

In a second experiment damage was examined in transplanted *Arnica montana* plants at three different altitudes. Whilst damage was negligible at 610m where natural populations occur, molluscs removed 8% of *Arnica* leaf area at 385m and 75% at 180m. At the two lower sites, protective caging of *Arnica* plants significantly reduced the amount of leaf tissue consumed by molluscs.

The paper also deals with some interesting aspects of timing: Damage to plant populations will be at a maximum when high slug activity coincides with the phase in the plant's life cycle that is most sensitive to herbivory. As for most perennial plant species, the most vulnerable time for *Arnica* is in the spring when the young leaves emerge and the phasing of slug activity with the sensitive growth period and how this may vary with altitude.

R. Arlettaz. **Habitat selection as major resource partitioning mechanism between two sympatric sibling bat species *Myotis myotis* and *Myotis blythii***

Journal of Animal Ecology, 1999, **68**: 460-471.

This paper examines the utilisation of different trophic niches by two genetically closely related species that are morphologically almost identical. The study provides an insight into habitat utilisation by closely related bats that may have some useful parallels in understanding similarly related British bats. The study related faecal analysis of dietary intake to radio-tracking of the two species. The faecal studies indicated that *M. myotis* primarily feeds on ground dwelling prey whilst *M. blythii* feeds on grass dwelling invertebrate species. The radio tracking confirmed that the two species segregate spatially when feeding which prevents competitive interference. *M. myotis* was found to feed primarily over habitats with high access to open ground such as freshly cut meadows, mown grassland and intensively cultivated orchards. *M. blythii* was recorded from habitats where grassland predominated.



The Greywell Tunnel – the largest bat hibernaculum in Western Europe

T. Madsen and R. Shine. **The adjustment of reproductive threshold to prey abundance in a capital breeder.**

Journal of Animal Ecology, 1999, **68**: 571-580.

The role of energy storage and expenditure in reproduction is examined in this paper with particular reference to water pythons in tropical Australia. Many species reproduce when they have exceeded a reproductive threshold when their energy reserves are sufficient to support breeding. The factors that determine the reproductive thresholds are poorly understood. The study is based on a research programme that showed that individual female pythons adjust their reproductive thresholds in response to the availability of prey.

In all years females that reproduced were in better condition than non-reproductive females as measured by mass relative to body weight. In years of bad prey supply female pythons continued to reproduce despite being in relatively poor condition. In these years although clutch size was slightly reduced, the principal effect of the lowered reproductive threshold was lowered body weight in females following laying. The mark and recapture results indicate that the variation reproductive thresholds is due to individual flexibility rather than different groups of snakes with different reproductive thresholds. The paper concludes that the observed adjustment of individual thresholds corresponds with life history models and is likely to be widespread.

S. Redpath and S. J Thirgood. **Numerical and functional responses in generalist predators: hen harriers and peregrines on Scottish grouse moors.**

Journal of Animal Ecology, 1999, **68**: 879-892.

This study of 6 moors over a 5 year period investigated the response by hen harrier and peregrine to changing grouse abundance. The study showed that neither species showed

numerical responses to grouse numbers. The highest number of hen harriers were associated with moors and years where their small prey were most abundant, whereas the highest numbers of peregrines were found on southern moors, where it is suggested the high abundance of racing pigeons has influenced the numbers of peregrines.

The study showed that harriers took a wide variety of prey, although mostly passerines (63%) with grouse forming (15%). The vast majority of grouse seen being brought to harrier nests (96%) were chicks. The study concluded that harriers took the highest proportion of grouse chicks at densities of 67 chicks km⁻² (equivalent to 12 broods/km⁻²) and that at high harrier densities over 60% of grouse chicks may be taken over the 6 week nestling period. For peregrines almost 50% (48%) of prey items were found to be racing or feral pigeons with grouse the next most abundant prey. Of the grouse taken by peregrines 92% were adult birds. The study concludes that no evidence was found that breeding densities of either harriers or peregrines were related to grouse density. It also concludes that in the absence of persecution the impact of harriers on grouse populations is most likely to be greatest on moors where alternative prey and thus harriers are abundant.

R.J. Delahay, S. Langton, G.C. Smith, R.S. Clifton-Hadley and C.L. Cheeseman. **The spatio-temporal distribution of *Mycobacterium bovis* (bovine tuberculosis) infection in a high-density badger population.**

Journal of Animal Ecology, 2000, **69**: 428-441

This study of a wild badger population in Woodchester Park in Gloucestershire since 1978 provides an insight into the transfer of bovine TB among badgers. The study area is approximately 7 square kilometres of wooded mixed farmland landscape. The resident population comprises 36 social groups, which are relatively evenly distributed across the study area. Over 15 years of mark and re-capture trapping and post-mortem records indicate that the annual prevalence of infection varied between 10.3 and 17.7 % of the population. Whilst the study confirmed previous work that the infection was aggregated in social groups located in the west of the study area, it also showed that there were low rates of disease transfer between neighbouring groups. The persistence of the disease within some social groups, however, is shown to be significant. The study draws particular attention to the presence of infectious adult female badgers, which were associated with new infections. The study concludes that the distribution of the disease within the population of the study area reflects persistent stable concentrations of infection, but with limited evidence of transfer between social groups. There are potential implications of these results for more focused and efficient control strategies that are discussed in the paper. The paper also warns that the extent to which this pattern of infection is representative of low density and disturbed badger populations is unknown.

J.J. Lennon, J.J.D. Greenwood and J.R.G. Turner. **Bird diversity and environmental gradients in Britain: a test of the species-energy hypothesis.**

Journal of Animal Ecology, 2000, **69**: 581-598.

Using data on the British bird fauna this paper tests this hypothesis that predicts that temperature patterns should match diversity patterns. In

addition the paper considers the view that the mechanisms operates directly through effects of temperature on thermoregulatory loads. The study is based on combination of the status of the bird species (i.e. resident or visitor) and its summer or winter distribution together with habitat, topographic and seasonal climatic data. The study supported the species-energy hypothesis but not the suspected mechanism of the role of body mass. Summer temperatures provided the best overall explanation for the patterns of bird diversity across Britain and appears to be a better tool for predicting winter diversity than winter temperature. The paper suggests that climate change is likely to influence the diversity of different areas to varying degrees.

F.A.M Tutyttens, D.W. Macdonald, L.M. Rogers. C.L. Cheeseman and A.W. Roddams

Comparative study on the consequences of culling badgers (*Meles meles*) on biometrics, population dynamics and movement.

Journal of Animal Ecology, 2000, **69**: 567-580.

This paper describes the process of recovery of a badger population following a typical badger removal operation (BRO) at North Nibley in Gloucestershire. Data on biometrics, demographics and movement from this low density and disturbed population was compared to that of nearby populations in Wytham Woods and Woodchester Park, which support undisturbed high-density populations of badgers. The badgers at North Nibley were found to move more frequently between social groups than in the settled populations at the other two sites. This was particularly the case shortly after the cull. Recolonisation of culled areas took place in the first instance by young female badgers and in the first year following the cull no cubs were reared in any of the culled groups. Despite this and the lack of sexually mature boars the badger population at North Nibley only took 3 years to recover to its pre-cull density. After the cull the North Nibley population suffered reduced losses from the adult and cub population as a result of death or emigration than at the other sites. In addition badgers at North Nibley were younger, heavier and in better condition than badgers at Wytham Wood and Woodchester Park. The paper finishes by arguing that the bovine TB disease dynamics are likely to be different in disturbed populations compared to undisturbed ones and that this could affect the efficacy of the cull. The paper discusses some undesirable effects of the cull from the point of view of disease spread. For example, the high rate of movement following the cull in North Nibley which could have been promoted by the lack of mature boars has been shown in other studies to be associated with high disease incidence the following year. The disturbance may also affect the frequency, nature and intensity of social contact between badgers, which in turn may increase the risk of the spread of infection. The authors also note however that not all disturbances are necessarily counterproductive to the control of bovine TB. They suggest that the reduction in competition for resources results in healthier and thereby less susceptible badgers, which are less likely to interact aggressively with other badgers with a lower risk of wounding, one possible mechanism for the spread of infection. The authors conclude that this study has enabled the effect on a badger cull on the remaining population to be quantified, but that the actual effect on the incidence of TB in the area remains speculative.

BOOK REVIEWS

by Pat Rae, MIEEM

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Earthscan Publications Ltd. ISBN 1 85383 690 7 208pp £19.95.

These two companion volumes from Earthscan Publications Ltd. are published in association with UNEP, and represent several years of collaborative effort.

Under firm editorial guidance, the writing is on the whole very clear and the insights and lessons learnt will be invaluable to those at whom the volumes are aimed. "Environmental Valuation" aims to provide source material for students and academics and also for policy makers and professionals who use valuation methods to frame policy. The audience for "Economics Instruments" is similar but with leanings towards academic and researchers. The range of examples is impressive, each volume covering 14 and 19 case studies respectively across Africa, Asia, Eastern and Central Europe and Latin America.

The books are deliberately written to be accessible to non economists, but it helps to be pretty much into the thinking and the jargon before you start. Each has a reasonable glossary, though as is always a danger with glossaries, the reader can become caught in the occasional cross referencing loop.

Because of the time taken to compile the case studies, inevitably the examples may seem a bit old for those who are seriously involved with environmental economics. However, that is not the real value of these books. They provide a forum to display and debate the various methodologies, and in a range of countries, developing and otherwise, with hugely different issues to address. It is clear that effective levels of economic instrument often depend on suitable resources valuation in the first place. The books certainly try to be honest in their appraisal of the techniques being used, and indeed this is just as well, as some of the methods, are limited and inevitably only as good as the assumptions made and the sampling procedures used – a fairly obvious dilemma which will already have improved since these studies because experience will have widened and data sets are gradually becoming more available. If ecology is considered as a young science then this type of economics is even younger, even though the etymological origins of their names and their complexities are similar.

The first volume, "Environmental Valuation" is, as it says, a Compendium of Case Histories. The introductory chapter sets it all in context and discusses the main issues and problems with the methodologies. Perhaps the most controversial aspect, is the issue of discounting - not surprising, as the economic cases will hold or fall depending on the assumptions made. One topic that would have enhanced both books would have been more

discussion on the role of the more familiar tool of Environmental Impact Assessment – how it is being integrated, successfully or otherwise, into Valuation methods in particular.

"Economic Instruments for Environmental Management" has nineteen, often fascinating examples of case studies ranging from emissions taxes to park entrance fees. On the whole this volume is much more readable as it deals with more tangible, and therefore more quantifiable, issues such as emissions and production rates etc. The benefits or otherwise of economic instruments are regarded as only being revealed in the longer term, as most of the examples quoted have only been operational for a maximum of eight years, and some only a few months. In cases of taxation, one always has to ask the question what the prime purpose is, whether to raise money for governments, or to reduce environmental impact. This is touched upon in the Introduction, with the clear conclusion that the revenue objectives are normally uppermost. It follows then that in the world of business, ways will be found round them. This then raises the differences between economic instruments and regulation, and when each is more suitable for use – there is a short discussion of this too. For those readers familiar with UK legislation and emissions permitry in particular, it is worth seeing how things are approached elsewhere. A bit more discussion in the book on tradeable permits would have been useful.

In summary, the case studies are a great horizon widener, especially if your work is largely UK based. The books really ought to be bought as a pair, so if you are tempted, just go for it – the price is right.

Pat Rae is Principal Environmental Engineer, Granherne, Limited



LEEDS CITY COUNCIL

Nature Conservation

Leeds City Council is seeking applications from suitably qualified and experienced Organisations who wish to be considered for inclusion on an approved list for the provision of Nature Conservation.

Interested Organisations will be required to complete an application form and provide audited accounts and annual report for the past two years; details of the organisations for whom they have undertaken similar services and from whom references can be obtained; a full and detailed copy of the Organisation's health and safety policy and insurance details. Interested Organisations must be able to carry out one or more of the following in support of their application:

- Vegetation survey, using the National Vegetation Classification methodology
- Surveys of bryophytes, fungi and lichens
- Surveys of mammals, including bats, badger, water vole and other small mammal species
- Amphibian and reptile surveys
- Terrestrial and aquatic invertebrate surveys, including a range of taxa such as insects, other arthropods, and non-arthropod invertebrates
- Breeding and wintering bird surveys

Interested Organisations are asked to forward a written request for an application form to:

Ms L Hayes, Leeds City Council, Department of Legal Services, Procurement Unit, Civic Hall, Leeds, LS1 1UR. Email: lynda.hayes@leeds.gov.uk

The closing date for expressions of interest is 12 noon on Friday 29 September 2000.

Institute News

There seems to be an ever increasing amount of material to report in Institute News and the good thing about this is that there really is quite a bit happening. Some of this is the necessary and sometimes rather unglamorous work that is vital to the overall development of the Institute and which is carried out in the Committees. Sometimes this has a much more visible result in the Conferences or workshops of the Institute. Either way the Institute is grateful to all those who continue to give their support in various ways.

Birmingham Conference

There was a generally highly favourable response to the Conference in Birmingham and the feeling that the presentations really did add to the current debate. This is certainly an issue which will not go away. The proceedings for the day were launched by Baroness Barbara Young, one of our Patrons and the scene was set for a stimulating series of papers. These will shortly be available and sent to all members. Much of the work is now complete but publication has unfortunately been slightly delayed.



Barbara Young addresses the Birmingham Conference

Patrons

The Institute is pleased and honoured that Dr Duncan Poore, MIEEM and Professor Charles Gimingham have agreed to be new Patrons of the Institute. Both are renowned for their contributions to ecology and environmental management and are particularly welcome as Patrons from Scotland.

Congratulations to Barbara Young who has been appointed as Chief Executive of the Environment Agency. Barbara Young was Chief Executive of the RSPB from 1991- 1998 and has been Chairman of English Nature since 1998. She is also a Vice-Chairman of the BBC and a Non-Executive Director of Anglian Water. She was made a Life Peer in 1997. She will now relinquish her posts with English Nature, Anglian Water and the BBC. With a staff of c.10,000 and an operating budget of c. 630m, the Environment Agency post is of major significance and IEEM would like to wish her well.

Code of Professional Conduct

The new Code of Professional Conduct was adopted at the Birmingham Conference in 1999 after careful scrutiny by the Professional Affairs Committee. The means by which the Code would be enforced was then to be developed. This is intended to apply both to current members and applicants who have to sign a declaration that they have practised within the Code as far as it applies before joining. There are therefore two processes. The Professional Affairs Committee and Council have given very detailed attention to this issue, the text has been scrutinized by the Institute's lawyers and Council approved the new procedures at its last meeting on July 20th. The majority of these are changes in the byelaws which Council has the power to approve. There are some proposed changes in the Articles of Association which have to be approved by a general meeting and these will be put to the AGM in Ayr with the recommendation from Council that they be accepted. There has been a great deal of work put into this exercise which is quite complicated and the Institute is grateful to the Professional Affairs Committee and Hilary Ludlow and Steve Gibson who did most of the drafting.

Charitable Status for IEEM

It is part of the Memorandum of Association of the Institute that steps can be taken when appropriate to apply for IEEM to become a Charity. Council considered this at their last meeting and decided that the advantages appeared to far outweigh any disadvantages and a formal application will be made to the Charities Commission in the near future. The application will not necessarily be accepted or acceptance may be dependent on making some constitutional changes. Where these require changes in the Memorandum or Articles of Association and if they seem reasonable, they will need to be put to a general meeting on the recommendation of Council. The Institute of Biology, the Landscape Institute and the British Ecological Society are all charities and some other institutes have parts of their operations registered as charities.

IEEM in Europe

IEEM was for some time a member of EFEP, the European Federation of Environmental Professionals but its membership lapsed due to financial pressures. The Federation itself would like IEEM to rejoin. The cost of this is currently about £600 or 75pence per accredited member. Council and F&GP considered this at their last meeting and decided provisionally that this was not an immediate priority but that the views of the membership should be sought.

The sum itself is not large but equally the benefits of joining have not been large. EFEP did act as a clearing house for a significant amount of work that was done on common credentials for European ecologists and it was always envisaged that the membership requirement of IEEM should be such that members would have little difficulty in gaining European recognition for their qualifications should such a system ever materialise. EFEP at the moment is therefore a network only but it is the only European network of its kind. For instance I was interested to learn that the Germans have been working on standards for survey, an issue which has evoked much interest in IEEM; there is to be a conference in Hungary in 2001 and a further seminar, probably in France. Other international organisations such as Europarc, and Eurosite are specifically concerned with protected areas and their management whilst there are several learned ecological societies who do meet together from time to time on themes of particular interest. Total membership at the moment is about 5,000 with members in France, Germany, Switzerland, Spain, U.K (The Landscape Institute). The question is whether to pursue membership at the moment so that IEEM can play at least some part in European matters or to await any further development.

Council would be interested to know of any views that the membership may have. Please write or E-mail the Office with your views **by 1st October** which Council will take into account in deciding whether to join or not.

Membership Directory

Although work is well underway and the new edition will be considerably larger than the last, it is unlikely that the new Directory will be available until October of this year. A number of members have not responded to the various reminders and so will not be included other than being listed by name. But the time available to the secretariat to send out repeated reminders is unfortunately limited and I am sorry if this will leave some members disappointed.

The 2000/ 2001 Professional Development Programme

The programme of short courses for this year is well underway but there are still vacancies on a number of courses. These are listed in the diary section. The training and Career development Committee has been looking at the overall strategy for this important aspect of the work of the institute. Robin Buxton will be reporting back to the Committee when it next meets on 3rd October. If any members have suggestions for any improvements, could you please let the office in Winchester know in time for the meeting. Also there are still opportunities for members to offer courses in topics which they consider would be of interest to the membership. Do not be put off by the prospect. The office handles virtually all the administration and there is detailed guidance on how a day might be run. A number of tutors who have given courses over the years would like to rest their course for a year or two so there are plenty of opportunities there. Tutors are also paid! Some themes continue to attract large numbers and grass identification is one. Giving a course is one aspect - attending is the other. The ethos behind them is that they are practical courses given by practitioners who mostly are IEEM members - to people who want to learn about the practical aspects of doing the job. Apart from that they can also be a lot of fun!



The 2000 Basic Introduction to Grasses Course at Settle led by Judith Allinson.

The 2000 Ayr Conference

I do hope that members will have reserved the dates in their diary for what promises to be a most interesting Conference. The booking form and full programme will be with you shortly. The idea is to make the Conference slightly more of a social occasion with whisky tasting and a Ceilidh all included as the antidote to the usual fairly intensive days of action. There will also be some very interesting site visits.

Future Meetings

The next one day Meeting of the Institute will be in Birmingham on 5th April 2001. The theme has yet to be finally decided but is likely to deal with the implementation of the new measures in what by then should be the new Countryside Act and how the costs of wildlife conservation and access to the Countryside are to be met.

The next 2-day Symposium will take place in November 2001 and is expected to focus on marine and Freshwater issues. This is a subject area not so far considered by IEEM and has plenty of aspects of interest, including Marine SACs

Membership Subscriptions

Subscriptions are due on 1st October and renewal forms have now been sent out. I am pleased to report that Council decided that the subscription rates should remain the same and so these levels have now been held for 6 years which is quite an achievement. IEEM has an excellent record of members renewing their membership but it does sometimes take a while to take the plunge. Do please pay the subscriptions promptly- sending out reminders is costly and time consuming. Also do please note that the renewal form is an invoice and can be treated as such.

IEEM 10th Anniversary.

Believe it or not IEEM will be 10 years old in September 2001. Now is the time to think how this might be marked and if members have any ideas they would be most welcome. The two future meetings will form part of the celebrations and there will also be meetings of the sections in Scotland and the Northeast. 2001 will be the year to put IEEM on the map and Council have been considering some sort of reception to be held in London and quite possibly to coincide with the exact date of the inaugural Meeting.

Seminar, 28th September

Members will now have been circulated with a flier advertising the forthcoming seminar to be based on the paper by Karen Regini in this edition. The intention is that this should be an informal gathering and something of a think tank. It will start at 11.00am and should finish by about 13.00. The venue is the Friends House, Euston Road and there is no charge for the event. It is hoped that a useful number of members will attend to make the discussion worthwhile and to advance the topic. The event will be followed by a meeting of the Professional Affairs Committee in the afternoon. **Do please let the Secretariat know if you intend to attend as space may be limited.**

Prospective members of IEEM

The following people have applied for membership of IEEM. If any existing member has any good reason to object to someone being admitted to the Institute, they must inform the Executive Director by telephone or letter before 22 October 2000.

Any communications will be kept strictly confidential. The final decision on an admission is always taken by Council.

F=Full A=Associate ()=Current membership grading

Name	Category applied for		
Dr	Victoria J.	Abernethy	F
Mr	Michael B.	Batley	F
Mr	Robert R.	Bearne	A
Dr	Andrew W.	Brooks	F
Mr	Peter J.	Brooks	F
Miss	Amy R.	Christie	F
Mr	Terence	Coult	A
Mr	Steve	Crosby	F
Ms	Julie M.	Dewar	F
Ms	Kathryn	Edwards	F
Mr	David C.	Feige	F
Miss	Tessa	G. Harding	F
Mr	Colin J.	Hedley	F
Mr	Timothy J.	Holzer	F
Mr	Mark	Jennison	F
Ms	Zoe V.	Kemp	A
Dr	Bruce	Lascelles	F
Mr	Stephen J.	Lees	F
Mr	Giles W.	Manners	F
Mr	Dougal P.	McNeill	F
Dr	Steven M.	Percival	F
Mr	Richard A.	Rivers	A
Miss	Margaret C.	Savory	F
Mr	Andrew G.	Shaw	F
Mr	Colin R.	Shawyer	F
Mr	Graeme J.F.	Smart	F
Miss	Jennifer A.	Smith	A
Mr	Steven A.	Spode	F
Mr	Tim	Sykes	F
Mr	David G.	Whitehorn	F
Mr	Michael C.	Williams	F

New Admissions to IEEM

Name	Grade Admitted
Dr Hilary J Ash	F
Mr Ian Barker	F
Miss Janine M Barrow	A
Ms Dolores S Byrne	A
Dr Jonathan H Cox	F
Mrs Imogen Crawford	A
Mr Andrew Davis	F
Ms Peta Denham	F
Mr Dominic Driver	F
Miss Stephanie Elliott	A
Mr Matthew E Fasham	A
Miss Katharine H Fisher	A
Mr Kurt Goodman	A
Ms Valerie J Hack	F
Mr Sean A Hathaway	F
Dr Karen L Hay	A
Miss Joanne L Hole	A
Dr Peter D Hulme	F
Mr Andrew P Jennings	F
Mr Andrew C Johnson	F
Dr Katie A Joyce	A
Mrs Jolanda Keeble	A
Miss Jennifer E Knight	A
Miss Deborah Land	A
Mrs Lesley Lawrence	A
Mr D.Alan Lewis	F
Miss Helen Lucking	A
Dr Aidan Marsh	F
Ms Isabelle R Moriera	A
Miss Kerry Nicholson	A
Miss Rebecca L Osborn	A
Dr Mark F Robinson	F
Miss Sacha Rogers	F
Miss Sarah L Rogers	A
Mrs Lesley J Saint	F
Mr Martin Slater	F
Mr David I Smith	F
Mr Patrick Waring	A
Mr Derrick W Warner	A
Mr James Waterson	F
Mrs Hazel M Willmott	A
Mr Andrew P Wilson	F
Dr Leander J Wolstenholme	F

Upgrades

Mrs Lizbe Pilbeam	F
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Email: enquiries@ieem.demon.co.uk

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IEEM uses Word and other PC packages but not MAC

The Course programmes for the Centre for Alternative Technology, The Field Studies Council, Losehill Hall, Plas Tan- y- Bwlch and have all been received and each offers a wide range of course that might be of interest to IEEM members. Further information is given below:

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 2000 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.

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

Plas Tan y Bwlch: For further details please contact Plas Tan y Bwlch, Maentwrog, Blaenau Ffestiniog, Gwynedd LL41 3YU. Tel: 01766 590324, Fax: 01766 590274 E-mail: Plastanybwlch@compuserve.com.

For practically based courses the BTCV offer an impressive range both for participants and through the Environmental Trainers Network.

Details from the BTCV Training Programmes Unit, Red House, Hill Lane, Great Barr, Birmingham B43 6LZ Tel: 0121 358 2155, Fax: 0121 358 2194, E-mail: a.groves@btcv.org.uk.

Other Courses/Events in 2000:

22-23 September. Our Place or Yours - Local Nature Reserves under the Microscope, Imperial College, London. Details from The London Wildlife Trust Tel: 020 7261 0447 E-mail: londonwt@cix.uk.

26 September. "Taking the Plunge" - Wetlands Creation, The wetlands Centre, Barnes, London. Details from Landlife, Tel: 0151 737 1819, Fax: 0151 737 1820 E-mail: info@landlife.org.uk.

28-29 September. Introduction to Bats and Bat Survey Work - A course for Environmental Consultants, Epping Forest Field Studies Council Centre. Details from: The Bat Conservation Trust, 15, Cloisters House, 8, Battersea Park Road, London SW8 4BG Tel: 020 7627 2629 Fax: 020 7627 2628 E-mail: gsargent@bats.org.uk.

4 October. Executing Environmental Projects on the Ground. Poole area, Dorset. Facilitator: Will Bond Details from the IEEM Office.

5-6 October. Flooding Risks and Reactions - CIWEM & ICE, London. Details from: Erica Hammond, Terence Dalton Limited 47, Water Street, Lavenham, Suffolk CO10 9RN Tel: 01787 249290 Fax: 01787 248267 E-mail erica@lavenhamgroup.co.uk.

10 October. Protected Aquatic Mammals in Scotland. Perth, Central Scotland. Facilitator: Rosemary Green. Details from the IEEM Office.

10 October. Putting Sustainability into Practice in the Coastal Environment, SOAS, University of London. Details from: Bob Earll, CMS, Candle Cottage, Kempley, Glos., GL18 2BU Tel/Fax: 01531 890415

11 October. Working with Badgers, Gloucestershire Facilitator: Warren Cresswell MIEEM. Details from the IEEM Office.

18 October. Dynamic Landscape Restoration - art or science? The Landscape Conservation Forum, Sheffield. Details from Mr Ken Smith, LCF, Peak District National Park, Aldern House, Baslow Road, Bakewell, Derbyshire, DE45 1AE. Tel: 01629 816206; Fax: 01629 816310; E-mail: krs@peakdistrict-mpa.gov.uk

24 October. Botanical surveys and their interpretation, The National Museum of Wales, Cardiff Facilitator: Tim Rich MIEEM. Details from the IEEM Office.

26 October. Integration of conservation and agriculture - Livestock farming, North Yorkshire. Facilitators: Steven Pullan MIEEM, and Robert Campbell LEAF Farmer. Details from the IEEM Office.

9-10 November. Ecology and the Rural Community Annual Symposium and AGM, The Quality Hotel Station, Ayr. Details from IEEM Tel: 01962 868626, Fax 01962 868625, E-mail: enquiries@ieem.demon.co.uk.

15-16 November. Marine SACs: Partnership in Action, Edinburgh Conference Centre, Herriot- Watt University. Details from: John Torlesse UK Marine SACs Project English Nature, Northminster House, Peterborough PE1 1UA. Tel: 01733 455308 Fax: 01733 568834 E-mail: john.torlesse@english-nature.org.uk

23 November. Professional practice: managing a contract, Stevenage, Hertfordshire Facilitator: Hilary Ludlow MIEEM. Details from the IEEM Office.

24th November. Biodiversity Recording and Planning - National and Regional issues in Working for Biodiversity, Sheffield. Details from: Dr Ian D. Rotherham, Centre for Environmental Conservation and Outdoor Leisure, LFM, Sheffield Hallam University, City Campus, Pond Street, Sheffield S1 1WB.

28th November. Using the NVC for Environmental Impact Assessment Location: The National Museum of Wales, Cardiff Facilitator: Tim Rich MIEEM. Details from the IEEM Office.

28th November. Tendering Procedures Location: Central Scotland. Facilitators: Carol Crawford, MIEEM and Kathy Dale, MIEEM. Details from the IEEM Office.

1-3 December. Birds of Prey in a changing environment, Edinburgh. Details from: Des Thompson, SNH 2, Anderson Place, Edinburgh EH6 5NP Tel: 0131 446 2419 Fax: 0131 446 2405 E-mail DES.THOMPSON@snh.gov.uk