



## Soils and Nature Conservation

Newsletter of the Soils Lead Co-ordination Network

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The Soils Lead Co-ordination Network was established by the Joint Nature Conservation Committee to bring together the views and expertise of the country nature conservation agencies and provide a common approach to UK issues.

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### Welcome - Editorial

Welcome to the fifth newsletter of the Soils Lead Co-ordination Network (LCN).

The last year has seen important developments at a UK level, represented by the activities of the UK Soil Indicators Consortium, the implementation of the England Soil Action Plan and the consultation on an environmental strategy for Wales.

The conservation agencies have also sought to clarify the role of soils in nature conservation and the conservation value of soils.

This issue of the newsletter focuses on these developments and also provides an update on other activities of the Soils LCN.

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## Soil indicators and soil monitoring framework

### NEWS FROM BRUSSELS

After the publication of the reports of the Soil Thematic Strategy technical working groups in June 2004 (<http://forum.europa.eu.int/Public/irc/env/soil/library>), the European Commission has been working towards submission of a draft directive on soil protection by the end of 2005.

The reshuffling of the EC after the last European elections had some impact on the rate of progress of the Soil Thematic Strategy. Responsibility for the strategy has been given to a new Unit of DG Environment, 'Directorate B: protecting the environment', in particular, 'Unit B1: Agriculture and Soil' led by Michael Hamell (Bernhard Berger, deputy head).

On 26 July, DG ENV - European Commission launched the long-awaited internet consultation for the Soil Thematic Strategy to gather opinions on possible elements of a 'Proposal for a Soil Thematic Strategy'. The full text of the consultation and statistical analysis of the responses can be found at <http://www.europa.eu.int/comm/environment/soil/index.htm>.

The consultation included two questionnaires, one for citizens and one for organisations and experts (some versions only mention the word 'organisations' but it was for both).

Background information and reference documents are available at the same web site. The results of this consultation were made public and were fed into the Thematic Strategy, the adoption of which is scheduled for the end of 2005.

### NEWS FROM THE UK

The UK Soil Indicators Consortium was formed by Defra in 2003 to take forward the output of the 2000 project on the 'Identification and development of a set of national indicators for soil quality' (P5A(00)01) (SP0512). This project identified 67 potential soil quality indicators which were published in the Loveland et al. report <sup>1</sup>(2002).

The UK Soil Indicators Consortium is a group of public stakeholders which is overseeing the development of a national set of soil indicators and the design of a framework for UK soil monitoring. In order to develop a scheme that meets both multiple national and European requirements, the consortium is working collectively to identify the indicators that should be built into a national soil monitoring scheme, and to suggest the best mechanisms for funding and undertaking this monitoring. Work will be completed by early 2006 and is expected to feed back to the EC to support the development of the technical annex of the EU soil monitoring directive. Further information on UK SIC activities can be found at: <http://www.defra.gov.uk/environment/land/soil/indicators/index.htm#consortium>

A series of workshops, at which the Soils LCN was represented, discussed soil quality indicators for environmental function, biodiversity function and resilience.

- The Environment Agency Workshop, 'Challenging the Indicators', was held over two days in Batch in July 2005. The workshop brought together policy makers, researchers and end-users to discuss the value and robustness of a range of pre-selected soil quality indicators for monitoring the environmental functions of soil. The discussion also covered the requirements for use of those indicators in a UK soil monitoring framework. The workshop participants were asked to provide clear evidence to support the inclusion or exclusion of potential indicators – personal points of view, however interesting, were

<sup>1</sup> [http://www.defra.gov.uk/science/project\\_data/DocumentLibrary/SP0512/SP0512\\_432\\_FRP.pdf](http://www.defra.gov.uk/science/project_data/DocumentLibrary/SP0512/SP0512_432_FRP.pdf)

generally not sufficient without supporting evidence. For example, assertions that an indicator be rejected because it exhibits high spatial variability should be supported with experimental evidence. The Environment Agency will review the outcomes of the workshop which are expected to be published later this year. This information will feed into the development of a UK soil monitoring framework. Details on this project - 'Indicators for the national assessment of soil quality in relation to its interaction with the environment' Science Project Number SC030265 - will be published in February 2006 on the EA publication web page. at <http://www.environment-agency.gov.uk/aboutus/275292/816066/>

- The Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) organised a workshop in October 2005 linked to a SNIFFER project, 'Indicators of Soil Resilience for Scotland and Northern Ireland', contracted to the Scottish Agricultural College (SAC). The workshop provided an opportunity to discuss the chosen indicators and implications for soil policy, with a focus on Scotland and Northern Ireland, and to review and validate a set of indicators developed by SAC under contract to SNIFFER. Details on the project and workshop can be found on the SNIFFER project database at <http://www.sniffer.org.uk/search.asp> - enter 'project LQ06'.
- CEH Lancaster hosted a workshop, 'Scoping biological indicators of soil quality for national soil monitoring', in November 2005. In a forum of scientific peers and stakeholders, the purpose was to review the approaches and principal conclusions from a Defra-funded SQID project, 'Soil quality indicators - developing biological indicators (SP0529)', to identify any gaps in the findings, and to scope what a national-level monitoring scheme for biological indicators might comprise. Details on this project can be found on the Defra 'biological indicators of soil quality' web page at: <http://www.defra.gov.uk/environment/land/soil/research/indicators/bio-indicators.htm>

The outcomes of these workshops will inform the work of UK SIC and will be reported in the next year.

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## UK conservation agencies: soil activities update

### LCN PERSPECTIVES ON SOIL AND THE NATURAL HERITAGE

Soils and associated natural heritage interests have been discussed within the LCN and its constituent country agencies in relation to the development of national soil strategies.

Soils form the foundation of all terrestrial ecosystems and cover most of the natural terrestrial world, supporting key processes in biomass production and mass exchange with atmospheric and hydrological systems. Even in our cities, soils are present in gardens and parks, or sealed under buildings and pavements. Soils are at the interface between the organic and mineral world. Soil and above ground biodiversities are closely linked to sustainable use of soil.

Most soils in the UK began to form after the retreat of the last ice sheet around 15,000 years ago which, in soil terms, makes them often immature and shallow. Because of the timescale involved in their formation, soils are considered to be a non-renewable resource. However, soils are continuously changing as their properties and development reflect the interaction of soil forming factors (climate, relief, vegetation, fauna, geology) at any given time and location. Human-driven activities can affect the balance between these factors, leading to immediate, often adverse, impacts on the soil resource or acceleration of natural trends. Even in the remote parts of Scotland, few soils can be described as “pristine”, as little of the countryside has been untouched by human activities. Changes to soils that affect their chemistry, physical properties and biological make-up are often irreversible and the best remediation actions will only be able to restore some of the functionality of the soil but not its original integrity. A full understanding of the soil functionality requires an accurate assessment of the soil current status (e.g. extent and quality of the soil resource), the drivers of change to the soil status (e.g. policy change, land use change, climate change), the threats/risks to the soil (e.g. contamination, planning development, loss of biodiversity), and the impact on and response of soil to changes.

In relation to the natural heritage, soils perform a wide range of ecological and physical functions, involving both above- and below-ground ecosystems. These functions can be grouped into five categories, in which soils are important:

- i. as components of geodiversity<sup>2</sup>, playing a part in the physical processes that underlie the natural environment and creating the basis for scenery and the built environment;
- ii. as features of the natural heritage with their own intrinsic conservation potential;
- iii. as an essential part of terrestrial ecosystems and a critical factor in the distribution of many plant and animal species (providing services and functions to maintain ecosystem dynamics, diversity of communities of conservation importance and rare species support);
- iv. for their wider environmental services, linking air, water and land (e.g. filtering and buffering function of soils in controlling nutrients, contaminants, greenhouse gases, carbon storage, runoff and water storage); and
- v. as repositories of environmental and cultural information (including palaeoenvironmental archives and records of historical and pre-historical human activity) which may also provide baselines for environmental monitoring.

The UK conservation agencies have responsibility to protect the natural heritage (which includes soil, flora and fauna, geological and physiographical features, natural beauty and amenity), to promote its understanding and to help to make sure that its use and management are sustainable. The role of soils in the conservation of the natural heritage lies in their value as an intrinsic constituent of the natural heritage and in their support functions and interactions with wildlife, habitats and landscapes. In setting conservation objectives for soil, broader environmental objectives and the links between soil, air and water quality also need to be considered. It is important to recognise the different functions that soils perform and to identify clearly those issues related to protection of the soil as a component of the natural heritage and those related to the sustainable management of soil to maintain wider environmental services.

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<sup>2</sup> Geodiversity is the variety of rocks, minerals, fossils, landforms, sediments and soils, together with the natural processes which form and alter them.

## JOINT NATURE CONSERVATION COMMITTEE

From the 31 March 2005, the Regulatory Reform (Joint Nature Conservation Committee) Order 2005 has allowed the JNCC to make change in the ways it operates. The Order is part of a package of measures implementing the Government response to the Financial, Management and Policy Review of JNCC, which reported in 2002.

JNCC has changed to a company limited by guarantee which will require formalisation of new arrangements for acquisition of the services and facilities needed to deliver its statutory functions efficiently. The role and activities of the lead co-ordination networks in delivering conservation agency special functions will now be covered by a service level agreement between the conservation agency chairing individual networks and JNCC. This will lead to improvements in the way of working for the Soils LCN, without affecting the bulk of our activities and responsibilities.

The JNCC new company is expected to undergo a name change, with various options being discussed.

## ENGLISH NATURE

### 1- Towards 'Natural England'

English Nature, the environment activities of the Rural Development Service and the Countryside Agency's Landscape, Access and Recreation division will be united in 2007 in a single body. The new agency will be called *Natural England* and will have a role in rural, urban and marine environments. It will have responsibility for enhancing biodiversity and English landscapes and wildlife in rural, urban, coastal and marine areas; promoting access, recreation and public well-being, and contributing to the way natural resources are managed – so they can be enjoyed now and by future generations. The new organisation retains all the powers of the existing bodies, including awarding grants, giving advice and information, designating Sites of Special Scientific Interest, National Parks and Areas of Outstanding Natural Beauty, managing National Nature Reserves, and enforcing the associated regulations.

### 2- Update on implementation of the Soil Action Plan for England

English Nature has produced a direction setting paper on soils and nature conservation which was discussed by its Council on 22 June (reference GC P05 21). This paper is available on their Council meeting web page at <http://www.english-nature.org.uk/about/meetings/GCP0521.pdf>

English Nature will shortly be commissioning a consultancy project to help produce guidance on soil issues in habitat restoration projects, one of the actions specified in the Soil Action Plan for England (contact: Jonathan Burney). Other proposed English Nature research includes a project about farm management practices and their effects on soil biodiversity and ecosystem function (contact: Ian Alexander; Dorset office).

Defra convened its second meeting of the Soil Action Plan Forum on 5 May. Amongst other matters, the meeting discussed progress on farm management planning guidance, and the English Nature research on habitat restoration (see above). There was a useful update from Defra about the EU Soil Thematic Strategy, and very interesting presentations on the Defra sponsored project on education materials, and on soils in the built environment.

## COUNTRYSIDE COUNCIL FOR WALES

### 1- News on CCW/WAG changes

The statutory functions or structure of the Countryside Council for Wales have not changed, but in November 2004 the First Minister Rhodri Morgan announced that the implementation of the Tir Gofal scheme will transfer to the Welsh Assembly Government, providing farmers and landowners with access to agri-environment schemes through a single source.

## 2- Update on the development of a soil strategy for Wales

The Welsh Assembly Government's plans to address environmental issues through an all-embracing Strategy for Wales came another step closer with the public consultation on an Environment Strategy for Wales, 'Our Environment –Our Future – Your views', launched in early July by the Welsh Assembly Government.

The consultation represents a key stage in developing an Environment Strategy for Wales. The document considers soil as a valuable natural resource and recognises its key role in many ecosystem services. It identifies a range of pressures facing soils in Wales and proposes a range of actions for better understood and sustainably managed soil resources. These include the adoption of good land management practices, improved understanding of the extent of soil contamination and actions to remediate contaminated land for beneficial use. The full text of the consultation, which closed on 3 October 2005, can be found at [www.countryside.wales.gov.uk/environmentstrategy](http://www.countryside.wales.gov.uk/environmentstrategy)

## SCOTTISH NATURAL HERITAGE

### 1- Relocation news

SNH is due to relocate its headquarters from Edinburgh to Inverness in April 2006. However, the posts of all three LCNs (Freshwater, Uplands and Soils) chaired by SNH have been retained in Edinburgh. This will minimise the disturbance to LCN activities.

### 2- Update on development of a soil strategy for Scotland

Since November 2004, soil policy issues within the Scottish Executive have been covered by Dr. Antje Branding, policy advisor with the Environment and Rural Affairs Department, Environment Group, Air Climate Engineering Division, Soil Policy Coordination Team. SNH and the Soils LCN have continued to provide advice and support for activities leading towards the development of a Scottish soil strategy.

A position paper setting out the role and responsibilities of SNH for protection of Scottish soil resources is being developed and should be circulated for discussion with partners shortly. It should help to identify further areas of potential collaboration in developing a Scottish soil protection strategy.

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## LCN research activities: update

### CARBON DYNAMICS AT MOOR HOUSE – UPPER TEESDALE NNR

This report is provided by Emilie Grand-Clement (PhD Student, Reading University/JNCC, who is undertaking research at Moor House on 'Soils and soil properties as indicators of past and present vegetation conditions in an upland environment').

A one-day meeting hosted by John Adamson at CEH (Lancaster) was organised on 6 May to discuss current carbon related research at Moor House - Upper Teesdale National Nature Reserve. The attendees were researchers, PhD students and conservation officers. Their interests were diverse, including global change, peat soil hydrology, C dynamics and cycling, and peatland conservation.

Moor House constitutes a National Nature Reserve (NNR), a UNESCO Biosphere Reserve, a European Special Protection Area, and is currently a terrestrial site within the Environmental Change Network. It has been managed for research and conservation since 1952 and has a long history of records and studies in different subject areas, like climate change, processes of peatlands and streams, pollution and the impact of land management practices. Most of the reserve is occupied by peat soils (some are 2 m deep), so that large amounts of carbon are stored in these soils. Since 1993 more than 30 scientific papers have been published relating to carbon dynamics on the site, and it is also used by postgraduate students for research. Many studies use Environmental Change Network data, in particular the 12-year dataset for Dissolved Organic Carbon in the peat and streams.

The aim of the meeting was to address:

- What is known about carbon dynamics at Moor House?
- What are the major gaps in the range of research about carbon at Moor House?
- How can those gaps be filled?

The first part of the meeting was dedicated to presentations on current work undertaken at Moor House. This included research on peat hydrology, carbon and nitrogen dynamics, and land and atmosphere CO<sub>2</sub> exchanges.

During the discussions, gaps were identified in both the science, and its use for broader conservation decisions. From a strict scientific point of view, data on processes (i.e. the role of Dissolved Organic Matter and chemicals like carbon, nitrogen and phosphorous), and the role of biota and budgets (i.e. CO<sub>2</sub> and sulphur deposition), are missing or too incomplete to be used within integrated models. It was suggested that a 'Knowledge Base', where information on past research could be found, would make the large range of data and results more accessible and be of great help for further studies. Moreover, the lack of extrapolation has been emphasised: research is usually carried out at a small scale (i.e. sub-catchment or plot), rather than at a broader landscape or catchment scale.

A strong message came from the conservation officers in favour of research intended to inform upland land-managers. This is in contrast to much of the current research at Moor House, which is orientated towards understanding the role of uplands in storing carbon, and thus more connected with climate change policy. There is clearly a lot of common ground between the two approaches. A consensus was that an area of degraded blanket bog outside the reserve would be identified for comparison with the reserve, bearing in mind that Moor House is not a typical example of moorland because of its geographical position (high altitude), and because of its NNR status, which means that the reserve is not facing many of the problems found elsewhere (i.e. high grazing, peat erosion, agriculture and burning).

More practically, a consortium agreement could constitute a good framework for developing a partnership on a systematic approach to C issues and modelling. Another workshop is envisaged for next autumn at Moor House to develop a conceptual model. Finally, the idea of a special issue of a journal on the work at Moor House has been proposed.

Information about Moor House, as well as a list of publications, can be found on the ECN web page: <http://www.ecn.ac.uk/sites/moorh.html>

## **ASSESSING THE CONSERVATION VALUE OF SOILS AND ITS RELATION WITH DESIGNATED FEATURES**

Contractor: MLURI (Willie Towers, Ann Malcolm). Funded by SNH.

This SNH project derived from discussion within the Soils LCN on the absence of a clearly defined and practical means of assessing the nature conservation value of soil. If soils are to be recognised as a feature of interest in protected areas, either for their geodiversity interest or in relation to the ecosystem role they play in supporting other designated features, it is important to develop a set of tools to assess their value and provide a means to monitor them.

It has been established by the Soils LCN that, by contrast with other designated features, the value of a soil cannot be assessed by the presence or absence of specific features or the mean of certain properties. A spatial approach is required that examines the interactions between soil and other aspects of the environment and addresses the functionality of the soil within a given context. This means that, in principle, the intrinsic value of a soil unit based on the idea of a benchmark soil is of limited use unless it is linked to other functional values of the soil. Using this approach, a range of conservation functional indices has been defined and a classification developed to obtain an overall measure of the conservation (functional) value of a soil.

The development of this soil conservation index methodology is based on an assessment of soil rarity, representivity and diversity and their relationship with sites designated as Sites of Special Scientific Interest (SSSIs), the National Vegetation classification and Key Biological Species within the Cairngorms National Park (CNP).

### Soil Conservation index

- About 60% of the soils of the National Park are classified as rare in a Scottish and/or European context. Montane soils in the CNP are rare within a UK context. A number of soils that are rare within the CNP are not rare within the rest of Scotland or Europe.
- An assessment of the complexity of soil map units provides an appropriate method of determining how well different soils are represented in the landscape
- The rarity, representivity and diversity criteria were allocated scores on a logarithmic scale and subsequently combined to give an overall conservation index score
- The diversity index is driven by the resolution of the data and by polygon size and is of lesser value in determining the overall combined conservation index.
- The combined conservation index is weighted in favour of rarity and representivity. Approximately 21% of the soils of CNP achieves the maximum or near maximum combined score (>200).

### Soil Conservation index within SSSIs in the Cairngorms National Park

- About 70% of the soils are classified as rare, with virtually all of these classified as such because of their national and/or international rarity.
- Areas with a combined soil conservation score of 200 or more (indicating rare, well represented soils) accounts for 31 % of the area designated as SSSIs. However this compares with 21% for the National Park as a whole, indicating that existing designations based on other criteria do target to some extent soils of higher conservation value.
- The proportion of soils within SSSIs with a high conservation value is higher than for the National Park as a whole, suggesting that the land designated on other criteria should also be valued for its soils, and although pedological characteristics are not a reason for designation, perhaps this could add extra weight to existing designations.
- Woodland SSSIs have lower soil conservation scores as the soils are unremarkable from a purely pedological perspective.

### Soil Conservation index and the National Vegetation Classification (NVC)

- As for the SSSIs, the associations between the NVC classification and soils are generally logical, even for some of the less extensive ones.
- Most of the NVC classes mapped occur on soils that are rare in a national and international context.

## Other LCN activities

### SOIL TRAINING FOR CONSERVATION AGENCY STAFF

The value of soil training for conservation agency staff, to raise awareness and improve understanding of the relationships between soil quality and the status of species and habitats is widely recognised. The specific needs for training vary between the agencies; for example in England there is a strong impetus deriving from the requirement of the Soil Action Plan for development and use of soil guidance. However, there are common objectives and issues which the LCN has started to prepare as a basis for in-house training courses. These include:

- understanding of soil resources;
- identification of conservation issues related to soil protection and land management;
- statutory responsibilities and the role of EU directives (Habitats, WFD, CAP reform, the forthcoming Soils Directive) and national policy;
- how to find relevant information and guidance on soil for Environmental Impact Assessment and Site Condition Monitoring.

Further information on soil training across the conservation agencies will be provided in due course.

### FC FORESTS AND SOIL CONSERVATION GUIDELINES REVIEW

The revision of the Forestry Commission Environmental guidelines was initiated because the existing guidelines were dated and have been overtaken by the 1999 devolution of forestry powers to the Scottish Parliament and Welsh Assembly Government, and by other developments including revision of the UK Forestry Standard and the advent of independent forest certification standards.

[http://www.forestry.gov.uk/pdf/questionnairereport.pdf/\\$FILE/questionnairereport.pdf](http://www.forestry.gov.uk/pdf/questionnairereport.pdf/$FILE/questionnairereport.pdf)

The Soils LCN was invited to participate in the working group for the revision of the Forests and Soil Conservation Guidelines. This group includes regulators, major stakeholders and technical experts and is led by Andy Moffat and Helen Mackay (FC). In July 2005, the working group produced a first draft of the 'Soil Guidelines' which will be issued in a revised form for external consultation in 2006. All the revised guidelines, including the 'Soil Guidelines', are expected to be launched in the latter part of 2006.

The 'Soil Guidelines' are not intended to provide detailed guidance on soil management practices. This will be delivered by subsequent documents.

### CROSS-CUTTING ISSUES

Soils, climate change and air pollution issues undoubtedly cut across the remits of many LCNs and inter-agency groups. Although many aspects of climate change activities result from international obligations which have a UK dimension, at the country level, especially in Scotland, there is a strong national dimension in research to address the impact of climate change in relation to soils. Soils LCN members are involved in such activities at an agency level rather than an LCN level. In Scotland, for example, because of the importance of the carbon reserves held in the soil, the Scottish Executive has funded a number of projects looking at greenhouse gas emissions, the soil carbon resource and impacts of fertiliser use on greenhouse gases. SNH has been involved as an active partner in some of this work (including membership of project steering groups). Currently SNH is developing a position on the relation between climate change and the natural heritage.

Over the next year, the Soils LCN intends to extend its activities and discussions with other agency networks to assess the scope for integrated work on cross-cutting interests.

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