**A report to the Department for Environment, Food & Rural Affairs
(on behalf of the UK Biodiversity Information Group)**

of the

UK BIODIVERSITY INDICATORS FORUM

An exchange of experience in the development and use of biodiversity indicators

JNCC, Peterborough

Monday 4th March 2002

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JUST ECOLOGY ENVIRONMENTAL CONSULTANCY

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Executive Summary

On Monday 4th March 2002 the first UK Biodiversity Indicators Forum was held at the offices of the Joint Nature Conservation Committee (JNCC) in Peterborough.

The purpose of the Forum was to enable exchange of experience in the development and use of biodiversity indicators in the UK at a range of scales and within a variety of sectors.

The meeting was arranged by JUST ECOLOGY on behalf of DEFRA, with support from the JNCC, English Nature and Scottish Natural Heritage, on behalf of the Biodiversity Information Group (a sub-group of the UK Biodiversity Partnership). A wide range of government agencies and non-governmental organisations attended.

Presentations on biodiversity indicators were given. They covered a variety of topics, ranging from sectoral issues such as climate change and agriculture through to the use and development of indicators at local, national and European levels. Open discussions were held at the end of each presentation session.

The main themes emerging from the Forum presentations and discussions were:

- A large number of biodiversity indicators are in existence or being developed, covering a wide variety of sectors and relevant at a range of scales.
- Indicators serve many purposes, leading to debate about whether indicators should be policy-driven, data-driven or process-driven.
- The UK was considered to be doing relatively well in the field of biodiversity indicator development, but needs to maintain an overview so that comparisons can be made with European and international counterparts.
- It would be valuable for the UK to continue to share its experience with indicator development internationally.
- Gaps in data exist, including for invertebrates, genetic diversity, marine species, linking diversity with climate change and capturing regional/local diversity. There is also a need for further scientific research, as well as work to address the problem of differences in data between countries and the current lack of public awareness about biodiversity.
- There is a need for increased co-ordination of efforts in indicator development, including awareness-raising, experience sharing, improving data collection, increasing access to data and tackling common problems. A *twin-track* approach was recommended, whereby we use what data and indicators we have while continuing to develop new and better approaches.
- Indicators should be simple, transparent yet meaningful, enabling common messages to be given, but without resorting to a rigid framework.

A UK Biodiversity Indicators Forum was considered useful and could have a number of functions: to undertake periodic reviews and facilitate information exchange; to establish, maintain and disseminate a list of contacts; to identify topics requiring more co-ordinated efforts; to develop and promulgate best practice and standards; and to create and maintain an internet hub for linking initiatives.

Introduction

This is a report of the first UK Biodiversity Indicators Forum, held on Monday 4th March 2002 at the offices of the JNCC in Peterborough. The meeting was arranged by JUST ECOLOGY on behalf of DEFRA, with support from the JNCC, English Nature and Scottish Natural Heritage, on behalf of the Biodiversity Information Group (a sub-group of the UK Biodiversity Partnership).

Background

The idea for a UK Biodiversity Indicators Forum was first raised at a BioAssess meeting in Dublin in January 2001. Subsequently, proposals for the Forum were made to the Biodiversity Information Group (BIG) in April 2001 and again in January 2002. A BIG sub-group, to be responsible for the Forum, was established, consisting of: Andrew Stott (DEFRA), Paul Rose (JNCC), Mark Felton (EN) and Phil Shaw (SNH). Jeff Kirby (JUST ECOLOGY) was appointed by DEFRA to organise the meeting.

Concurrent to this, the report *'Sustaining the Variety of Life'* was published in March 2001. The report recommends that "the UK continues to work with other countries, within the framework of the CBD, to develop a suite of indicators which can be used to assess the state of biodiversity generally and progress towards the achievement of the primary aims of the UK BAP".

Biodiversity indicators portray the status of, and trends in, biodiversity, as well as related pressures and responses. They operate at international, UK, country, regional, local and sectoral levels. Indicator initiatives share common data resources and a common purpose of enabling policy development and/or actions to take better account of the implications for biodiversity. However, differences also exist between biodiversity indicators, such as differences in context, methods of calculation, presentation and interpretation.

Purpose

The overall purpose of the Forum was to facilitate exchange of experience in the development and use of biodiversity indicators in the UK, at a range of scales and including sectoral applications. Its focus was on *biodiversity indicators* only.

Objectives

More specifically, the objectives of the Forum were:

- To take stock of activity on biodiversity indicators in the UK
- To explore the need for a network for consultation, information exchange and co-ordination
- To provide information on UK and European initiatives on biodiversity indicators
- To identify data sources currently available which would support effective development and use of indicators
- To identify gaps in information, shared problems and research requirements

Programme

The Forum was structured around five main sessions, with each session focusing on a particular aspect of biodiversity indicators. Session topics were: International; UK & Country; two Sectoral & Local sessions; and a session on The Way Forward. Each session involved presentations and a discussion (see Annex 1 for details).

Who Attended?

A wide range of government agencies and non-governmental organisations attended the Forum. A list of participants and organisations, together with a brief description of their involvement in UK biodiversity indicator development, is supplied in Annex 2.

<u>Summary of Presentations</u>

A summary of the presentations from sessions 1-4 is given below. For further details, and for accounts of the discussions following each session, please follow the links or go to <u>Annex 3.</u>

<u>Session 1: International</u>

<u>Indicator Development at the European Level</u> - <u>Ben Delbaere, ECNC</u>

European development of biodiversity indicators was discussed in this presentation. A large number of indicators and projects are being developed on a European scale. As yet there is no common, pan-European set of indicators, and no single authoritative biodiversity database for Europe. Data is mostly collected at local level, centralised nationally and transferred/reported at international level. A trend towards integration and co-operation is emerging. There are many interlinking issues, from urban and rural development to climate change, agriculture and nature protection. Linkages between international organisations were also described. Reports on biodiversity indicators are mostly used for assessing and developing policies, and for raising awareness. A number of bottlenecks exist, including a lack of political willingness to apply indicators once they have been developed. Future actions may include development by the EEA of a 'core set' of biodiversity indicators; EC development of 'headline indicators'; and opportunities for increased co-operation within the framework of existing international biodiversity programmes. In the meantime, a twin-track approach – using existing indicators while continuing with scientific development – was advocated.

<u>Assessing Biodiversity: a European Perspective</u> - <u>Allan Watt, CEH</u>

This presentation concentrated on the assessment of biodiversity indicators at a European level, focusing particularly on the BioAssess (Biodiversity Assessment Tools) project. The project's original objectives were to develop a tool-box for assessing the impacts of policies on biodiversity in Europe; and to quantify the impact of land-use change on biodiversity. The approach and methodology were discussed. Field sites were established in 8 countries. Within these, selected biodiversity components are measured, as are landscape features (via remote sensing). Biodiversity assessment tools, comprising sets of indicators, are subsequently developed. Field sites were described and examples of sites were presented photographically and diagrammatically. Some results were presented. The newly evolving objectives were described: to evaluate existing indicators of biodiversity; and to evaluate existing environmental monitoring systems as 'biodiversity' monitoring systems. A twin-track approach was advocated, deploying the best available indicators at present while continuing with research.

<u>Session 2: UK & Country</u>

<u>Biodiversity Indicators: Quality of Life Counts – Jenny King, DEFRA</u>

UK biodiversity indicators were discussed in the context of the UK Government's Sustainable Development Strategy and Quality of Life Counts. The process of indicator development was described. Core biodiversity indicators within the Quality of Life indicators were described, and some results given. Core biodiversity indicators are: native species at risk; Biodiversity Action Plans; trends in plant diversity; landscape features; Sites of Special Scientific Interest; and biodiversity in UK coastal/marine areas (to be developed). Limitations to indicators were discussed, including the danger of over-simplification and the importance of public resonance. Regional indicators were also mentioned, and the difficulty of developing them (largely because of insufficient data) was highlighted.

<u>Indicators of change in Britain's biodiversity – Phil Shaw, SNH</u>

Biodiversity indicators and their potential use at national level were discussed in this presentation. Criteria for indicator selection were examined in relation to the main information needs of country agencies. Criteria included: illustrating outcome relative to policy objectives; providing

clear trend data; being applicable at a variety of geographical scales; and allowing for frequent updates. The 'BAP' traffic light system of reporting on the proportion of actions taken for BAP species (red = no action taken, amber = some actions taken, green = all actions taken) was described. Finally, a suite of potential biodiversity indicators to be used UK-wide was proposed, and the feasibility of measuring these indicators by SNH, EN, CCW and EHS discussed.

Session 3: Sectoral & Local

Indicators for Sustainable Agriculture – Richard Findon, DEFRA

The former Ministry for Agriculture, Fisheries and Food's pilot set of sustainability indicators, Towards Sustainable Agriculture (2000), was presented and discussed. Britain was one of the first countries to publish indicators for agriculture and the pilot set are a strong starting point for developing the sustainability of the sector. They compliment the UK Sustainable Development Strategy indicators, *Quality of Life Counts,* assessing sustainability across all sectors of business, government and public life. Their strengths include: the pilot set of indicators provides a good foundation or starting point; many of the indicators show positive action; and some indicators have strong public resonance. Weaknesses include: problems of indicator substitution (surrogates); omissions for a number of topics such as social and community progress, and animal welfare; poor data; and the diversity of farming practices and local conditions, which is difficult to capture at aggregate level. The emergence of DEFRA and the importance of DEFRA's Sustainable Development Strategy, as well as the Sustainable Food and Farming Strategy following on from the Curry Report, are major driving forces for reviewing the indicators, as are European and international developments. The revised indicators will need to be clear, relevant, durable, reliable and resonant. The entire set of indicators will also need to reflect the principles of the DPSIR model. DEFRA will be seeking views in the coming year. The input of Forum participants regarding a number of issues to be addressed during the review, was requested.

UK Indicators of Sustainable Forestry: Biodiversity – Vicky West, FC

The Forestry Commission (FC)'s developing set of Sustainable Forestry indicators was presented and discussed, particularly those indicators relating to biodiversity. The process of indicator development was outlined in the context of international and UK developments in sustainable forestry strategy. The FC's consultation procedure to date was described. The Sustainable Forestry indicators span the following topics: woodland; biodiversity; condition of forest and environment; timber; and people. Potential biodiversity indicators and sources of data were divided into two categories: those indicating the diversity of woodland (including ancient woodland, native woodland, regeneration, and diversity within a stand); and those indicating the diversity of fauna and flora within woodland (including the woodland birds index and the SAP species index). Problems were identified, including the lack of data for key areas (e.g. loss of woodland, woodland condition); and the difficulty of obtaining data that is applicable to the whole of the UK. The FC aim to publish the indicators in summer 2002.

Woodland Biodiversity – Richard Smithers, Woodland Trust

A series of measures of woodland biodiversity potential, developed for use in measuring improvements in woodland biodiversity, and the relative merits of possible future activities, were presented. These are described in detail in *Woodland biodiversity: expanding our horizons*, which can be downloaded from the Woodland Trust's website at www.woodland-trust.org.uk/policy/publications.htm. The measures have helped inform the development of the Trust's thinking, as described in *Space for nature: landscape-scale action for woodland biodiversity*. This has been published since the forum met and copies are to be sent out to everyone who attended. It can also be downloaded from the Trust's website.

Session 4: Sectoral & Local

Indicators of Climate Change Impacts on UK Biodiversity – Terry Parr, CEH

Climate change and biodiversity were set in the context of the DPSIR (Drivers, Pressures, State, Impact, Response) model. Current broad-scale indicators were presented as: the increase in global mean surface temperature 1860-1999; a variety of studies showing impacts associated with regional temperature change; and phenology. Recent UK and European reports, relating to both climate change and biodiversity, were discussed. Indicator criteria were described, including: sensitivity to climate; relationship to ECN; routinely available data; and long time-series where possible. The UK's 34 climate change indicators, spanning a variety of sectors from health and pollution to agriculture and wildlife, were presented. Those relating to biodiversity were discussed in more detail, for example insect abundance and swallow arrival dates. Biodiversity trends and indicators associated with climate change from a variety of other sources – including Scottish National Heritage and the Forestry Commission – were also presented. Indicators need to fulfil a number of functions, including: helping us to understand causality; helping us to manage climate change impacts; and showing the contribution that biodiversity can make to mitigation. The UK Phenology Network and the UK ECN were described. The nature of UK biodiversity monitoring schemes in relation to climate change was shown diagrammatically as a 'monitoring pyramid'. In conclusion, the UK was appears to be doing well relative to other countries, but can be seen to lack a strong policy focus for – or linkage between – climate change and biodiversity indicators.

Local Indicators – Mike Oxford

Biodiversity indicators were discussed in a Local Authority context. Key service areas for biodiversity were shown to include political leadership, local partnership, data collection, planning, community involvement, Local Authority land management and assistance of land management for other landowners. Indicators were grouped into types: context, input, output and outcome indicators. Tables showing headline activities and indicators for biodiversity were presented and discussed.

<u>Common Issues Identified</u>

The common issues identified in sessions 1-4 are presented in tabular form on the following pages, in order to facilitate comparisons between indicators and indicator development as outlined in the presentations. The following attributes have been addressed:

- *Which indicators are used*

- *Why they have been developed (context)*

- *How they were developed (methods)*

- *On what data they are based*

- *How they are reported and used*

- *Their relationships with others (co-ordination)*

- *Problems encountered (data, methods, gaps, knowledge)*

- *Planned developments and future opportunities*

- *Further information*

Session 1: International

	Indicator development at the European level	Assessing Biodiversity – a European perspective
Indicators used	- No common, pan-European set of biodiversity indicators - Survey listed 655 biodiversity-related indicators for 12 sectors	Initiatives include: CBD; European Biodiversity Strategy (BAPs, directives); EEA (core set; BIO-IMP); OECD indicators; TBFRA; MCPFE; ICP-Forests; NGOs; and research projects (BEAR, BioAssess)
Why developed	- Scientific purposes - Policy development, assessment, feedback - Reporting - Early warning - Country benchmarking - Awareness-raising, communication - Environmental impact assessment - Adaptive management	- Measure geographical change in biodiversity - Measure temporal change in biodiversity - Measure impacts of drivers & pressures - Measure impacts of policies - Identify need to change policies - Identify need for new policies - To focus research
How developed	Perceptual models, including: - DSR & DPSIR - Sustainability Framework	Example: the BioAssess project: - 6 field sites each in 8 countries - Measure selected components of biodiversity - Landscape features via remote sensing - Develop biodiversity assessment tools
Data that the indicators are based on	- No single database for Europe. Mostly, data is: - Collected at local level - Centralised at regional/national level - Reported to international level (CBD, OECD, EIONET)	BioAssess: - Assess richness, composition & abundance of: birds; butterflies; lichens; plants; ground beetles; soil macrofauna; soil collembola
Presentation and use	- Mostly in support of policy development/ assessment or awareness-raising - E.g. CBD National reports; OECD Environmental performance reports; EEA Environmental Signals & Europe's Environment reports, UNEP Global Biodiversity Outlook, 'World Resources' reports, WWF Living Planet, Natura Barometer	BioAssess Original objectives: - Tool box to assess impacts of policies - Quantification of impact of land use change Evolving objectives: - Evaluate existing indicators - Evaluate existing monitoring systems for monitoring biodiversity
Co-ordination and relationship with other indicators	- Linkages in Issues: agriculture; nature protection; forestry; energy; recreation/tourism; climate change; urban development; rural development; water; infrastructure / transport; trade; fisheries. - Linkages between orgs: EEA, CBD, FAO, Wetlands Intl, ECNC, EC, OECD, Birdlife Intl, Eurostat, MCPFE, WRI, World Bank, EFI, UNDP, IUCN,UNEP	- BioAssess has collaborators in UK, Spain, Portugal, Finland, Ireland, Germany, The Netherlands, Switzerland, France, and Hungary.
Problems (gaps, data, methods, knowledge)	- 'Short-termism' - Lack of national/international co-ordination - Lack of data at European level - More scientific development needed - Need to test existing indicators - Hesitation to apply indicators - Policy objectives to be more clearly defined.	- More scientific research and direct measurement is needed
The future	- EEA to develop 'core' set of biodiversity indicators - EC to develop 'headline indicators' - Enhanced co-operation in framework of CBD, OECD, FAO, EUROSTAT etc - EBMI-F - IWG-BioMIN, BEG - Twin-track approach needed	- Twin-track approach is the way forward - Research to test and improve existing indicators and monitoring systems and develop new ones - BioAssess approach: direct measurement for verification; adaptable.
Further information	- delbaere@ecnc.nl, drichard@mnhn.fr, ulla.pinborg@eea.eu.int - www.strategyguide.org/ebmf.html	- adw@ceh.ac.uk

Session 2: UK & Country

	UK Indicators and Quality of Life Counts	Indicators of Change in British Biodiversity
Indicators used	150 core indicators inc 15 headline indicators. Core biodiversity indicators are: - Native species at risk - Biodiversity Action Plans - Trends in plant diversity - Landscape features - Sites of Special Scientific Interest - Biodiversity in UK coastal/marine areas (tbd) Index of wild birds is good indicator of wildlife. Many other indicators are related to biodiversity.	- SNH suggested indicators: BAP species & habitats; Plant species diversity, Woodlands, Statutory sites, Wild Birds indicator, Wildfowl & waders, Breeding seabirds, Riverine mammals, Salmonids, Estuarine fish diversity, Riverine invertebrates, Marine fish stocks - EN could add: landscape; butterfly species - EHS do not have data for: Plant species diversity; Riverine mammals; Estuarine fish diversity but could add BAP broad habitats; semi-natural vegetation.
Why developed	- Monitor and report on progress - Help focus on specific issues - Links to policies or targets - Communicators	To satisfy the main needs of Country Agencies, i.e.: - Biodiversity Action Plan: Progress and outcomes - SSSIs: The condition of notified interests - European Directives: status of habitats & species, mainly on sites; and compliance with articles - International conventions and agreements: status of habitats & species; compliance with articles
How developed	- 1996 – 1st set developed mostly within government - 1999 –wider consultation advisory group 'Wildlife & Habitats'; reps from government, conservation agencies and other organisations	Criteria for indicators: - Illustrate outcomes relevant to policy objectives/ targets - Data strengths/weaknesses can be described, with sources referenced. - Trends can be described clearly to non-specialists - Utilises the best available trend data. - Potentially applicable at different geographical scales. - Updated reasonably frequently.
Data that the indicators are based on	- Native species at risk: % threatened, % nationally scarce, % other. Source: JNCC - BAPs: no. of SAPs & BAPs. Source: DEFRA - Trends in plant diversity: % change in mean species numbers within major vegetation groups. Source: CS 1990 & 2000 - Landscape features: Changes in characteristic countryside features. Sources: DEFRA, CS - SSSIs: number, area, status. Sources: EN, CCW, SNH, DoE (Northern Ireland). - Biodiversity in UK Coastal Marine areas - Index of wild birds: pops of wild bird groups: farmland spp(19), woodland spp(33), all spp	- A variety of governmental and non-government sources, including: JNCC, CS, FE, CSM, BTO, RSPB, WWT, VWT, Fishery Boards, SEPA, ICES, EN, CA, BC, EA, Forest Service, EHS.
Presentation and use	- Uses: monitoring, policy development, target development, communication.	- The 'BAP' traffic light: species for which all, some or no action (green, amber, red) has been taken.
Co-ordination and relationship with other indicators	- Nested within UK Sustainable Development Strategy & UK Quality of Life Counts. Report published May 1999: A Better Quality of Life: 'A better quality of life for everyone, now and for generations to come'.	- Much information is common to the four UK countries, whose agencies have similar data/ reporting needs - Indicators of change should be a key component of any national set of indicators. - The potential indicators presented span terrestrial, freshwater, estuarine and marine ecosystems.
Problems (gaps, data, methods, knowledge)	- Indicators have limitations: quantifiability; over-simplification; resonance with public; interpretation of trends; timeliness. - Regional Indicators difficult: insufficient data - Biodiversity in UK Coastal Marine Areas: hard to communicate while retaining concept	- Gaps in data between countries - Gaps in our knowledge of marine species biodiversity - Many UK BAP targets are not likely to be met
The future	- DEFRA soon to produce report on regional indicators	- Indicators must be transparent, clearly sourced, understandable, updated frequently, well integrated with national reporting requirements.

		- Focus should be on outcomes rather than process
Further information	- Jenny.king@defra.gsi.gov.uk Report: A Better Quality of Life - a strategy for Sustainable Development for the UK (May 1999)	Phil.shaw@snh.gov.uk

		Indicators for Sustainable Agriculture	UK Indicators of Sustainable Forestry	Woodland Biodiversity
Indicators used		- 35 'pilot' indicators of sustainable agriculture. Issues: A – agriculture within the rural economy & society, B – farm management systems, C – input use, D – resource use, E – conservation value of agric land. Within E are: - Environmental conservation, 31: area of agricultural land under commitment to environmental conservation - Landscape, 32: characteristic features of farmland - Habitats, 33: area of cereal field margins under environmental management, 34: area of semi-natural grassland - Biodiversity, 35: population of key farmland birds	- Woodland diversity: B1. ancient woodland (AWI); B2. native woodland (NIWT) (A4: loss of woodland?); B3. Native woodland condition?; B6. Nat regeneration of woodland (Admin) B7. Woodland diversity within a stand (NIWT) (A7: woodlands in landscape) - Diversity of fauna & flora in woodland: B4: Diversity of Fauna: woodland bird index – abundance; butterflies, bats, mammals, SAP spp; B5: Diversity of Flora: vascular plants – species richness; SAP species index - abundance	- Key Features for Woodland Biodiversity: Ancient woodland; Old Growth; Size; Core Area; Woodland edge adjacent to semi-natural habitats; Density of semi-natural habitats; Linkage of open ground habitats - Surrogate measures of woodland biodiversity: Density of ancient woodland cover; % of ancient woodland which is semi-natural; cumulative core area of semi-natural habitats; area of old growth woodland
Why developed		- Means of measuring economic, social & environmental impacts of agriculture in GB; assess effectiveness of policies & sustainability of the sector.	- Contribution of forestry to SD in UK - Common approach across the UK - Enable UK to report in international processes more easily - Show UK takes sustainable forestry seriously on international level	- Useful for measuring improvements in woodland biodiversity & merits of possible future activities. - Helpful for target setting & to define sustainable land use
How developed		- Selected after intensive public consultation - Criteria: policy relevance, analytical soundness, measurability, spatial & temporal level of aggregation	- June 1999: Agreement to develop the indicators - March 2001: 1st public consultation; long list - June 2001: Review consultation; work on smaller list - February 2002: 2nd public consultation - Summer 2002: publication of indicators	- Measures were developed using a 'landscape scale' approach - Criteria: measures should be relevant to: all habitats and species; existing habitats and habitat creation; landscapes and individual sites.
Data that the indicators are based on		- Indicators based on the data available to MAFF at the time of development (c2000)	- National Inventory of Woodland & Trees (~34,000 sample plots ~0.8 ha in UK); Ancient Woodland Inventories; Admin (Woodland Grant Scheme, Forest Enterprise); Native woodland HAP working group; RSPB/BTO; BMS, 44 sites; MaMoNet; SAP species index?; CS2000 scores	- Various data sources, including: Countryside Council for Wales, English Nature, Natural Environment Research Council and Scottish Natural Heritage
Presentation and use		- MAFF pub: 'Towards Sustainable Agriculture' 2000 - Some of the set may be used to monitor the Sustainable Food and Farming Strategy to be published in autumn 2002. The entire set will be reviewed in 2003.	- Hard copy updated ~ 5 years; annual web updates - Inclusion of some info in 'Forestry Statistics'	- WT has published two documents (see below) - Approach used to inform development of WT's thinking.
Co-ordination and relationship with other indicators		- Biodiversity set within Sustainable Agriculture indicators - Complement UK Sustainable Development Strategy indicators - Now part of wider DEFRA context - International: OECD & EC developing agri-	- Set within 38 UK indicators of sustainable forestry: woodland, biodiversity, forest/environmental condition, timber, people - Pan-European sustainable forest mgmt indicators being developed - Scottish Forestry Strategy – development for Scottish	- The biodiversity measures were developed to be relevant to all habitats and species.

	environment indicators; we should try to fit in with these	forests - Loc schemes e.g. SW Forests - - UK QoL counts	
Problems (gaps, data, methods, knowledge)	- Surrogates: e.g. 31,33,34 represent 'ecosystem health' - Omissions: e.g. social & community progress; upland area - Poor data - lack of value of indicators - Diversity of farming practices & local conditions.	- Loss of woodland (esp. Ancient) - Woodland condition - Woodland SAP species abundance index? - Getting data applicable to all of UK	- Boundaries of the concentrations of ancient woodlands need to be adjusted to the actual landscapes, rather than following gridlines.
The future	- 2003 review; Setting a wider definition of sustainable agriculture; balance between environmental, social, economics indicators; Capturing farm diversification; Linking indicators	- Public consultation to 2/5/02 - Publication of indicators: summer 2002 - Continual refinement of indicators - Annual updates on web	- Combined targets for the concentrations of ancient woodland - Vision of sustainable land use in areas with a concentration of ancient woodland: 30% semi-natural woodland, 40% low intensity land use, 30% semi-natural habitats
Further information	- Richard.findon@defra.gsi.gov.uk - 'Towards Sustainable Agriculture' – MAFF 2000 - LEAF & Hertfordshire University project to describe National Indicators at farm level.	- Vicky.west - http://www.forestry.gov.uk/sfindicators - Pan-European indicators: http://www.mcpfe.org - UK Forestry Standard,'98; Englands Forestry Strategy, '99; Forests for Scotland,'00; Woodlands for Wales,'01	- Richard.smithers@woodland-trust.org.uk - www.woodland-trust.org.uk/policy/publications.htm - WT publications: Woodland biodiversity: expanding our horizons; Space for nature: landscape-scale action for woodland biodiversity

Session 4: Sectoral & Local

	Indicators of Climate Change Impacts	Local Indicators
Indicators used	UK/DETR Climate Change Indicators (34) incl.: - Wildlife, Insects and Birds (5): Dates of Insect Appearance and Activity; Insect Abundance; Swallow arrival date; Egg-laying dates in birds; Small bird population changes - Marine and Freshwater (3): Marine plankton; Migration of salmon - Also mentioned were SNH, FC, and IPCC indicators.	- Context Indicators: population or land area of local authority; number of SPAs, SSSIs or SINCs. - Input Indicators: number of ecologists employed, or budgets spent on biodiversity. - Output Indicators: number of local habitat or species actions plans published. - Outcome Indicators: increase in the number of otters present; increase in extent of priority habitat.
Why developed	DETR/CEH report, 1999: - Provide early warning - Resonant -promote republic awareness - Aid ecosystem management - Relate to ecosystem services - Inform policy response	There are 8 key service areas for biodiversity: - Political leadership & democratic accountability - Encourage local co-ordination/partnership on biodiversity - Data collection and use - Planning policy and development control - Enabling community involvement & education - Management of LA land - Assisting other land managers and owners - Statutory responsibility & professional competence
How developed	DETR/CEH indicator criteria: - Sensitive to climate - strong correlations - Long time series exist of good quality data - Routinely collected, low cost availability - Relevant to public & policy makers - Representative of region/sector; relationship to ECN	Indicators developed in 3 contexts: - Statutory context, e.g. Wildlife & Countryside Act - National context, e.g. PPG9 Nature Conservation - Local context, e.g. Biodiversity Grant Aid Initiatives
Data that the indicators are based on	- Main sources: Rothamsted Insect Survey; Biological Records Centre; Butterfly Monitoring Scheme; Bird Observatories (migration dates); British Trust for Ornithology; SAHFOS (Marine plankton); Amateur records (plant phenology) - Some sources of new data: CS 78, 84, 90, 89; MarClim; UK Phenological Network; ECN	This information was not given in the presentation.
Presentation and use	- Use: e.g. UK ECN: External – direct web to database access for users in science, society & education. Internal – analysis & modelling for indicators, trend direction, forecasting	- Review: Best Value for Biodiversity, Mike Oxford & Steve Moon, ALGE, 2001
Co-ordination & relationship with other indicators	- Climate change falls within the UK Biodiversity Monitoring Pyramid along with a variety of biodiversity programmes, e.g. UK ECN; UK phenology network; CS; MarClim; MONARCH;	- The indicators fall within local, national and statutory contexts.
Problems (gaps, data, methods, knowledge)	- Limited in scope - Difficult to be sure of cause and effect - Simple indicators don't promote appropriate response - No link to BAPS - Lack of national data - Lack of framework for prioritising measurements/indicators - Lack of analytical framework for interpreting data	- Many partners & LAs do not properly understand the concept of biodiversity. - The emphasis of LAs is often on 'value' for money rather than on the real issues affecting biodiversity
The future	- Climate change is an escalating problem; we need a suite of indicators that enable us to understand its impacts on biodiversity and provide information on what we should do about it. - Do nothing	Conclusions arising from Best Value review: - To Challenge. Why is the service provided? How is it provided? What benefits do the community get from it? How could it be improved? - To Compare. Are others giving a better service? - To Consult. What do stakeholders think of

	- Focus on BAP species - Focus on BAP priority habitats - General assessment of impacts on ecosystems and ecosystem processes	services? - To Compete. Is the service competitive? Would it be more efficient and effective to use different approaches to deliver the service?
Further information	- Twp@ceh.ac.uk - A variety of reports, including: - Indicators of Climate Change in the UK, DETR/CEH; Climate Change & Nature Conservation in Britain and Ireland, MONARCH	- Mike.oxford@ukgateway.net - Review: Best Value for Biodiversity, Mike Oxford & Steve Moon, ALGE, 2001

The Way Forward

Session 5 focused on the future of biodiversity indicators and the future of the Forum. Hilary Neal gave a presentation on indicators as viewed from a policy perspective, subsequent to which Andrew Stott prompted an open discussion by asking a series of questions about the Forum's future. Following this, John Custance summed up the main conclusions of the Forum.

A policy perspective on the use of indicators

Hilary Neal
Head of Biodiversity Policy Unit
DEFRA

The policy purposes of indicators
- Justification: through evidence
- Explanation: through clarity /transparency
- Accountability: through trends
- Early warning: through measuring the right things
- Why? What? How? How well?

The indicator jungle
QOLC, MCPFE, DPSIR, TBFRA, EBMI-F, MDIAR – to name but a few!

The beauty of simplicity
- The populations of wild birds
- The condition of SSSIs
- The achievement of BAP targets
- The amount of ancient woodland
- The length and quality of hedgerows

The Holy Grail
The Value of the Forum:
- To keep us real
- To build on success and available information
- To pool our efforts
- To contribute to international efforts
- To feed into country policy development (e.g. Biodiversity Strategy for England)

Future of the Forum

Andrew Stott
Head of WCSU
DEFRA

Andrew Stott prompted a discussion by asking a series of questions on the future of the Forum. The objective was to solicit the views of the attendees and to provide some feedback to BIG on the success or otherwise of the meeting and about its potential role and future.

What are the requirements?

- *There is a need to maintain an overview for better UK representation*

The UK seems to be doing relatively well in the field of biodiversity indicator development, but needs to maintain an overview in order for comparisons to be made with European and international counterparts. The group could also make an important contribution internationally by being a first point of call and preparing information to feed into international events and initiatives.

- *There is a need for greater awareness, experience-sharing, and tackling of common problems*

The group identified a need for improved co-ordination in sector and scale across the UK, as well as in Europe and internationally. Those who need to represent UK activity in this area internationally need to know what is going on and need a network for consultation. It was agreed that the Forum was a good way of initiating the processes of information exchange and awareness-raising. Increased co-ordination of our efforts could also be facilitated over the Internet and via the maintenance of a contact list (see below).

- *There is a need to avoid confusing our shared constituencies (political masters and public)*

The group identified the need for common messages to be given without resorting to a rigid framework, thus allowing the variety of biodiversity indicators to be valued. Indicators may serve a number of purposes, from providing evidence and explanation for policy decisions, to providing accountability and raising public awareness. It was also felt that indicators can be an excellent way of engaging the public – as well as Local Authorities and BAP partners – with the issue of biodiversity. The group highlighted the importance of simple, transparent and yet meaningful biodiversity indicators, and the difficulty of achieving this objective was discussed. There was also considerable discussion on the subject of what should drive the development of indicators: should they be policy driven, data/output driven, process driven, and/or guided by fundamental ecological principles? This topic could be usefully aired again at future Forum meetings.

- *There is a need to co-ordinate our efforts to improve data collection and access to data*

The wide variety of information sources and methods of data collection mean that it is often difficult to compare indicators. However, focusing on co-ordination should not preclude the use of existing data. One of the Forum's ideas was to adopt a *twin-track* approach, whereby we use what data and indicators we have while continuing to develop new and better approaches.

What could a UK Forum do?

- *Establish, maintain and disseminate a list of contacts*

The participants' list and description of participants provided in Annex 2 of this report can be seen as a first step towards the establishment of such a contact list.

- *Create and maintain an internet 'hub' for linking initiatives*

The group agreed that the development of an Internet 'hub' resulting from the Forum would be an excellent means of communication. It would also enable comparisons to be made more easily between the UK and our European counterparts.

- *Facilitate information exchange and undertake periodic reviews, e.g. via an annual Forum*

The Forum was widely agreed to be a highly useful day. A regular (e.g. annual) Forum would provide a form of outreach from BIG to the larger community.

- *Identify topics requiring co-ordinated efforts, e.g. data requirements*

A number of topics were identified as requiring co-ordinated efforts. Gaps in data were seen to include invertebrates, genetic diversity, marine species, linking diversity with climate change and capturing regional/local diversity. The group also highlighted the need for further scientific research; the problem of differences in data between countries; and the current lack of public awareness about biodiversity.

- *Develop and promulgate best practice and standards*

The Forum was an important first step in sharing current work on biodiversity indicator development. Continued communication – via reports, the Internet, and future Forums – would enable best practice to be identified and adopted within different sectors and at different scales.

Discussion

Discussant: Andrew Stott

Ben Delbaere
- The role of this Forum could be as a central UK access point within Europe for what is happening on indicators in the UK, and to communicate progress and best practice from the UK to the European level.

Paul Rose
- We should avoid introducing a rigid framework for biodiversity indicators but there is a distinct need for common messages. Perhaps some form of report would be a good way of doing this.

Jim Munford
- Regarding the question of this Forum resolving issues and giving guidance, smaller working groups are needed, that report to the main forum. The main purpose of this Forum needs to be decided: is it for the exchange of ideas, or solving hard issues?

Andrew Stott
- The Biodiversity Information Group (BIG) is responsible for the exchange of information and ideas about biodiversity information needs. This Forum is a form of outreach from BIG to the larger community.

Hilary Neal
- The important part, as I see it, is how we engage with the European agenda. We should use this Forum as a sounding board for how to filter ideas into Europe. BIG could decide on particular issues for this group to address.

Ed Mackey
- An important point for Scotland would be knowing how we compare, i.e. how does Scotland's contribution to biodiversity conservation compare with that made by other countries?
- SNH is doing some work with the WCMC on biodiversity information sources. They are finding very few examples where good comparisons can be made using indicators.
- The Internet would be a good hub for the exchange of ideas and information. It may also be a good way to compare the UK with its European counterparts.

Summing Up

John Custance
Chief Statistician
DEFRA/EPSIM

John Custance summed up the main conclusions of the Forum. These were:

- There are a lot of biodiversity indicators, both nationally and internationally.
- Perhaps we should value their diversity rather than try to over-rationalize them.
- It is important that we continue to talk, listen and learn.
- This Forum has an important role in ensuring that we do so.

Annex 1: Programme

UK BIODIVERSITY INDICATORS FORUM

Programme

Department for Environment, Food & Rural Affairs
(On behalf of the UK Biodiversity Information Group)
JNCC, Peterborough
Monday 4th March 2002

An exchange of experience in the development and use of biodiversity indicators

Chairman: John Custance, DEFRA

10.00	*Coffee and registration*	
10.30	**Welcome**	John Custance, DEFRA
10.35	**Introduction and purpose**	Andrew Stott, DEFRA
Session 1: International		
10.45	Indicator development at the European level	Ben Delbaere, ECNC
11.00	Biodiversity Assessment	Allan Watt, CEH
11.15	Discussion	**Discussant:** Paul Rose, JNCC
Session 2: UK & Country		
11.25	UK indicators and Quality of Life Counts	Jenny King, DEFRA
11.40	Indicators of change in British Biodiversity	Phil Shaw, SNH
11.55	Discussion	**Discussant:** Marcus Yeo, JNCC
Session 3: Sectoral & Local		
12.05	Indicators for Sustainable Agriculture	Richard Findon, DEFRA
12.20	UK Indicators of Sustainable Forestry	Vicky West, FC
12.35	Woodland Biodiversity	Richard Smithers, Woodland Trust
12.50	Discussion	**Discussant:** Mark Felton, EN
13.00	*Lunch*	
Session 4: Sectoral & Local		
14.00	Indicators of Climate Change Impacts on UK Biodiversity	Terry Parr, CEH
14.15	Local indicators	Mike Oxford, ALGE
14.30	Discussion	**Discussant:** Jeff Kirby, Just Ecology
Session 5: The Way Forward		
14.40	A policy perspective on the use of indicators	Hilary Neal, DEFRA
14.55	Discussion	**Discussant:** Andrew Stott, DEFRA
15.25	Chairman's Concluding remarks	John Custance, DEFRA
15.30	*Tea &Close*	

Annex 2: List of Participants

Name, organisation, position, e-mail	Description
Alison Barnes *SSO* DEFRA/EWD Alison.barnes@defra.gsi.gov.uk	Provides advice on development of local and regional biodiversity indicators including: Audit Commission's Voluntary Quality of Life Biodiversity Indicators, Public Service Agreement Indicators (with Local Authorities), Best Value and Biodiversity Indicators, development of regional indicators: Regional Planning Guidance Biodiversity Indicators, Government Office Business plan indicators.
Allan Watt CEH Adw@ceh.ac.uk	Involved in a number of relevant EU-funded research projects. He is the co-ordinator of the EU FP5 project 'BioAssess' which is looking into the scientific underpinning for biological indicators.
Amy Coyte *Joint Chief Executive* Bat Conservation Trust Acoyte@bats.org.uk	Senior staff member with BCT interested in overall indicators of progress and any best practices developing in this field. Recently completed an MBA dissertation applying the concepts of performance measurement. Unable to attend Forum but would like to be involved in information exchange
Andrew Stott *Head of Wildlife and Countryside Science Unit* DEFRA/EWD Andrew.stott@defra.gsi.gov.uk	Head of the WCSU and responsible for providing advice to Government on national and international biodiversity indicators. A member of the Biodiversity Information Group.
Ben Delbaere *Senior Programme Co-ordinator – Biodiversity & Landscapes* ECNC Delbaere@ecnc.nl	A member of the European Centre for Nature Conservation in the Netherlands, and an expert on the development of biodiversity indicators in Europe. Representing the European Topic Centre on Nature Protection and Biodiversity as one of it's consortium partners.
Carol Somper *Senior Research Officer* Countryside Agency Carol.somper@countryside.gov.uk	Leads the Agency's work into the development of national indicators of 'change in countryside character' and 'countryside quality'; these will both deal with changes in the landscape with obvious links to biodiversity interest.
David Noble *Head of Census Unit* BTO David.noble@bto.org.uk	A senior researcher with the BTO and involved in the development and presentation of the wild birds headline indicator.
David Smallshire *Principal Ecologist* DEFRA/RDS David.smallshire@defra.gsi.gov.uk	A member of the Technical Advice Unit of DEFRA's Rural Development Service and provides advice to MAFF/DEFRA on the development of the QOLC and Sustainable Agriculture wildlife indicators.
Dominic Rowland *HEO* DEFRA/CMD Annadominic@ukonline.co.uk	No information received.
Dr David Crowhurst Building Research Establishment Crowhurstd@bre.co.uk	BRE, working with CIRIA, is soon to start a project to investigate and develop a biodiversity indicator(s) for construction projects. Biodiversity is one of the indicators used in the BRE Environmental Assessment Method (BREEAM) and other associated methodologies developed and used at BRE.
Dr David Gibbons *Head, Conservation Science* RSPB David.gibbons@rspb.org.uk	Head of Research and involved in developing and producing the UK headline indicator on wild bird populations.

Name, organisation, position, e-mail	Description
Dr Ian Bainbridge *Head of Ecological Adviser's Unit* Scottish Executive Ian.Bainbridge@scotland.gsi.gov.uk	Head of Ecological Adviser's Unit, which advises policy staff in SE on ecology and biodiversity issues, including development of biodiversity indicators in Scotland.
Ed Mackey *Head of Environmental Audit Unit* Scottish Natural Heritage Ed.mackey@snh.gov.uk	Head of the Environmental Audit Unit and lead author of 'Natural Heritage Trends: Scotland 2001'. He is closely involved in the identification of indicators of the state of the natural heritage, e.g. on biodiversity, towards the assessment of sustainable development in Scotland and international comparison.
Fred Currie *Wildlife and Conservation Advisor* Forestry Commission Fred.currie@forestry.gsi.gov.uk	Involved in the development of the biodiversity sub-set of indicators within the UK Indicators of Sustainable Forestry.
Galina Gardiner *Ecologist* Just Ecology Galina@justecology.co.uk	An ecologist, Galina is involved in support work in relation to Just Ecology's contract with DEFRA and other commissions.
Gavin Measures *Biodiversity Officer* English Nature Gavin.measures@english-nature.org.uk	Has worked to identify and produce biodiversity indicators of sustainable development for each of the eight Government Regions and London, based on UK BAP priorities. Working with the Audit Commission, involved in drawing up a series of local biodiversity indicators (included on the Commissions Library of Local PIs), that local authorities can use to measures their local service delivery (Best Value).
Gy Ovenden *National Biodiversity Co-ordinator* DEFRA/RDS Gy.ovenden@defra.gsi.gov.uk	Responsible for delivery of UK biodiversity targets through agri-environment schemes. Interested in the use of agri-biodiversity indicators to measure progress towards the achievement of sustainable agriculture.
Helen Doran English Nature Helen.doran@english-nature.org.uk	Responsible for developing EN's policy on sustainable development, which includes maintaining an overview of biodiversity indicator development. Part of the team that developed the Audit Commission's biodiversity indicators for Local Authorities.
Hilary Neal *Head of Biodiversity Policy Unit* DEFRA/EWD Hilary.neal@defra.gsi.gov.uk	Head of Biodiversity Policy Unit, currently responsible for developing the England Biodiversity Strategy and for inputs into EU Biodiversity Strategy.
James Munford *Programme Director* NBNT j.munford@nbn.org.uk	A key member of the National Biodiversity Network Trust - a public/voluntary sector partnership using new technology to improve access to biodiversity information of known quality from whatever managed source to meet the needs of all users.
Jeff Kirby *Director, DEFRA Science Consultant* Just Ecology / DEFRA Jeff@justecology.co.uk	An environmental scientist with Just Ecology and under contract to DEFRA as a science consultant. He has considerable experience in biodiversity monitoring, indicator development and reporting, and in local biodiversity issues.
Jenny Duckworth *Biodiversity Research Manager* PlantLife Jenny.duckworth@plantlife.org.uk	No information received.
Jenny King *Assistant Statistician* DEFRA/EPSIM Jenny.king@defra.gsi.gov.uk	Works on the Quality of Life Counts team and the government's indicators for sustainable development as a whole. Many of these indicators are relevant to biodiversity, for example the headline indicator for wildlife - the index of wild bird populations.

Name, organisation, position, e-mail	Description
John Custance (EPSIM) *Chief Statistician* DEFRA/EPSIM John.custance@defra.gsi.gov.uk	Head of EPSIM, with responsibility for coordinating the production of biodiversity indicators to underpin and monitor progress of the UK's Sustainable Development Strategy. Also involved in other related work for the UK agri-environmental indicators and biodiversity indicators for various international organisations e.g. EEA, EU, OECD and UNCBD.
Marcus Yeo *Head of Habitats Action* JNCC Marcus.yeo@jncc.gov.uk	Carries out leading work on setting standards for habitat assessment and reporting on condition.
Mark Felton *General Manager* English Nature Mark.felton@english-nature.org.uk	A director of EN and also representing the inter-agency Land Use Policy Group. He is a member of the Biodiversity Information Group.
Martin Bolton *Building for Nature Project Officer* SEEDA Martinbolton@seeda.co.uk	Runs the Building for Nature Project, a new initiative aiming to ensure gains for biodiverstiy from the development sector. Hopes to be involved with Martin Hunt (CIRIA) in developing indicators for the development sector.
Martin Hunt *Project Manager* CIRIA Martin.hunt@ciria.org.uk	No information received.
Melanie Heath *Head of Science Division* BirdLife International Melanie.heath@birdlife.org.uk	A representative from BirdLife International who is currently working on the development of international indicators for bird population changes.
Mike Oxford *Environmental Consultant* ALGE Mike.oxford@ukgateway.net	Formerly with North Somerset District Council, Mike has taken a lead within the Association of Local Government Ecologists in developing best practice on local indicators.
Paul Rose *Head of Biodiversity Information* JNCC Paul.rose@jncc.gov.uk	Provides advice to DEFRA on European indicator initiatives and is heavily involved in information systems to support UK BAP. Paul is a member of Biodiversity Information Group.
Phil Shaw *Environmental Audit Officer* SNH Phil.shaw@snh.gov.uk	Author of the comprehensive report on Natural Heritage Trends in Scotland 2001.
Richard Findon *Head of Sustainable Agriculture Strategy* DEFRA Richard.findon@defra.gsi.gov.uk	Responsible for development of sustainable agriculture indicators.
Richard Gregory *Head of monitoring & Survey Section, Research* RSPB Richard.gregory@rspb.org.uk	The RSPB's lead person on biodiversity indicators. Was involved in the development of the UK Government's headline wild bird indicator and responsible, with BTO and DEFRA, for its annual update and publication. Is also involved in the development and production of regional wild bird indicators in English Government regions, Wales, Scotland and Northern Ireland; and in a range of international initiatives, most especially in Europe, to develop environmental indicators based on bird populations. Manages a European common bird monitoring project which aims to build policy relevant pan-European indicators for birds.
Richard Smithers *UK Conservation Adviser* Woodland Trust Richard.smithers@woodland-trust.org.uk	UK Conservation Adviser to for the Woodland Trust, providing an NGO perspective on indicators, especially in relation to woodland sites.

Name, organisation, position, e-mail	Description
Sandy Shattock (EUASD) policy advisor, Sustainable Agriculture Unit *Policy Advisor* DEFRA/SAU Sandy.shattock@defra.gsi.gov.uk	Co-ordinating DEFRA's review of the pilot Indicators for Sustainable Agriculture.
Stephen Reynolds *Statistician* DEFRA/EPSIM Stephen.reynolds@defra.gsi.gov.uk	DEFRA statistician with responsibility for wildlife and countryside statistics, including management of the BTO/RSPB contract that covers the production of the UK headline indicator on wild bird populations.
Steve Moon *Principal Officer – Environment* ALGE Planning@bridgend.gov.uk	An ALGE representative from Wales, Steve has been involved in developing best practice on local indicators.
Terry Parr *Co-ordinator UK ECN* CEH Twp@ceh.ac.uk	Leads the Environmental Change Network, which is researching environmental change at long-term reference sites.
Terry Rowell *Head, Environmental Audit* CCW t.rowell@ccw.gov.uk	Unable to attend forum (sent apologies) but is actively involved in biodiversity indicators and would like to be involved in exchange of information.
Tom Brereton *Monitoring & Species Ecologist* Butterfly Conservation Tbrereton@butterfly-conservation.org.uk	A representative from BC who is keen to see the application of annual butterfly monitoring data to develop butterflies as flagship invertebrate indicators.
Vicky West *Assistant Statistician* Forestry Commission Vicky.west	Developed and published a consultation on indicators of sustainable forestry.

Annex 3

Presentations and Discussions, Sessions 1-4

Session 1: International

Indicator development at the European level

Ben Delbaere
Senior Programme Co-ordinator – Biodiversity & Landscapes
European Centre for Nature Conservation
On behalf of the ETC/NPB of the EEA

Indicators In Use

There is no common, pan-European set of biodiversity indicators. Many initiatives are ongoing at various levels, for various purposes, by a multitude of organisations. A survey revealed some 15 international developments by major established organisations, a multitude of this in projects. The survey listed 655 biodiversity-related indicators for 12 sectors.

Why are indicators developed?

- Scientific purposes
- Policy development, assessment and feedback
- Reporting
- Early warning
- Country benchmarking
- Awareness-raising, communication
- Environmental impact assessment
- Adaptive management

How are they developed?

There are a number of conceptual models behind the development of indicators, including:

⇒ *DSR:* Driving Force - State - Response

⇒ *DPSIR:* Driving Force - Pressure - State - Impact - Response

⇒ *Sustainability Framework*

There is a trend from isolated and diverging development to co-operation, co-ordination, convergence and integration.

Data underpinning the indicators

There is no single authoritative biodiversity database for Europe. Data is mostly collected at a local level, centralised at regional/national level and transferred/reported to international level (e.g. CBD, OECD, EIONET). International databases have varying degrees of coverage, quality, completeness and actuality.

Some indicators are well developed, e.g. birds, wetlands, Natura 2000 and protected areas. Others are in progress, e.g. forests (TBFRA), EUNIS. Some indicators are poorly developed, e.g. invertebrates, mosses, heathlands and genetic diversity.

Reporting and use of indicators

Reporting is mostly in support of policy development or assessment, or for awareness-raising purposes. Examples include:

- CBD National Reports
- OECD Environmental Performance Reports
- EEA Environmental Signals and Europe's Environment reports
- UNEP Global Biodiversity Outlook
- 'World Resources' reports
- WWF Living Planet report

- Natura Barometer

Linkages in Biodiversity Indicators

The EEA CORE touches many inter-linking issues. These include agriculture; nature protection; forestry; energy; recreation/tourism; climate change; urban development; rural development; water; infrastructure / transport; trade; fisheries.

Linkages also exist between multitudes of different international organisations. These include:

Abbreviation	Full name
EEA	European Environment Agency
CBD	Convention on Biological Diversity
FAO	Food and Agriculture Organisation
Wetlands International	Wetlands International
ECNC	European Centre for Nature Conservation
EC	European Commission
OECD	Organisation for Economic Co-operation and Development
Birdlife International	Birdlife International
Eurostat	Statistical Office of the European Commission
MCPFE	Ministerial Conference for Protection of Forests in Europe
WRI	World Resources Institute
World Bank	World Bank
EFI	European Forest Institute
UNDP	United Nations Development Programme
IUCN	World Conservation Union
UNEP	United Nations Environment Programme

Bottlenecks

- Indicator development is often on a short-term project basis, with no long-term perspective
- There is a lack of co-ordination at national and international levels
- For most indicators there is a lack of data at European level
- There is a need for further scientific development
- There is a need for testing existing indicators
- Although increasing political willingness to develop indicators is apparent, there is also continued hesitation to really apply them
- There is a need for clearly defined policy objectives that can be monitored using indicators

Future perspectives

- Development by EEA of 'core set of biodiversity indicators'
- Development by EC of 'headline indicators'
- Enhanced cooperation in framework of CBD, OECD, FAO, EUROSTAT, etc
- European Biodiversity Monitoring and Indicator Framework (EBMI-F)
- IWG-BioMIN, BEG

A two-track approach is perhaps required, whereby we **use what is available** *whilst* **continuing with scientific development.**

Further Information

- E-mail contacts: delbaere@ecnc.nl, drichard@mnhn.fr, ulla.pinborg@eea.eu.int
- Survey report: http://nature.eionet.eu.int/activities/products/indicators
- www.strategyguide.org/ebmf.html: a paper on European indicators and information on EBMI-F
- CBD/COP6 side-event on monitoring and indicators: www.ecnc.nl/doc/projects/COP6

Assessing Biodiversity – A European Perspective

Allan Watt
BioAssess Co-ordinator
NERC Centre for Ecology & Hydrology

Biodiversity Assessment – Why?

- To measure geographical change in biodiversity (e.g. European patterns of species richness)
- To measure temporal change in biodiversity
- To measure the impacts of drivers and pressures on biodiversity
- To measure the impacts of policies on biodiversity
- To identify the need to change policies
- To identify the need for new policies
- To focus research

Biodiversity Assessment – Initiatives

- Convention on Biological Diversity
- European Biodiversity Strategy (BAPs & Directives)
- EEA (Core set of indicators; BIO-IMP project)
- OECD indicators
- TBFRA (UN-ECE/FAO Forest Resources Assessment)
- MCPFE (Ministerial Conference for Protection of Forests in Europe)
- ICP-Forests (International Co-operative Programme on the Assessment and Monitoring of Air Pollution on Forests)
- NGOs (Birdlife, Wetlands International)
- Research projects (e.g. BEAR, ENVIP-Nature, EON2000+, BioAssess; national projects)

The BioAssess Project

The BioAssess (Biodiversity Assessment Tools) project is part of the Environment and Sustainable Development programme, covering the area of Biodiversity and Global Challenge. It runs from August 2000 to July 2003.

Collaborators

Organisation	Country
Centre for Ecology and Hydrology	United Kingdom
Department of Ecology and Systematics, Division of Population Biology, University of Helsinki	Finland
National University of Ireland, Dublin	Ireland.
The British Trust For Ornithology	United Kingdom
The Natural History Museum, London	United Kingdom
Department of Remote Sensing and Land Information Systems, FELIS, Freiburg	Germany
The Ministry of Environment, Government of Catalonia	Spain
Dutch Butterfly Conservation / De Vlinderstichting	The Netherlands
Swiss Federal Institute For Forest, Snow and Landscape Research (WSL), Zurich	Switzerland.
IRD/Universite De Paris VI	France
Universidad Autónoma De Madrid	Spain
Universidad De Castilla, La Mancha	Spain
Universidad De Murcia	Spain
University Complutense of Madrid	Spain
Department Of Environmental Sciences and Technology, New University of Lisbon	Portugal
Institute of Environment and Life Sciences, University of Coimbra	Portugal
Mãe D'água, Consultoria Técnica Em Áreas De Interesse Natural, Ldt.	Portugal
Centro De Ecologia E Biologia Vegetal, Univeristy of Lisbon	Portugal
The Institute of Agronomy, Technical University of Lisbon	Portugal

Hungarian Natural History Museum	Hungary
The Finnish Forest Research Institute (METLA)	Finland
CNRS, University Paul Sabatier	France
CNRS, Museum National D'histoire Naturelle	France
Parc Naturel Regional Du Morvan	France

Objectives (original)
- To develop a tool-box for assessing the impacts of policies on biodiversity in Europe
- To quantify the impact of land-use change on biodiversity

Approach
- Establish field sites in 8 countries (6 in each)
- Measure biodiversity (selected components)
- Measure landscape features from remote sensing
- Develop "biodiversity assessment tools" comprising sets of indicators, potentially including both *biological indicators* and *Remote Sensing based indicators*

Field Sites
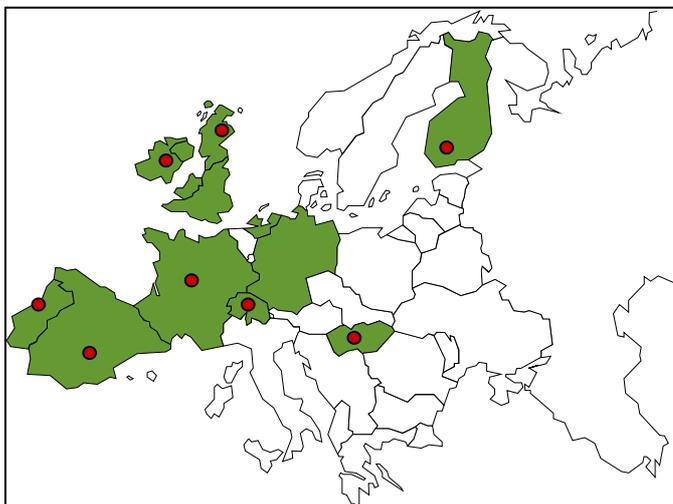
Land-use "intensity" gradients:
- Old-growth forest
- Managed forest
- Forest / woodland-dominated mixed-use landscape
- Mixed-use landscape not dominated by a single land-use
- Pasture-dominated mixed-use landscape
- Arable crop-dominated mixed use landscape

Map showing countries with field sites in the BioAssess project

Examples
Photographic examples of BioAssess sites in the UK, Finland, Switzerland, Portugal, Ireland, Spain and France, were shown. Photographic and diagrammatic examples were also shown of the assessment of birds, plants & lichens, invertebrates and butterflies. Systematic sampling methods at 16 points on a grid square were used for birds, plants & lichens and invertebrates. Transect methods were used for assessing butterflies.

Assessments are made of the *richness, composition* and *abundance* of:
- Birds
- Butterflies
- Lichens
- Plants
- Ground beetles
- Soil macrofauna
- Soil collembola

Remote Sensing in BioAssess – the Swiss test sites

A fusioned remotely sensed image was shown, with the six Swiss test sites superimposed. This was followed by several enlarged images of site LSU 6 (mixed-use dominated by arable crops), each displaying separate interpretations of the site's landscape features. Segments of these images were then shown, illustrating the way in which Remote Sensing can pick out landscape features that are important for biodiversity, e.g. edges, fragmentation and linear features.

Development of indicators
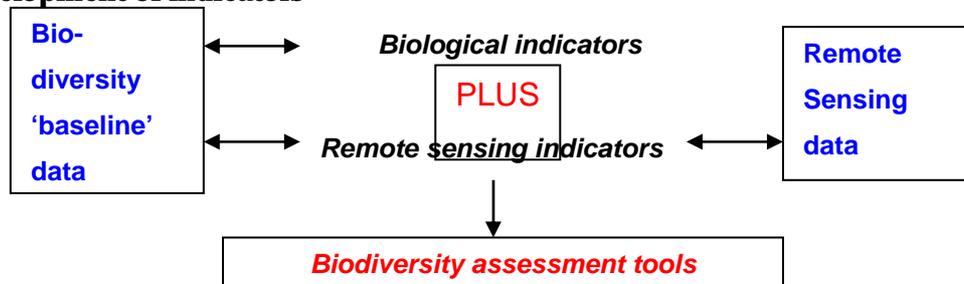
Some Results

1. *Soil Macrofauna, UK.* Species Richness – soil macro-invertebrates:
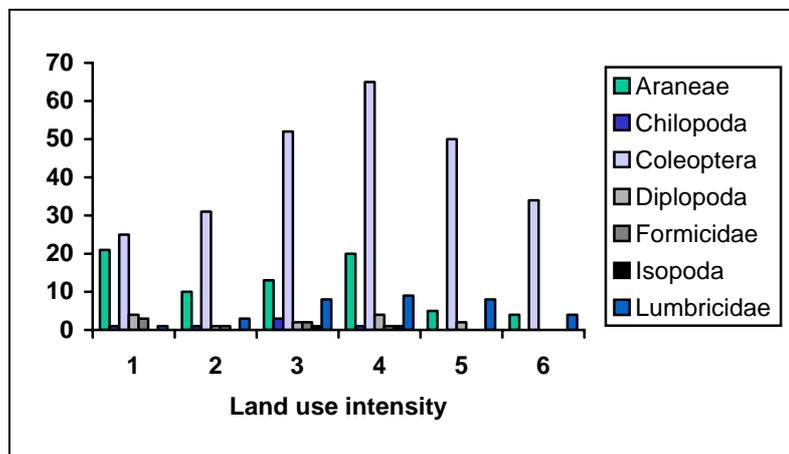
2. *Butterflies.*

a) Species richness of different countries:

	Hungary	Finland	Portugal	France	Ireland	UK
Species	28.7	20	19	11.2	10.5	6.5

b) Species richness at different land use intensities:
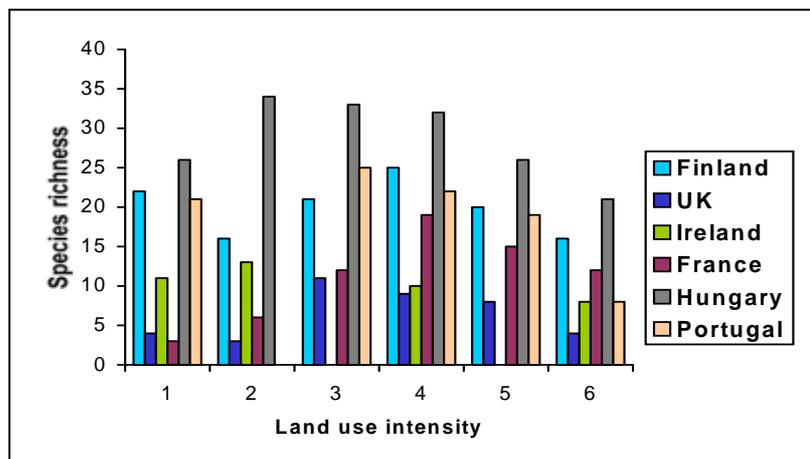
Objectives (evolving):
- To evaluate existing indicators of biodiversity
- To evaluate existing environmental monitoring systems as 'biodiversity' monitoring systems

Conclusions – the role of research in the development of indicators
- A twin-track approach to biodiversity assessment is needed – deploy best available indicators
- Research on biodiversity assessment is needed:
  - $\Rightarrow$ To test existing indicators and monitoring systems
  - $\Rightarrow$ To improve/adapt existing indicators and monitoring systems
  - $\Rightarrow$ To develop new biodiversity assessment systems
- The 'BioAssess' approach – direct measurement of biodiversity:
  - $\Rightarrow$ Necessary for verification
  - $\Rightarrow$ Adaptable – can be applied to national systems and different sectors (eg agriculture, forestry)

Driving forces
- Global market economy
- Agriculture
- Demography
- Socio-demographic changes
- Transport
- Energy
- Forestry
- Tourism

Pressures
- Fragmentation
- Intensification
- A-refforestation
- Drainage & irrigation
- Eutrophication
- Acidification
- Climate change

State
- Biodiversity status
- Land cover status

Impact on biodiversity
- Threats on habitats and species
- Perturbations of ecological functions

Policy measures
- EC & PEBLDS strategies for CBD
- Helsinki process
- Kyoto convention

Sectoral measures
- CAP agri-environmental
- CAP afforestation
- Spatial planning

Environmental programme
- Natura 2000 & Emerald networks

Responses

aims & priorities identification

Session 1 Discussion

Discussant: Paul Rose, JNCC
An important point from Ben Delbaere's presentation is that 655 international indicators have so far been identified. This large quantity suggests a lack of coordination both in Europe and internationally.

David Gibbons
- Regarding BioAssess, is there a plan to go back every few years to the field to continue this work?

Allan Watt
- Yes, if the funding is available. CEH are definitely repeating the fieldwork for a second year.

Unidentified participant
- Is there a problem with using direct measurement to derive indicators? For example, if one is looking at species, one must consider factors such as the time lag needed for an environmental pressure to affect a species. Therefore perhaps the focus on species gives a false value to indicators.

Allan Watt
- Yes, this may be true. One way around this is to analyse abundance, which we are doing (e.g. UK headline indicators). Another solution is to be selective about which species are used: to 'sift' species according to certain factors, such as how endangered they are.

Andrew Stott
- Are there other forums in Europe similar to this one?

Ben Delbaere
- We have mainly looked at the international scale, rather than at arrangements nationally. However, regarding existing national fora, there is one in Belgium and one in Denmark – but no others that I am aware of.

Terry Parr
- Work at a strategic level is fine – but there can be problems with translating science into action, e.g. BAPs, protected species/habitats. What is the read-across?

Allan Watt
- There is much activity in the UK on BAPs, and this takes care of the endangered aspects of biodiversity. At the opposite end of the spectrum are the common species and the wider countryside. In BioAssess we are focusing on the middle ground.

Ben Delbaere
- Most European-level work tends to look at the special, not the generic, aspects of biodiversity.

Carol Somper
- In looking at different land use systems, are you also looking at trends in land use, which will have important implications for biodiversity?

Allan Watt
- No. There is a possible plan to model trends from data, but at present this is not being progressed. We are hoping to link a project on land use decisions with BioAssess, but can foresee a number of problems in doing this.

Ian Bainbridge
- Perhaps there is a need for two types of indicator, one reflecting the generic and one focusing on more specialised aspects of biodiversity. For example, if solely BAP species are used, one gets a different set of responses than if one uses indicators that reflect the 'generality' of nature, e.g. the common birds census.
- It is also important not to get tied up with indicators that reflect the number of species, because of phenomena such as 'species substitution' e.g. in farmland. We often need the detail about what's happening to individual species.

John Custance
- It seems important to consider whether indicators should be objectives led or data led. We think they should always be objectives led. However, perhaps we need to use what we already have, whilst continuing to develop better indicators.

Ben Delbaere
- Regarding how the UK can help at EU level, the UK is pretty advanced with indicator development. Exchange of experience with European counterparts would probably be very useful.

Session 2: UK & Country

Biodiversity Indicators – Quality of Life Counts

Jenny King
Assistant Statistician
EPSIM, DEFRA

UK Sustainable Development Strategy
Report published May 1999: *A Better Quality of Life - a strategy for Sustainable Development for the UK*
'A better quality of life for everyone, now and for generations to come'.

Indicators
150 core indicators including 15 headline indicators (Quality of Life Counts, Dec 1999). Purpose:
- Monitor and report on progress
- Help focus on specific issues
- Links to policies or targets
- Communicators

An example chart of the population of wild birds from 1970-2000 was shown, with birds divided into farmland species (19), woodland species (33) and all species. The chart showed the largest decline to be in farmland species, followed by woodland species, while there was no real change for all species combined.

Recently there has been some positive news about wild birds in Britain. A sample page from the BBC news website was shown with the headline 'British Birds stage patchy recovery'; and example newspaper headlines, showing positive news about wild birds, were illustrated.

How the indicators were developed
1996 – first set of indicators developed largely within government
1999 – much wider consultation advisory group 'Wildlife & Habitats'; representatives from government, conservation agencies and other organisations

Biodiversity Indicators
The index of wild birds can be seen as a good indicator of British wildlife in general, as birds are at or near the top of the food chain; have wide ranging habitat distributions; and are resonant with the public.

Core biodiversity indicators are:
- *Native species at risk*
- *Biodiversity Action Plans*
- *Trends in plant diversity*
- *Landscape features*
- *Sites of Special Scientific Interest*
- *Biodiversity in UK coastal/marine areas (to be developed)*

Many other indicators are strongly related to biodiversity.

Indicators have limitations

- Some issues not readily quantifiable
- Danger of over-simplification
- Not always resonant with the public
- Trends may be capable of different interpretations
- Timeliness

Native species at risk

Invertebrate example: % threatened species, % nationally scarce species, % other. Data source: JNCC
A pie chart of native invertebrate species at risk in Great Britain was shown, illustrating that 12% are threatened and 16% are nationally scarce. 15,000 species were assessed.

Biodiversity Action Plans

Number of species and habitat action plans 1995-2001. Data source: DEFRA

Biodiversity action plans: 1995 - 2001

United Kingdom

- species action plans
- habitat action plans
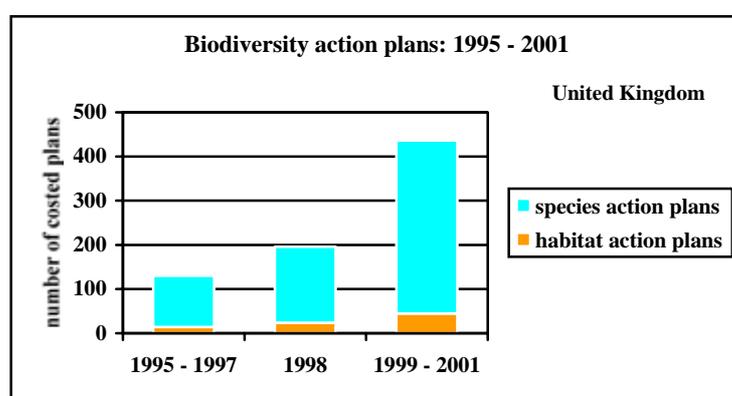
Trends in plant diversity

% change in mean species numbers within major vegetation groups 1978 1990 and 1990-1998, (and their statistical significance). Data source: Countryside Survey 1990 & 2000
A bar chart was used to illustrate this indicator. Vegetation groups were defined as:

- Crops/weeds
- Moorland grass
- Heath/bog
- Upland wooded
- Lowland wooded
- Infertile grassland
- Fertile grassland
- Tall grass/herb

Landscape features

Changes in characteristic countryside features 1984-1998 (1984, 1990, & 1998). Sources: DEFRA, Countryside Survey 1990 & 2000.
A bar chart was shown to illustrate this indicator. Landscape features were measured by kilometres of boundary (hedges, relict hedges, walls, banks/strips) and by numbers, in thousands, of ponds. Results varied according to habitat type.

Sites of Special Scientific Interest

- *Number and area of SSSIs 1984 – 2001. Sources: EN, CCW, SNH, DoE (Northern Ireland).*
A graph showing the increase in the total area of SSSIs and ASSIs (thousands of hectares) and the number of sites was shown. There was an increase from 1388000 ha and 4225 sites in 1984 to 2369000ha and 6775 sites in 2001.

- *Status of SSSIs from assessment in 1997/98. Source: EN*

A pie chart was shown illustrating that 56% of sites were in a favourable condition, 15% unfavourable but recovering, 16% unfavourable with no change and 13% unfavourable and declining or destroyed.

Biodiversity in UK Coastal Marine Areas
- Still being developed
- Difficult to produce something which is easy to communicate whilst still properly expressing the concept
- Could incorporate a number of measures

Regional Indicators
These are difficult to develop as there is insufficient data available.
- Regional quality of life counts
- Regional indicator of wild bird populations. Some indices (mostly farmland) are only reliable for some regions. Low sampling number of sites; relatively few species. DEFRA is working to develop reliable indicators for these regions. There will be a publication out soon.

Indicators of change in Britain's biodiversity

Phil Shaw
Environmental Audit Officer
SNH

Country Agencies: main information needs

Biodiversity Action Plan	Progress and outcomes
SSSIs	The condition of notified interests
European Directives	The status of habitats and species, mainly on sites; and compliance with articles
International conventions and agreements	The status of habitats and species, mainly on sites; and compliance with articles

Trends in terrestrial and freshwater species

A graph was shown to illustrate that:

- *Widespread butterfly species have tended to expand in range while scarce species have contracted.*

- *In recent decades land mammal, freshwater fish and rare vascular plant species have declined.*

- *Land bird species have shown mixed fortunes, but the majority of seabird, wader and wildfowl species have increased in abundance.*

Trends in Marine Species: How much do we know?

A table was shown illustrating that there are large gaps in our knowledge of marine species.

Criteria for selecting indicators

1. Illustrate *OUTCOMES* relevant to policy objectives / target levels.
2. Data strengths and weaknesses can be described, with sources referenced.
3. Trends can be described and interpreted clearly, for a non-specialist audience.
4. Utilises the best available trend data.
5. Potentially applicable at different geographical scales.
6. Updated reasonably frequently.

Examples

- *Extinction rates since 1850-1950* were used as an example, showing that 1% of bryophyte species, 2.9% water beetle species and 0% lacewing species have become extinct since the period 1850-1950. The indicator in this case could be *"x% of species present in Scotland during 1850-1950 have not been recorded in the past 50 years*. This would meet criteria 2-4 but not 1 or 6.

- *Wild Birds Indicator 1970-2000* was used as another example, with a graph to illustrate the relative numbers of woodland birds (33 species), farmland birds (19 species) and all birds (105 species) from 1970-2000. *Sources: RSPB, BTO, DEFRA.* This indicator meets all criteria.

The 'BAP' traffic light

Red: species for which no action yet taken
Amber: species for which some actions have been taken
Green: species for which all actions have been taken

Example: BAP Bird Species in Scotland

Status of Actions	Species Trends	Likely to meet UK targets?
3% completed	10%: increase	10%: yes/likely
9% not started	35%: decline	80%: unlikely
88% ongoing	20%: little change	10%: unclear
	35%: unclear	

Potential indicators: SNH

Indicator	Measure	Source	Frequency
BAP species & habitats – Q	Status	JNCC	3 years
Plant species diversity – Q	Diversity	CS	8-10 years
Woodlands	Diversity	FE	10 years
Statutory sites – Q	FC	CSM	6 years
Wild Birds indicator – Q	Status	BTO/RSPB	Annual
Wildfowl & waders	Status	BTO/WWT	Annual
Breeding seabirds	Status	JNCC	Annual
Riverine mammals	Status	VWT	5-10 years
Salmonids	Status	Fishery boards	Annual
Estuarine fish diversity	Diversity	SEPA	3 years?
Riverine invertebrates	Diversity	SEPA	Annual
Marine fish stocks – Q	Status	ICES	annual

Potential indicators: EN

Indicator	Measure	Source	Frequency	
BAP species & habitats	Status	JNCC	3 years	Y
Plant species diversity	Diversity	CS	8-10 years	Y
Woodland	Diversity/area	FE	10 years	Y
Statutory sites	FC	CSM	6 years	Y
Wild Birds Indicator	Status	BTO/RSPB	Annual	Y
Wildfowl & waders	Status	BTO/WWT	Annual	Y
Breeding seabirds	Status	JNCC	Annual	Y
Riverine mammals	Status	VWT	5-10 years	Y?
Salmonids	Status	Fishery boards	Annual	Y?
Estuarine fish diversity	Diversity	EA?	3 years	Y?
Riverine invertebrates	Diversity	EA?	Annual	Y?
Marine fish stocks	Status	ICES	Annual	Y
Landscape	'quality'	EN/CA	Annual?	Y?
Butterfly species	Abundance	BC	Annual	Y?

Potential indicators: CCW

Indicator	Measure	Source	Frequency	
BAP Species & Habitats	Status	JNCC	3 years	Y
Plant species diversity	Diversity	CS	8-10 years	Y
Ancient/semi-nat. woodland	Area	FE	10 years	Y
Statutory sites	FC	CSM	6 years	Y
Wild Birds Indicator	Status	BTO/RSPB	Annual	Y
Wildfowl & waders	Status	BTO/WWT	Annual	Y
Breeding seabirds	Status	JNCC	Annual	Y
Riverine mammals	Status	VWT	5-10 years	Y?
Salmonids: SAC Rivers	Status	EA	Annual	Y
Estuarine fish diversity	Diversity	EA	3 years	Y?
Riverine invertebrates	Diversity	EA	Annual	Y?
Mairine fish stocks	Status	ICES	Annual	Y?

Potential indicators: EHS

Indicator	Measure	Source	Frequency	
BAP Species & Habitats	Status	JNCC	3 years	Y
Plant species diversity	Diversity	CS	8-10 years	N
Woodlands	Diversity	Forest Service	10 years	?
Statutory sites	FC	CSM	6 years	Y

Wild birds Indicator	Status	BTO/RSPB	Annual	Y
Wildfowl & waders	Status	BTO/WWT	Annual	Y
Breeding seabirds	Status	JNCC	Annual	?
Riverine mammals	Status	VWT	5-10 years	N
Salmonids	Status	Fishery Boards	Annual	Y
Estuarine fish diversity	Diversity	EHS?	3 years?	N
Riverine invertebrates	Diversity	EHS	Annual	Y
Marine fish stocks	Status	ICES	Annual	Y

Potential Indicators: EHS

Indicator	Measure	Source	Frequency	
BAP species & habitats	Status	JNCC	3 years	Y
Woodlands	Diversity	Forest service	10 years	?
Statutory sites	FC	CSM	6 years	Y
Wild Birds Indicator	Status	BTO/RSPB	Annual	Y
Wildfowl & waders	Status	BTO/WWT	Annual	Y
Breeding seabirds	Status	JNCC	Annual	?
Salmonids	Status	Fishery boards	Annual	Y
Riverine invertebrates	Diversity	EHS	Annual	Y
Marine fish stocks	Status	ICES	Annual	Y
BAP broad habitats	Area	CS	8-10 years	Y
Semi-natural vegetation	Area	CS	8-10 years	Y

Conclusions

- Indicators must be transparent, clearly sourced, easy to understand, updated frequently and well-integrated with national and international reporting requirements.
- Indicators should aim to focus on biological *outcomes*. Measures of *process* are no substitute for this.
- In the UK there is a wealth of information on trends in habitats and species.
- Much of this is common to the four countries, whose agencies have similar data needs and reporting requirements.
- Indicators of change in BAP habitats and species should be regarded as a key component of any national set of indicators.
- A set of potential habitat and species indicators is presented. These span terrestrial, freshwater, estuarine and marine ecosystems.

Session 2 Discussion

Discussant: Marcus Yeo, JNCC
There is a need for greater integration, both in scale (local, national, international) and by sector. Regarding the twin-track approach, incorporating both data-driven and policy-driven indicators: have we got the balance right?

Phil Shaw
- Regarding the balance between data-driven and policy-driven indicators: the twelve indicators mentioned are a *provisional list,* developed on the basis of an inter-agency meeting. They span a range of sources but are not necessarily representative of all aspects of UK biodiversity. For example, information on genetic change is especially deficient. The invertebrate content of the list is also deficient, whilst birds may be over-represented.
- There are 2 focuses for indicator development: outcomes and readily available data sources.

Jenny King
- For our work, we have to use what data are available.

Jim Munford
- Outcomes are important, but so too is the mechanistic link between policy actions and outcomes, which should be remembered when focusing on data and outcomes.

Phil Shaw
- Yes, and it is difficult to make the link. But of the three areas of action, outcome and policy, outcome is the most important.

Mark Felton
- If the country agency indicators were adopted, what would be the risk if we used the indicators to assess overall natural biodiversity? Should we wait for more indicators, or use what we have? Current indicators tend to reflect a particular interest of a person/group of people, and hence there is often a bias in coverage. The role of science is to bring dialogue that looks at the significance of these indicators. Should indicators be more science-based so that we can look at the success of our actions?

Phil Shaw
- Agreed Mark's points, and again highlighted gaps in genetic and invertebrate data/indicators.

Helen Doran
- The economic and social aspects of biodiversity are often very important – e.g. site visitors, education, and recreation. Are these being looked at? The Forum could have a role to play in ensuring that they are.

Phil Shaw
- These were not discussed during the course of the meeting at which the twelve indicators were proposed. Yes, it is partly up to this group to discuss the value of economic and social measures.

Tom Brereton
- Butterflies make good invertebrate indicators; and most UK faunal species are invertebrates. There is much more butterfly information available than was previously thought: for example, there are 5-600 validated UK sites for butterflies. Butterfly work is also cost-effective and engages many people.

Phil Shaw
- This raises the issue of good data sets available in England but not in Scotland, or data sets that are available in one country only within the UK. Are we willing to accept indicators that can only be applied in one country?

Tom Brereton
- It might be valuable to look at correlations between indicators, and identify gaps this way.

John Custance
- There is a need to keep realistic when considering geographical differences. For example, species richness is higher in southern England for common species but northern England for rare species. Indicators can be applied at various scales but need to be interpreted with care.

Jim Munford
- As regards to the information available on butterflies: many other established frameworks for monitoring different species are available, and we ignore them at our peril.

Session 3: Sectoral & Local

Indicators for Sustainable Agriculture

Richard Findon
Sustainable Agriculture Unit
DEFRA

History

Sustainability cannot be condensed into a single, simple definition or measurement. Indicators therefore help us to understand and define sustainability as well as measure progress towards it. MAFF published a pilot set of sustainability indicators, *'Towards Sustainable Agriculture',* in early 2000. The indicators provide a means of measuring the economic, social and environmental impacts of agriculture in Great Britain, and help assess the effectiveness of policies and the sustainability of the sector. The set of indicators complements the UK Sustainable Development Strategy and the accompanying indicators *Quality of Life Counts*.

The selection of indicators followed intensive public consultation. Many people present at this Forum would have contributed their comments to this. The initiative was generally welcomed and seen to be, as we intended, a positive first step towards tracking performance and change across the agriculture sector.

The Indicators – Strengths and Areas for Improvement

The indicators attempt to provide a means for making a balanced assessment of agriculture's progress towards sustainability. They were selected for their policy relevance, analytical soundness, measurability, and spatial and temporal level of aggregation. Their strengths are:

- They are a good foundation/starting point.
- Many show positive action, e.g. area converted to organic farming (indicator 11)
- Britain was among the first countries to publish indicators.

Weaknesses of the indicators

The indicators could only be based on the data available to us at the time, and so there are gaps and weaknesses, some of which were highlighted during the consultation process. These are:

- *Surrogates*
  Indicators may be used to represent another factor. For example, the area of agriculture land under commitment to environmental conservation (indicator 31), the area of cereal field margins under environmental management (indicator 33) and the area of semi-natural grasslands (indicator 34) are used to represent ecosystem health, which is what we are really interested in. Substitution may be resorted to when it is very difficult/expensive to measure the factor of real interest, and in some cases it is perfectly valid to do so. However we must be sure that the measures we are making are actually a useful substitute. In this example they may not be - CEH research shows habitat *quality* measures are much more sensitive to many drivers of change than habitat *quantity*.
- *Omissions*. We recognise that it has been difficult to establish indicators for social and community progress, animal welfare and upland area. For example, it may be of interest in the future to have an indicator for the number of family-run farms in existence
- *Poor data*. An example is the indicator on farmers' knowledge of Codes of Good Agricultural Practice (indicator 12) - showing that more than 50% were not even aware of their existence – based on a single study in 1996. Ownership is very difficult to understand.
- *Indicators that don't really demonstrate anything at all!* An example is indicator 29, the change in land use from agriculture to hard development. Do we wish to see a positive or negative trend in this?

- *Diversity of farming practices and local conditions.* This is difficult to capture at an aggregate level. There is no breakdown of the indicator values for different farm types or geographical demarcation.
    - Changes at farm level are required before improvements at national level can be seen.
    - Few of the national indicators have direct, close links with on-farm management decisions and some are not directly measurable on farm. There is a project underway with LEAF and the University of Hertfordshire to describe the National Indicators at farm level.
    - Variety of techniques – dis-aggregation, harmonisation, use of surrogate indicators and other measures.
    - Also to produce a simple tool for farmers that identifies appropriate indicator values for a specific farm and location. Effectively then setting a 'benchmark' for farmers to compare their business practices with those of their peers and so assess their performance and take steps for improvements where required.

The current set of indicators represents a 'best available' set at the time of publication. Some of the set have demonstrated themselves to be valuable, while others may need to be reconsidered.

Why are we reviewing the indicators?
It was always our intention that the indicators should be reviewed and at the time of their publication the department made a commitment to a 2003 review. As well as this commitment there are other pressures for a review.

- There is a new department (DEFRA) with a much wider aim and set of objectives. The objective for farming is set in the context of sustainability and recognises the need to facilitate the development of a more modern, adaptable approach to farming through domestic and international actions and further ambitious CAP reform.
- DEFRA is the lead department for sustainability and is responsible for promoting sustainability across government.
- We are currently reviewing our Public Service Agreement targets as part of SR2002 and for new departmental objectives
- DEFRA's Sustainable Development Strategy identifies a number of challenges for agriculture, particularly the need to strengthen farmers' connections with consumers and the environment and increase skills and knowledge levels within the industry.
- Sustainable Food and Farming Strategy, following from Curry Report: The Department is now considering the implications and detail of recommendations and will be consulting widely on the issues and seeking a steer on our future strategy by:
    - Developing arrangements to engage with main stakeholders (replacement to industry forum)
    - Consulting on a high level 'steering document'
    - Holding series of regional seminars, and a national event
    - Separate consultation exercises on individual recommendations e.g. review of agri-environment schemes
    - Individual policy leads developing options in consultation with main stakeholders
    - Producing the 'final' strategy in the autumn. But its to be a living document that is rolled forward as new further developments are taken forward.
    - Indicators will need to be a part of this strategy so we can measure the industry's progress on achieving its aims.
- Developing an international context: the OECD has been leading on developing agri-environment indicators for policy makers. They cover:
    - *Agriculture in the broader economic, social and environmental context*
    - *Farm management and the environment*
    - *Use of farm inputs and natural resources*
    - *Environmental impacts of agriculture*

The EC is now taking these on board in developing its own set of agri-environmental indicators. It is important that national indicators should fit within these international frameworks so that we have a base of comparison with other countries.

The way forward

When reviewing the indicators we wish to consult as widely as possible and make the most of external ideas and expertise. There are many questions for which we would seek your input:

- Setting a wider definition of sustainable agriculture
    - Where does agriculture end and the food chain begin? or wider issues of rurality begin? or other land use e.g. forestry begin?
    - What about downstream industries?
    - How should we include these broader interactions?
    - How should we set agriculture in its global context?
- The balance between environmental indicators and economic and social indicators, e.g. there are 5 indicators on pesticides and only one on employment, one on non-food crops, and none on marketing of sustainable agricultural products or animal welfare.
- Capturing farm diversification information
- Using improved data sets
- Linking the indicators so we can effectively interpret changes in them
    - Dis-aggregating national data to local levels to uncover rational patterns
    - Ensuring the necessary research and models are available so that changes in state indicators can be interpreted in terms of changes in driving indicators (links between indicators). For example, populations of key farmland birds are related to the time of sowing cereals, grazing pressure etc – but the necessary driving indicators aren't being measured so any change in indicator 35 could not be interpreted.
- What other issues do you think we should be addressing? We want to hear from you and shall be seeking your views.

Table showing sustainable agriculture indicators

Issue	Area	Indicator
A. Agriculture within the rural economy and society	Structure of the agriculture industry	1 Agricultural assets and liabilities 2 Age of farmers 3 Percentage of holdings that are tenanted
	Farm financial resources	4 EU Producer Support estimate (PSE) 5 Payment to farmers for agri-environment purposes 6 Total income from farming 7 Average earnings
	Agricultural productivity	8 Agricultural Productivity
	Agricultural employment	9 Agricultural employment
B. Farm management systems	Management	10 Adoption of farm management
	Organic farming	11 Area converted to organic farming
	Codes of Practice	12 Knowledge of codes of Good Agricultural Practice
C. Input use	Pesticides use	13 Pesticides in rivers 14 Pesticides in groundwater 15 Quality of pesticides 16 Spray area treated with pesticides 17 Pesticides residues in rivers
	Nutrients	18 Nitrate and phosphorus losses from agriculture 19 Phosphorus levels of agricultural topsoil 20 Manure management
	Greenhouse gas emissions	21 Ammonia emissions from agriculture 22 Emissions of methane and nitrous oxide from agriculture
	Energy	23 Direct energy consumption by farms 24 Trends in indirect energy inputs to agriculture
D. Resource use	Water	25 Use of water irrigation
	Soil	26 Organic matter content of agricultural top soils 27 Accumulation of heavy metals in agricultural top soils
	Agricultural Land	28 Area of agricultural land 29 Change in land use from agriculture to hard development
	Non-Food crops	30 Planting of non-food crops
E. Conservation value of agricultural land	Environmental Conservation	31 Area of agricultural land under commitment to environmental conservation
	Landscape	32 characteristics features of farmland
	Habitats	33 Area of cereal field margins under environmental management 34 Area of semi-natural grassland
	Biodiversity	35 Population of key farmland birds

UK Indicators of Sustainable Forestry - Biodiversity

Vicky West
Assistant Statistician
Forestry Commission

1. Background

Why develop UK indicators?
- Show forestry's contribution to sustainable development in the UK
- Common approach across the UK, where country forestry strategies diverge
- Enable UK to report in international processes much more easily
- Show UK takes sustainable forestry seriously on an international level

International Developments
- Rio World Summit 1992: no formal forestry agreements
- Mid-1990s: Pan-European indicators of sustainable forestry
- 1998: Assessment of pan-European forests (TBFRA) based on these indicators

UK developments
1998: UK Forestry Standard published
1998: Work to show common basis of pan-European and UK forestry standard indicators
1999: England's Forestry Strategy: a new focus for England's woodlands
2000: Forests for Scotland: Scottish Forestry Strategy
2001: Woodlands for Wales

The Development Process
- *June 1999:* Agreement to develop 'UK indicators of sustainable forestry'
- *March 2001:* 1st public consultation. Long list of possible indicators. Included 2 workshops.
- *June 2001:* Review consultation and work on smaller list of indicators
- *February 2002:* 2nd public consultation
- *Summer 2002:* publication of indicators

2. UK Indicators of Sustainable Forestry
These can be accessed via the Internet at http://www.forestry.gov.uk/sfindicators and are:
- Woodland   (7)
- Biodiversity   (7)
- Condition of forest and environment   (10)
- Timber   (7)
- People   (7)

3. Woodland Biodiversity

Biodiversity Indicators for diversity of woodland
- B1. Ancient woodland (AWI)
- B2. Native woodland (NIWT)
    - *A4. Loss of woodland?*
- B3. Native woodland condition?
- B6. Natural regeneration of woodland (Admin)
- B7. Woodland diversity within a stand (NIWT)
    - *A7. Woodlands in landscape (NIWT)*

- National Inventory of Woodland and Trees (~ 34,000 sample plots ~ 0.8 ha in UK)
- Ancient Woodland Inventories
- Administrative records (Woodland Grant Scheme and Forest Enterprise records)
- Native woodland HAP working group considering 'condition'

Biodiversity Indicators for diversity of fauna/flora within woodland
- B4: Diversity of Fauna
    - Woodland bird index - abundance
    - Butterflies, Bats, Mammals, SAP species
- B5: Diversity of Flora
    - Vascular plants - species richness
    - SAP species index - abundance
- Woodland birds - RSPB/ BTO
- Butterflies - Butterfly monitoring scheme - 44 woodland sites
- Mammals - MaMoNet - follow developments
- Woodland SAP species - develop index for fauna and flora?
- 'Flora' - CS2000 scores at woodland sites

4. Problems / Gaps
- Loss of woodland (esp. Ancient)
- Woodland condition
- Woodland SAP species abundance index?
- Getting data applicable to whole UK - (often Northern Ireland is not compatible with GB)

5. Dissemination

Reporting and Use of Indicators
- Hard copy updated ~ 5 years.
- Annual updates on web where data allow
- Inclusion of some information in 'Forestry Statistics'
- Previous bias towards timber statistics $\rightarrow$ More balanced picture of UK forestry and its priorities

Relationship to Other Indicators
- *Pan-European indicators of sustainable forest management* being developed in parallel (http://www.mcpfe.org)
- *Scottish Forestry Strategy* - developed own indicators for Scottish forestry (~50% overlap)
- *Local schemes* (e.g. South West Forest)
- *UK indicators of sustainable development* (Quality of life counts) - 3 woodland indicators

6. The Future?
- Public consultation until Thursday 2nd May 2002, http://www.forestry.gov.uk/sfindicators
- Publication of indicators: summer 2002
- Continual refinement of indicators
- Annual updates on web

Woodland Biodiversity

Richard Smithers
UK Conservation Advisor
Woodland Trust

Richard Smithers presented what the Woodland Trust believes to be a series of simple yet meaningful measures of woodland biodiversity potential, developed for use in measuring improvements in woodland biodiversity and the relative merits of possible future activities. These are described in detail in *Woodland biodiversity: expanding our horizons*, which can be downloaded from the Trust's website (www.woodland-trust.org.uk/policy/publications.htm). Richard went on to explain how these measures have helped inform the development of the Trust's thinking, as described in *Space for nature: landscape-scale action for woodland biodiversity*. This has been published since the forum met and can be downloaded from the Trust's website. Hard copies of the report can be obtained by contacting Richard directly. Telephone 01476 581141. Email richardsmithers@woodland-trust.org.uk

Session 3 Discussion

Discussant: Mark Felton
The presentations thus far have highlighted the importance of indicators in clarifying intentions. Otherwise, they become simply an indulgence. Two important issues highlighted include:
1. Handling Complexity. Obtaining meaningful but simple biodiversity indicators is very difficult and can be compared with indicators such as inflation or interest, which are also the subject of much debate. When developing indicators, remember the importance of transparency and of knowing where more indicators are needed.
2. Social/Economic Factors. Should these be included with biodiversity indicators? Or should biodiversity indicators exist at a lower level than this?

Proposition: The 12-16 country agency indicators could be adopted as long as they were explained in terms of what they include and exclude, and what they mean.

Andrew Stott
- Just to clarify, are the agriculture indicators for the UK or for England?

Richard Findon
- Previous ones for the UK, but that was before devolution. It is not yet decided what geographical unit will be used for future indicators for agriculture.

Session 4: Sectoral & Local
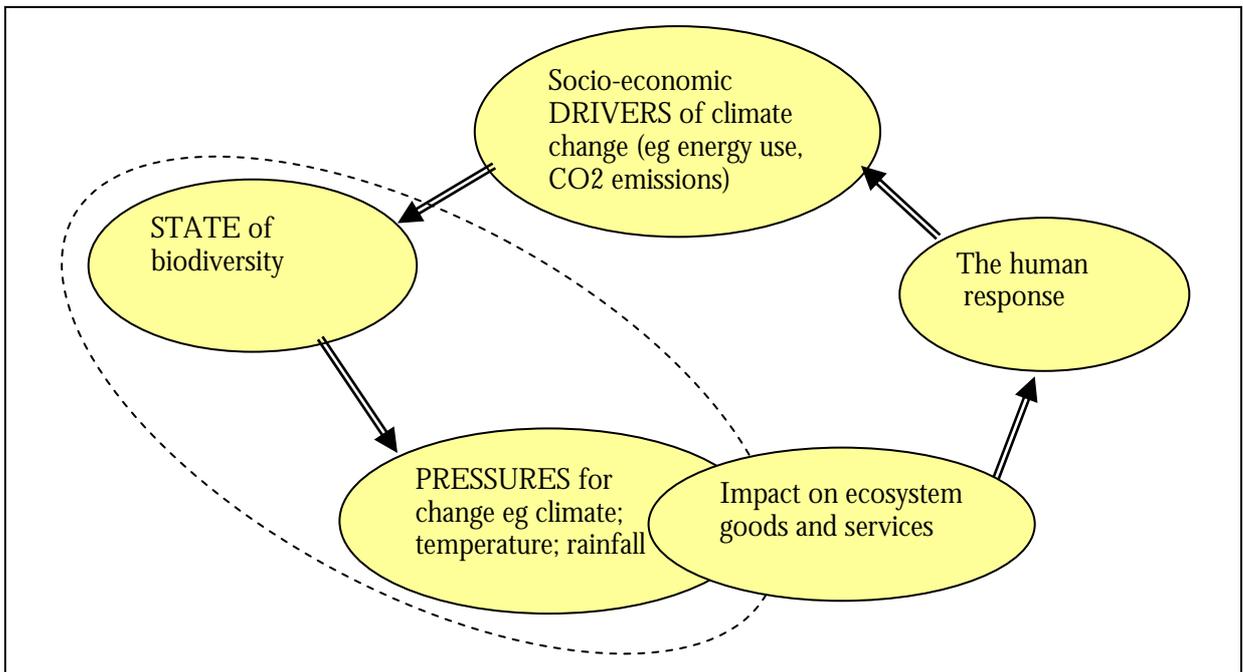
Indicators of Climate Change Impacts on UK Biodiversity

Terry Parr
Co-ordinator: UK Environmental Change Network
CEH Merlewood

Indicator Frameworks for Climate Change Impacts

Drivers:Pressure:State:Impact:Response (DPSIR):

Current Indicators

1. ***Increase in global mean surface temperature 1860-1999*** *(The Met Office, Hadley Centre for Climate Prediction and Research):*
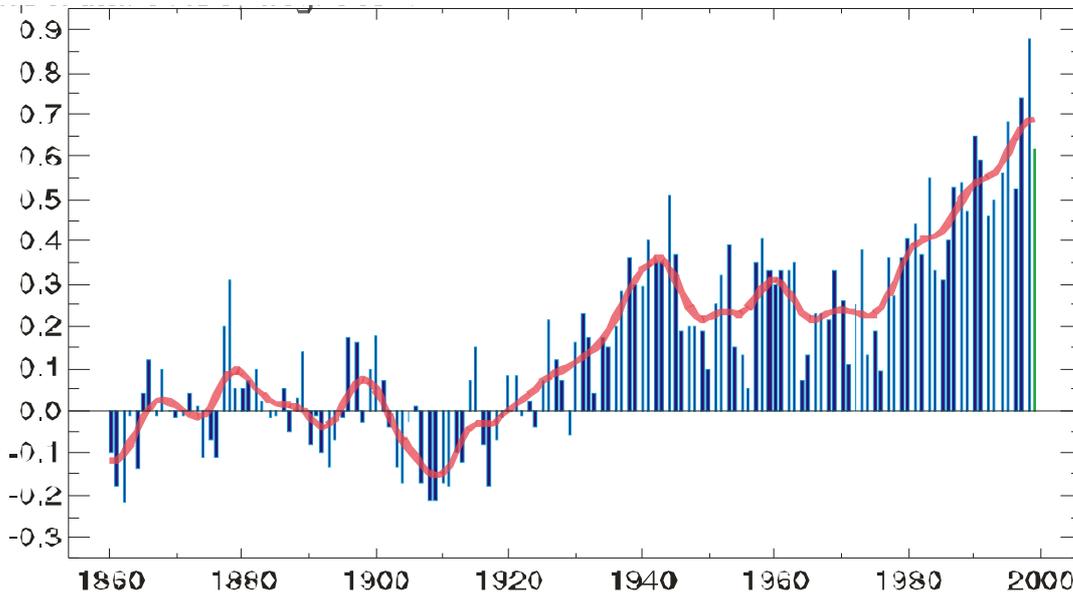
2. ***Studies showing impacts associated with regional temperature change.***

- The distribution of such studies was shown on a map of the world. *Source: Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) "Climate Change 2001: Impacts, Adaptation and Vulnerability ".* Studies encompassed hydrology & glaciers; sea ice; animals; plants; studies covering large areas; remote sensing projects. The majority were conducted in the Northern Hemisphere.

- **IPCC – published studies of climate change impacts on fauna and flora in the UK**
  Phenology:
  - Bird Egg laying date (Slater 1999, Crick 1999)
  - Bird Migration dates (Mason 1995, Sparks 1999)
  - Aphid flight periods (Zhou 1995, Fleming 1995)
  - Amphibian breeding (Reading 1994, 1998, Beebee 1995)
  - Growing season (Menzel 1999)
  Distribution/Range Changes:
  - Butterflies (Parmesan 1999)
  - Birds (Thomas 1999)

- **Main Sources of Data**
  - Rothamsted Insect Survey
  - Biological Records Centre
  - Butterfly Monitoring Scheme
  - Bird Observatories (migration dates)
  - British Trust for Ornithology
  - SAHFOS (Marine plankton)
  - Amateur records (plant phenology)

3. *Phenology*

- Definition: "the study of the response of living organisms to seasonal and climatic changes to the environment in which they live".
- An example of frog spawning, with an associated time series graph, was shown.
- Maps were shown of the distributions of two butterfly species, *Boloria euphrosyne* and *Polygonia c-album,* with associated graphs showing a decrease of *Boloria* and an increase of *Polygonia* from 1976-2000 *(sources: BRC atlas, Butterfly Monitoring Scheme).*

Reports

Recent UK Reports
Impacts of climate change on wildlife, ed. Rhys E Green, Mike Harley, Mark Spalding & Christoph Zockler
Climate Change & Nature Conservation in Britain and Ireland – MONARCH – Modelling Natural Resource Responses to Climate Change, part of the UK Climate Change Impacts Programme, ed. PA Harrison, PM Berry and TE Dawson
Wales: Changing Climate, Challenging Choices – the impacts of climate change in Wales from 2000 to 2080, Technical Report, May 2000, NAW
Indicators of Climate Change in the UK, DETR/CEH
Environment 2000 and Beyond – Summary, EA
Natural Heritage Trends Scotland 2001, SNH
Climate Change: Impacts on UK forests, ed. Mark Broadmeadow, ICF Bulletin 125, FC
Quality of Life Counts, Indicators for a strategy for sustainable development for the United Kingdom: a baseline assessment.
Recent European Reports
Europe's Environment: The Dobříš Assessment, ed. David Stanners and Philippe Bordeaux. – 1995, State of the Environment Report, EEA.
Europe's Environment: The Second Assessment, EEA – 1998

Sustainability Indicator Reports

Quality of Life Counts, Indicators for a strategy for sustainable development for the United Kingdom: a baseline assessment.

- UK Sustainability Indicators 1999: climate indicators and wildlife indicators
- But no indicators linking biodiversity to climate
- Key Idea: indicator related to an explicit objective e.g. "reverse decline in UK wildlife and habitats"

Environment Agency: State of Environment Reports

Environment 2000 and Beyond – Summary, EA

- Trends in populations and biodiversity habitats and key biological indicators
    - Freshwater inverts
    - Salmon: cause?
    - Farm birds
- Nothing on climate impacts on biodiversity

UK Indicators of Climate Change 1999

Indicators of Climate Change in the UK, DETR/CEH
Aim: to identify data sources for **economic and environmental parameters** that are sensitive to climatic variation, monitored regularly and which **could serve as indicators of climate change** that may be collated and **reported on a regular basis:**

- Provide early warning
- Resonant -promote republic awareness
- Aid ecosystem management
- Relate to ecosystem services
- Inform policy response

Indicator criteria
- Sensitive to climate - strong correlations with climate variables, which will cause long-term trends if the climate changes
- Long time series exist of good quality data
- Data are collected routinely and readily available at low cost
- Relevant and easy to understand by the public and policy makers
- If possible, representative of region or sector and related to Environmental Change Network set of variables.

UK/DETR Climate Change Indicators (34)
- *Climate, Hydrology, Sea Level and Air Pollution* (11 indicators)
- *Insurance, Energy, Tourism and Fire* (4 indicators)
- *Health* (2 indicators)
- *Air Quality* (1 indicator)
- *Agriculture and Forestry* (8 indicators)
- *Wildlife: Insects and Birds* (5 indicators)
  - Dates of Insect Appearance and Activity
  - Insect Abundance
  - Swallow arrival date
  - Egg-laying dates in birds
  - Small bird population changes
- *Marine and Freshwater* (3 indicators)
  - Marine plankton
  - Migration of salmon

Indicators: Impacts on Birds
- SWALLOW ARRIVAL DATE - 1959-1996
- EGG LAYING - ROBINS 1939-1996
- SMALL BIRD POPULATIONS 1962-1997

All these indicators show correlations to climate (graphs were shown illustrating this).

Insect Abundance Indicators
Examples of moths and butterflies sensitive to climate were given, including:
- Common blue 1965-1997
- Orange tip
- Common footman moth

Trends in Scotland Associated with Climate Change
Natural Heritage Trends Scotland 2001, SNH
Climate Change Impacts on Habitats and Species:
- Phenological changes: earlier arrival of migrants, earlier reproduction advanced leafing, later autumns
- Breeding distributions of pops moved north (birds and butterflies)
- Abundance of arctic alpines
- Abundance of northern birds – capercaillie

Forestry Commission: February 2002
Climate Change: Impacts on UK forests, ed. Mark Broadmeadow, ICF Bulletin 125, FC
The main biodiversity related indicators are:

- Seasonality of woodland flora and fauna
- Increases in squirrels and deer
- Pests and diseases
- Advancement of leaf flushing dates:
  - Hawthorn   9.9 (days per ºC)
  - Sycamore   6.7
  - Birch   5.2
  - Elm   5.7
  - Mountain ash   5.6
  - Oak   5.6
  - Beech   3.0
  - Horse chestnut 4.8
  - Hornbeam   6.1
  - Ash   3.5
  - Lime   5.2
  - Field maple   4.4

  (Sparks & Gill 2002)

Synchrony between Orange Tip butterfly and Garlic mustard (a larval foodplant)
A graph was shown, illustrating that an increase in March temperature causes both earlier flowering of the Garlic mustard and earlier flying season of the Orange Tip.

Climate Change and BAPs
Numbers of species and habitat plans mentioning climate change as an issue:

  - Bees/wasps   3
  - Beetles   1
  - Birds   6
  - Corals   1
  - Crickets/grasshoppers   2
  - Marine mammals   4
  - Moths   1
  - Mosses   4
  - Lichens   3
  - Liverworts   2
  - Stoneworts   2
  - Vascular plants   2
  - **TOTAL SPECIES**   **31**
  - **PRIORITY HABITATS**   **21**

The Future and Biodiversity Indicators
A thematic map of predicted changes in temperature in a northern winter in the Northern Hemisphere by the 2050s, relative to today, was shown.

Looking Ahead: Some key reports

The MONARCH project (multi-agency)
Modelling as an aid to targeting climate change impacts monitoring and indicator development

Climate Change and UK Nature Conservation (MAFF/DETR/ADAS)
A review of the impact of climate change on UK species and habitat conservation development

What kind of Change Impact Indicators do we need?

General Awareness

- *Indicators of Climate Change Impacts on Habitats and Species:*
    - BAP targets
    - early warning
- *Indicators that help us to understand causality:*
    - Habitats Directive
    - local v global issues
- *Indicators that help us to manage:*
    - action is required – alert limits
    - to help with adaptive management
- *Indicators that show how well we are dealing with the change:*
    - mitigation
    - adaptation
- *Indicators show contribution of Biodiversity to Mitigation:*
    - Win-win options - habitat protection, habitat creation
- *Indicators that inform about indirect threats from climate change:*
    - spread of alien and pest species
    - ecosystem changes
    - land use change/landscape change

Some Sources of New Data

- *Countryside Surveys 1978, 1984, 1990, 1998*
- *MarClim (coastal - multi-agency project using existing data and new long-term sites)*
- *UK Phenological Network*
- *ECN*

UK Phenology Network

- UK-wide scheme, revived 1998 - WT partnership
- Spring and Autumn schemes
- Recording simple events of common species: responsive
- Compatibility with historical and contemporary schemes
- See www.phenology.org.uk
- International links
- High profile

Ecological Effects of Climate Change:
- Direct effects on species/populations
    - changes in phenology
    - changes in abundance
    - changes in distribution
    - changes in genotype/phenotype
- Effects on communities
- Effects on ecosystems and ecosystem functions
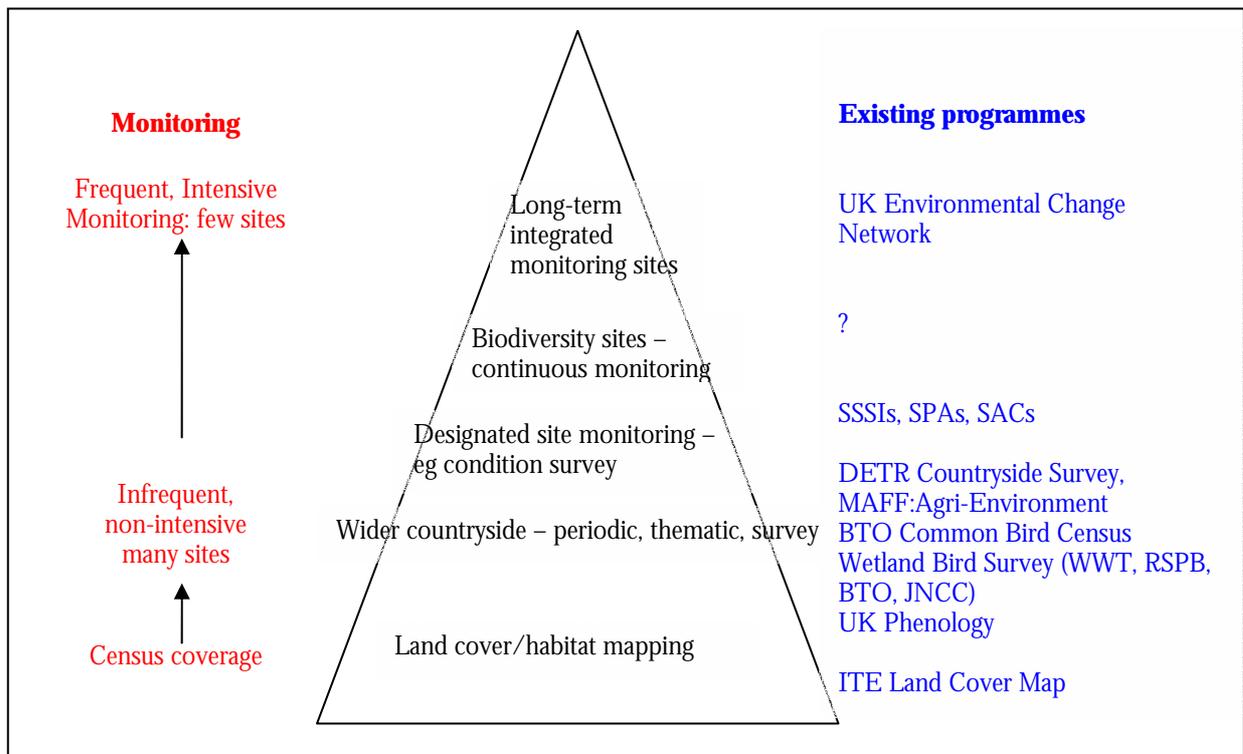
The UK Environmental Change Network (UK ECN)

- Monitoring and research to detect and interpret environmental change
- The UK's long-term integrated monitoring and research network.
- Coordinated by NERC at CEH Merlewood
- 14 sponsoring & 9 research organisations, 54 sites, 260 measurements (driver & response variables) since 1993, standard protocols.

- Data goes into a central database (see www.ecn.ac.uk)
- Quality assurance: control, validation, assessment
- Data is used for:
  - *External Use – direct web to database access for users in science, society & education*
  - *Internal Use – analysis and modelling for indicators, trend direction, forecasting*
- This feeds into a number of issues:
  - Climate change
  - Atmospheric pollution
  - Land-use change
  - Water resources
  - Biodiversity
  - Soil quality

Effects of 1995 drought on insects in the UK (Data from 10 ECN sites):

Butterflies	Moths	Beetles
Most species increased	Most species increased	Similar number of increasing and decreasing species
Increases in southern species with high mobility	No clear association with species attributes	Decreasing species associated with lower temperatures and wetter soils.
Some Northern species decreased		

UK Biodiversity Monitoring Pyramid:

Monitoring

Frequent, Intensive Monitoring: few sites

Infrequent, non-intensive many sites

Census coverage

Long-term integrated monitoring sites

Biodiversity sites – continuous monitoring

Designated site monitoring – eg condition survey

Wider countryside – periodic, thematic, survey

Land cover/habitat mapping

Existing programmes

UK Environmental Change Network

?

SSSIs, SPAs, SACs

DETR Countryside Survey, MAFF:Agri-Environment
BTO Common Bird Census
Wetland Bird Survey (WWT, RSPB, BTO, JNCC)
UK Phenology

ITE Land Cover Map

ECN Biodiversity Monitoring Network
Upland Pilot Study

Issues to be addressed
1. Is climate change happening and is it impacting on the phenology, abundance and distribution of species and the species composition of communities?
2. In which regions will these impacts have a significant effect on nature conservation sites?
3. What are the consequences of these impacts for nature conservation policy?

Conclusions – climate impacts indicators
The Good:
- UK is doing relatively well
- high public resonance
- regularly updated

The Bad:
- limited in scope
- difficult to be sure of cause and effect
- simple indicators not designed to promote "appropriate" response
- no link to BAPS
- lack of national data
- lack of framework for prioritising measurements/indicators
- lack of analytical framework for interpreting data

Climate change impacts on biodiversity: What do we do next?
Climate change is an escalating problem and we need a suite of indicators that enable us to understand its impacts on biodiversity and provide information on what we should do about it.
- Do nothing
- Focus on BAP species
- Focus on BAP priority habitats
- General assessment of impacts on ecosystems and ecosystem processes

"Science in Action for Biodiversity", Report of the Biodiversity Research Working group 1998-2001
Cross-cutting research programme on science-based monitoring of biodiversity and evaluation of actions. Nothing explicitly on climate change. A programme to develop the best approaches to measuring biodiversity, identifying negative impacts and evaluating the success of the actions we take.
- What are the best methods and indicators for the measurement of status and change in biodiversity?
- How do we identify the causality and significance of change
- How should we evaluate the success of our actions?
  By:
- Max value from existing data
- Linking biodiversity monitoring with other activities

Conclusions

The UK is doing well … but:

- No strong policy focus for climate change/biodiversity indicators although
  - Biodiversity has role in mitigation
  - Needs to be considered in adaptive responses to climate change
- Requirements for indicators - priorities in relation to climate change.
  - The need to understanding causality
- Inclusion of climate change impacts in BAPs
- Review of existing monitoring in relation to needs
- Need continued development of cost-effective monitoring and surveillance techniques.

Wales:

- Ecological impacts – general statements reflecting great uncertainty especially under the high change scenarios
- Some BAP habitats at risk: mainly coastal, montane and wetland: uplands particularly vulnerable.
- Freshwaters – qualitative and speculative impact assessments
- Pest species may increase – Rhododendron, Himalayan Balsam

Reviews discussing potential impacts

- *Impacts of climate change on wildlife,* ed. Rhys E Green, Mike Harley, Mark Spalding & Christoph Zockler
- *Climate Change & Nature Conservation in Britain and Ireland* – MONARCH – Modelling Natural Resource Responses to Climate Change, part of the UK Climate Change Impacts Programme, ed. PA Harrison, PM Berry and TE Dawson
- *Wales: Changing Climate, Challenging Choices* – the impacts of climate change in Wales

Local Indicators

Mike Oxford

Environmental Consultant
ALGE

Eight Key Service Areas for Biodiversity:
- Political Leadership and Democratic Accountability
- Encouraging Local Co-ordination and Partnership on Biodiversity
- Data Collection and Use
- Planning Policy and Development Control
- Enabling Community Involvement, Education and Participation
- Management of Local Authority Land
- Assisting Other Land Managers and Owners
- *Statutory Responsibility and Professional Competence*

Types of Indicator
- Context Indicators*: population or land area of local authority; number of SPAs, SSSIs or SINCs.*
- Input Indicators*: number of ecologists employed, or budgets spent on biodiversity.*
- Output Indicators*: number of local habitat or species actions plans published.*
- Outcome Indicators*: increase in the number of otters present; increase in extent of priority habitat.*

Best Value for Biodiversity Review: The 4 'C's

- **To Challenge.** Why is the service provided? How is it provided? What benefits do the community get from it? How could it be improved?
- **To Compare.** Are others giving a better service?
- **To Consult.** What do stakeholders think of the service?
- **To Compete.** Is the service competitive? Would it be more efficient and effective to use different approaches to deliver the service?

Tables showing headline activities and indicators for biodiversity, which Mike used during his presentation, are given below.

Tables Shown during Local Indicators Presentation

Headline Activities and Indicators for Biodiversity

4.1 Political Leadership, Democratic Accountability and Financial Management

STATUTORY CONTEXT	NATIONAL POLICY CONTEXT	LOCAL POLICY CONTEXT	INDICATORS Of Key Activity	TARGETS Proposed Voluntary Min. Service Standards
National Parks and Access to the Countryside Act 1949

The Countryside Act (1968)

Wildlife & Countryside Act 1981

Town and Country Planning Act 1990

Planning and Compensation Act 1991

Conservation (Natural Habitats & c) Regulations 1994

Land Drainage Act Chpt. 25 (1994)

Local Government Act 2000

The Countryside and Rights of Way Act 2000 | Making Biodiversity Happen Across Government: Green Ministers Checklist (2000)

Preparing Community Strategies: guidance to local authorities (2000) (Wales version awaited)

Parliamentary Select Committee: Report and Proceedings on Biodiversity (House of Commons; 2000)

Circular 04/2001 Countryside and Rights of Way Act (Sections 47 and 48)

Learning To Live Differently – The Sustainable Development Scheme of the National Assembly of Wales (2000)

UK Biodiversity Action Plan (1995) | Examples of relevant policy documents include:

ISO 14001

EMAS

EMS

Community Strategies

Corporate Plan

Corporate Budgets | Does the Council state clearly in it's Corporate Strategy / Plan that it recognises Biodiversity conservation as a key component for achieving Sustainability | Written public statement in the Corporate Plan (or equivalent) expressing the importance attached to biodiversity conservation as a key component of Sustainability. |
| | | | Is Biodiversity an integral part of the Council's Community Strategy? | All Community Strategies should incoporate a Local Biodiversity Action Plan as an integral component. |
| | | | Have council departments implemented EMAS or EMS or achieved ISO 14001? | Biodiversity is incorporated into the Council's EMS |
| | | | What is the total corporate cost of the biodiversity service? | Funding is available for examples such as:
- Site management of LNRs/SINCs
- Employment of an ecologist
- Monitoring and reporting on corporate BAPs
- Grant aid towards small BAP projects
- Local record centres |

4.2 Local Coordination and Partnership on Biodiversity Action

STATUTORY CONTEXT	NATIONAL POLICY CONTEXT	LOCAL POLICY CONTEXT	INDICATORS	TARGETS
National Parks and Access to the Countryside Act 1949 Wildlife & Countryside Act 1981 Town and Country Planning Act 1990 Planning and Compensation Act 1991 Conservation (Natural Habitats & c) Regulations 1994 Local Government Act 2000 The Countryside and Rights of Way Act 2000	Preparing Community Strategies: guidance to local authorities (2000) (Wales version awaited) PPG 9 Nature Conservation (1994) UK Biodiversity Action Plan (1994) Biodiversity: UK Steering Group Report (1995) Parliamentary Select Committee: Report and Proceedings on Biodiversity (House of Commons; 2000) Circular 04/2001 Countryside and Rights of Way Act (Sections 47 and 48) Sustaining the Variety of Life: 5 Years of the UK Biodiversity Action Plan (2001)	Examples of relevant policy documents include: Local Biodiversity Action Plans for priority habitats and species. Local Supplementary Planning Guidance on Biodiversity and Countryside Community Strategy	Number of Local Habitat Action Plans being implemented (in full or in part) by the Council?	A public statement of the number of Local Habitat Action Plans that the Council agrees to help implement locally
			Number of Local Species Action Plans being implemented (in full or in part) by the Council?	A public statement of the number of Local Species Action Plans that the Council agrees to help implement locally
			Number of biodiversity or countryside partnerships where the local authority offers support (e.g. via chairing the group, providing secretariat, funds etc.)	Provide tangible support for the Local Biodiversity Partnership along with a commitment to provide resources for at least the first five years of the initiative

4.3   Data Collection and Management

STATUTORY CONTEXT	NATIONAL POLICY CONTEXT	LOCAL POLICY CONTEXT	INDICATORS	TARGETS
National Parks and Access to the Countryside Act (1949) Countryside Act (1968) Wildlife & Countryside Act (1981) Town and Country Planning Act Section 11 and 30 (1990) Planning and Compensation Act (1991) Land Drainage Act Chpt. 25 (1994) Conservation (Natural Habitats & c) Regulations (1994) Local Government Act (2000) The Countryside and Rights of Way Act (2000)	Preparing Community. Strategies: guidance to local authorities (2000) (Wales version awaited) PPG 9 Nature Conservation (1994) UK Biodiversity Action Plan (1994) Biodiversity: UK Steering Group Report (1995) Parliamentary Select Committee: Report and Proceedings on Biodiversity (House of Commons; 2000) Circular 04/2001 Countryside and Rights of Way Act (Sections 47 and 48) Sustaining the Variety of Life: 5 Years of the UK Biodiversity Action Plan (2001)	Relevant development plan policies which promote sustainability e.g. Policy for international sites Policy for national sites Policy for local sites Policy for species protection Policy for managing landscapes of major importance for wild flora and fauna Policy to secure mitigation and compensation of biodiversity losses Policy to secure a positive contribution to the physical environment and a local net gain in biodiversity	Does the Council have ready access to biodiversity data (e.g. location and extent of LBAP priority habitats and species, location of protected species, or quality and location of SINCs / local wildlife sites)	Authority-wide coverage for LBAP Audit and Maps Authority-wide SINC / Local Wildlife Sites System
			Does the Council support a Local Biological Records Centre?	Provide contribution to local record centre in line with NBN partnership arrangements.
			Number of biological records held and managed?	Sufficient information to identify and map (75%) of LBAP priority habitats and species by (2005)
			Number of enquiries answered per annum? Income derived from commercial enquiries per annum?	
			Net change in the quality and/or quality of natural and semi-natural habitat ?	Net positive change (no negative change)

4.4 Planning Policy and Development Control

STATUTORY CONTEXT	NATIONAL POLICY CONTEXT	LOCAL POLICY CONTEXT	INDICATORS	TARGETS
National Parks and Access to the Countryside Act (1949) The Countryside Act (1968) Wildlife & Countryside Act (1981) Town and Country Planning Act (1990) Planning and Compensation Act (1991) Conservation (Natural Habitats & c) Regulations (1994) Hedgerow Regulations (1997) The Town and Country Planning Environmental Impact Assessment Regulations (1999) Local Government Act (2000) The Countryside and Rights of Way Act (2000)	PPG 9 Nature Conservation (1994) PPG 11 Regional Planning (2000) Planning Circular 1/97 (Planning Obligations) Technical Advice Note No 5 (Wales) Nature Conservation and Planning (1996) UK Biodiversity Action Plan (1994) and Biodiversity: UK Steering Group Report (1995) Parliamentary Select Committee: Report and Proceedings on Biodiversity (House of Commons; 2000) Circular 04/2001 Countryside and Rights of Way Act (Sections 47 and 48) Sustaining the Variety of Life: 5 Years of the UK Biodiversity Action Plan (2001)	Relevant Development Plan and Biodiversity SPG contributing to sustainability; including: Policy for international sites Policy for national sites Policy for local sites Policy for species protection Policy for managing landscapes of major importance for wild flora and fauna Policy to secure mitigation and compensation of biodiversity losses Policy to secure positive contributions to the physical environment and a local net gain in biodiversity	Are there policies in the Development Plan for (Biodiversity) nature conservation that conform to good practice? (e.g. RTPI's Planning for Biodiversity: A Good Practice Guide 2000)	Full suite of good practice policies
			% of SINCs or LBAP habitat in Council area lost to development per year?	None
			If losses are greater than 0% then was effective mitigation and compensation achieved?	Full compensation and mitigation should be achieved for all significant losses.
			Total area of land of importance for LBAP habitats and species created or restored as a result of positive development measures?	Local Plan and Development Briefs should identify locations where development should make positive contribution to net gain targets.
			Total area of land of BAP importance managed for and contributing (as a result of development) towards LBAP habitats and species targets?	An appropriate local target to be stated in LBAP Supplementary Planning Guidance
			Number of "important" hedgerows removed per annum?	None – without clear justification that the reason for removal outweighed the benefits of retention.

4.5 Increasing Community Education, Awareness and Participation

STATUTORY CONTEXT	NATIONAL POLICY CONTEXT	LOCAL POLICY CONTEXT	INDICATORS	TARGETS
National Parks and Access to the Countryside Act (1949) The Countryside Act (1968) Wildlife & Countryside Act (1981) Town and Country Planning Act (1990) Planning and compensation Act (1991) Conservation (Natural Habitats & c) Regulations (1994) Local Government Act (2000) The Countryside and Rights of Way Act (2000)	Preparing Community Strategies: guidance to local authorities (2000) PPG 9 Nature Conservation (1994) UK Biodiversity Action Plan (1994) Parliamentary Select Committee: Report and Proceedings on Biodiversity (House of Commons; 2000) Circular 04/2001 Countryside and Rights of Way Act (Sections 47 and 48) Sustaining the Variety of Life: 5 Years of the UK Biodiversity Action Plan (2001) Case Studies in Business and Biodiversity Earthwatch on behalf of DETR (2000)	Examples of relevant policy documents include: Local Agenda 21 Community Strategies Local Biodiversity Action Plans Local Countryside Strategies Policy documents relating to Countryside Management Services	Number of members of the public attending Biodiversity events each year?	A pubic statement for the % of the total population in the Council area to be targeted each year
			Questionnaire survey asking people indirectly if they know what Biodiversity is? (e.g. Question asking "please name four important wild species occurring locally or four types of important local habitats?)	Response over time showing an increased understanding and appreciation of nature and enjoyment of biodiversity events.
			Proportion of school children (specify age group) receiving / attending specialist biodiversity information, literature, packs, events?	100% of all 9-11years (or alternative ages to be stated)
			Number of active projects involving local people in various biodiversity initiatives?	
			Number of local businesses actively involved and/or sponsoring biodiversity initiatives	Recruitment of two 'large' businesses as partners or sponsors in the LBAP by 2005

4.6 Management of Local Authority Land to Achieve Biodiversity Targets

STATUTORY CONTEXT	NATIONAL POLICY CONTEXT	LOCAL POLICY CONTEXT	INDICATORS	TARGETS
National Parks and Access to the Countryside Act 1949	Preparing Community Strategies: guidance to local authorities (2000)	Examples of relevant policy documents include:	Total area of SSSIs owned and managed by the authority (under duties from CROW Act 2000)	All SSSI land owned by the Council to be managed in accordance with EN/CCW requirements
Wildlife & Countryside Act 1981	PPG 9 Nature Conservation (1994) UK Biodiversity Action Plan (1994)	LNR acquisitions and management policy. Grounds Maintenance Contracts	Total area of Council owned land surveyed to identify presence or opportunities for LBAP priority habitats and species	100% of Council land surveyed by 2005
Town and Country Planning Act 1990 Planning and compensation Act 1991 Conservation (Natural Habitats & c) Regulations 1994	Biodiversity: UK Steering Group Report (1995) Parliamentary Select Committee: Report and Proceedings on Biodiversity (House of Commons; 2000)	Highway Verge Maintenance Contracts Highway Hedge Maintenance Contracts	Total area of Council land managed in support of LBAP habitats For instance: LNRs School Grounds Small Holding Farms Road Verges Public Open Space Cemetaries and Graveyards	A public statement for the % of Council land to be managed for LBAP Habitats 1 hectare of LNR per 1000 head of population (English Nature 2001)
Local Government Act 2000 The Countryside and Rights of Way Act 2000	Circular 04/2001 Countryside and Rights of Way Act (Sections 47 and 48) Green Ministers Checklist (1999)	Small Holdings Tenancy Agreements	Total area of Council land managed in support of LBAP species For instance: LNRs School Grounds Small Holding Farms Road Verges Public Open Space Cemetaries and Graveyards	A public statement for the % of Council land to be managed for LBAP Biodiversity species
			Is there a composite map showing all of the Council's land holdings - showing areas managed for LBAP targets?	To make available to the public a map showing all land managed for LBAP targets by 2005

4.7 Assisting Other Land Managers/Owners to Manage Their Land for Biodiversity Targets

STATUTORY CONTEXT	NATIONAL POLICY CONTEXT	LOCAL POLICY CONTEXT	INDICATORS	TARGETS
National Parks and Access to the Countryside Act 1949	Preparing community Strategies: Guidance To Local Authorities (2000)	Examples of relevant policy documents include:	Number of LNRs owned and managed by other bodies but supported by the LA	LA to support all LNRs
Wildlife & Countryside Act 1981	PPG 9 Nature Conservation (1994) UK Biodiversity Action Plan (1994)	Biodiversity Grant Aid Initiatives	Total area of land managed in support of LBAP habitats For instance: National / Local BAP Priority Habitats occurring locally.	To identify through BAP Audit the total potential land area that could be managed and to report on the area / % actually managed by 2005
Town and Country Planning Act 1990 Planning and compensation Act 1991 Conservation (Natural Habitats & c) Regulations 1994	Biodiversity: UK Steering Group Report (1995) Parliamentary Select Committee: Report and Proceedings on Biodiversity (House of Commons; 2000) Circular 04/2001 Countryside and Rights of Way Act (Sections 47 and 48)	Policy documents relating to Countryside Management and Ranger Services	Total area of land managed in support of LBAP species For instance: National /Local BAP Priority species occurring locally. Locally distinctive BAP species	To identify through BAP Audit the total potential land area that could be managed and to report on the area / % actually managed by 2005
Local Government Act 2000 The Countryside and Rights of Way Act 2000	Sustaining the Variety of Life: 5 Years of the UK Biodiversity Action Plan (2001)		Officer time (e.g. % of staff post) spent offering advice on biodiversity to private land owners	To be established locally
			Grant aid for biodiversity available from the Council for private landowners	To be established locally

4.8 Statutory Responsibility and Professional Competence

STATUTORY CONTEXT	NATIONAL POLICY CONTEXT	LOCAL POLICY CONTEXT	INDICATORS	TARGETS
National Parks and Access to the Countryside Act (1949)

The Countryside Act (1968)

Wildlife & Countryside Act (1981)

Town and Country Planning Act (1990)

Planning Compensation Act (1991)

Conservation (Natural Habitats & c) Regulations (1994)

Land Drainage Act Chapter 25 (1994)

Hedgerow Regs. (1997)

The Town and Country Planning Environmental | Making Biodiversity Happen Across Government: Green Ministers Checklist (2000)

PPG 9 Nature Conservation (1994)

Planning Circular 1/97 (Planning Obligations)

Technical Advice Note No 5 (Wales) (1996)

UK Biodiversity Action Plan (1994) and Biodiversity: UK Steering Group Report (1995)

Parliamentary Select Committee: Report and Proceedings on Biodiversity (House of Commons; 2000)

Preparing community Strategies: guidance to local authorities (2000) (Wales version awaited)

Circular 04/2001 Countryside & | Examples of relevant policy documents include:

LNR policy documents

Policy documents for section 39 Agreements

ISO 14001

Corporate Environmental Management Systems

Corporate EMAS

Internal corporate | Has the Council taken documented action to exercise duties or powers under any or all of the following:

• National Parks and Access to the Countryside Act (1949)
• Wildlife & Countryside Act (1981)
• Conservation (Natural Habitats & c) Regulations (1994)
• Land Drainage Act (Chpt. 25; 1994)
• Hedgerow Regulations (1997)
• The Town and Country Planning Environmental Impact Assessment Regulations (1999)
• Countryside and Rights of Way Act (2000) | For instance: English Nature state that there should be one hectare of Local Nature Reserve per 1000 head of population. |
| | | | Does the Authority employ an ecologist and/or Local Biodiversity Action Plan Coordinator? | At least one per authority |

| Impact Assessment Regulations (1999)

Local Govt. Act (2000)
The Countryside and Rights of Way Act (2000) | Rights of Way Act

Sustaining the Variety of Life: 5 Years of the UK Biodiversity Action Plan (2001) | procedures and Standing Orders (covering statutory duties relating to biodiversity) | Judicial review of LA with a ruling that they have failed in their statutory environmental duties and responsibilities

Receipt of a formal notification from English Nature or the Countryside Council for Wales, that the LA's actions may have contravened environmental legislation | Full compliance with all relevant statutory duties and constraints |

Session 4 Discussion

Discussant: Jeff Kirby

Taking the climate presentation first, a number of important issues were raised:

- Climate was "one of the most serious pressures on biodiversity" and its manifestations are very complex, with direct, indirect, synergistic effects etc.. How do we decide which indicators to use?
- Do all climate change effects matter? How do we choose which do?
- Will our system of monitoring and surveillance be sufficient for deriving reliable climate change indicators?
- Should the focus be on BAP species, BAP priority habitats, or ecosystems perhaps?

Unidentified Participant

How does one differentiate between the effects of climate change and those of other impacts, e.g. land use change, on different species? Following on from this, focusing on BAP species, as indicators, could be a mistake.

Terry Parr

- Yes, the situation is complex. One can, however, be more certain in some situations e.g. climate change impacts on blanket bogs.

Ian Bainbridge

- How much monitoring is there of agricultural and land use practice phenology? Agriculturalists respond to climate change through their subsequent actions, so this phenology is of great importance.

Richard Findon

- Perhaps the proposed sustainable agriculture indicator scheme could help bridge this gap.

Richard Smithers

- Phenology is useful for hypothesising about changes in life cycles etc. but should not be used as a surrogate for other, perhaps more direct, indicators.

Terry Parr

- The advantage of phenology is that it is unequivocal; other things cannot always be used as such direct indicators.

Allan Watt

- The 'does it matter?' question must be remembered. One must decide on the importance of an effect and link this up with other aspects of biodiversity: e.g. between swallows, their foods, land use change etc., i.e. perhaps a more integrated approach is needed.
- Indicators should not be used as an excuse to get research money just because a subject is of interest. Rather, they should be used as a response to a pressure, e.g. environmental / public pressure.

Discussant: Jeff Kirby

Commenting on the Local Indicators presentation:

- A different set of terminology had been used and the scope of local indicators was very wide, emphasizing the political aspects of biodiversity indicators. Perhaps the Forum should consider scope and terminologies at a future meeting?
- Local indicators may be voluntary or for guidance only. Is this likely to cause problems for national consistency and also hesitancy on uptake?

Steve Moon

- Pointed out that Best Value for Wales mentioned in Mike Oxford's presentation has changed its name to the Wales Improvement Programme, hence the emphasis of the indicators is on improvement
- Regarding the question of when to use indicators, the Welsh Government recently decreed that Welsh BAPs driven by partnerships must be a performance indicator for Wales, to ensure that they are important.

Alison Barnes
- Regarding the importance of outcome, Mike illustrated that many partners do not understand the concept of biological outcome. Indicators and indicator development are important in bringing Local Authorities along the track to understanding outcome.

Annex 4: List of Abbreviations

Abbreviation	Full Name
ADAS	Agricultural Development Advisory Service
ALGE	Association of Local Government Ecologists
BAP	Biodiversity Action Plan
BC	Butterfly Conservation
BEAR	Indicators for monitoring and evaluation of Forest Biodiversity in Europe (EC project)
BEG	Biodiversity Expert Group (of the European Commission DG Environment)
BIG	Biodiversity Information Group
BioAssess	Biodiversity Assessment Tools Programme
BMS	Butterfly Monitoring Scheme
BRC	Biological Records Centre
BRE	Building Research Establishment
BTO	British Trust for Ornithology
CA	Countryside Agency
CBD	Convention on Biological Diversity
CCW	Countryside Council for Wales
CEH	Centre for Ecology and Hydrology (part of NERC)
CIRIA	Construction Industry Research and Information Association
CS	Countryside Survey
CSM	Common Standards Monitoring
DEFRA	Department for Environment, Food & Rural Affairs
DEFRA/CMD	DEFRA Conservation Management Division
DEFRA/EPSIM	DEFRA Environmental Protection Statistics and Information Management
DEFRA/EWD	DEFRA European Wildlife Division
DEFRA/RDS	DEFRA Regional Development Service
DEFRA/SAS	DEFRA Sustainable Agriculture and Strategy
DEFRA/SAU	DEFRA Sustainable Agriculture Unit
DETR	Former Department of Environment, Transport & Regions (now part of DEFRA)
DoE (Northern Ireland)	Department of Environment (Northern Ireland)
DPSIR	Driving Force - Pressure - State - Impact - Response
EA	Environment Agency
EBMI-F	European Biodiversity Monitoring and Indicator Framework
EC	European Commission
ECN	Environmental Change Network
ECNC	European Centre for Nature Conservation
EEA	European Environment Agency
EFI	European Forest Institute
EHS	Environment & Heritage Service
EIONET	European Environment, Information and Observation Network
EN	English Nature
ENVIP-Nature	Landscape typology and indicators for nature protection (EC project)
EON2000+	Earth Observation for Natura 2000+ (project)
EUNIS	European University Information Systems
FAO	Food and Agriculture Organisation
FC	Forestry Commission
FE	Forest Enterprise
HAP	Habitat Action Plan
ICES	International Council for the Exploration of the Sea
IUCN	World Conservation Union

IWG-BioMIN	Informal International Working Group on Biodiversity Monitoring and Indicators (by EEA)
JNCC	Joint Nature Conservation Committee
MAFF	Former Ministry for Agriculture, Fisheries & Food (now part of DEFRA)
MarClim	Marine Biodiversity and Climate Change study
MCPFE	Ministerial Conference for Protection of Forests in Europe
MDIAR	'Monitoring – Data – Indicators – Assessment – Reporting' chain
MONARCH	Modelling Natural Resource Responses to Climate Change (part of the UK Climate Change Impacts programme)
NAW	National Assembly for Wales
NBNT	National Biodiversity Network
NERC	Natural Environment Research Council
OECD	Organisation for Economic Co-operation and Development
QOLC	Quality of Life Counts
RSPB	Royal Society for the Protection of Birds
SAP	Species Action Plan
SE	Scottish Executive
SEEDA	South-East England Development Agency
SEPA	Scottish Environmental Protection Agency
SNH	Scottish Natural Heritage
TBFRA	Temperate and Boreal Forest Resources Assessment
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VWT	Vincent Wildlife Trust
WRI	World Resources Institute
WT	Woodland Trust
WWF	World Wide Fund for Nature
WWT	Wildfowl & Wetlands Trust