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**JOINT NATURE CONSERVATION COMMITTEE**

**UK AND INTERNATIONAL AIR POLLUTION POLICY: PRIORITIES FOR JNCC AND THE COUNTRY AGENCIES**

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**1. Background – recent trends in air pollution and impacts on the environment**

- 1.1 There have been substantial reductions in the UK of emissions of the major air pollutants sulphur dioxide (SO<sub>2</sub>) and oxides of nitrogen (NO<sub>x</sub>) from their peaks in the 1970s and late 1980s respectively. This major success reflects better regulation as well as changes to industry, such as a switch from coal to gas for electricity production and cleaner technologies.
- 1.2 However, emissions of ammonia from livestock production increased substantially in the latter half of the 20<sup>th</sup> century because of the intensification of agriculture, and are now declining very slowly. Increasingly, nitrogen deposition in the UK is dominated by reduced forms of nitrogen (arising from ammonia emissions) rather than oxidised forms (mostly from vehicles and industry).
- 1.3 Ozone is a secondary pollutant formed by reactions between oxides of nitrogen and volatile organic compounds in the presence of sunlight. Concentrations of ozone show large spatial and temporal variations because specific meteorological conditions are required for its formation. Due to the reductions in emissions of the precursor gases in the UK and Europe, peak ozone concentrations have generally declined over the last 20 years. However, the mean 'background' concentration of ozone is steadily increasing as a result of increasing emissions in the northern hemisphere.
- 1.4 Despite reductions in emissions, damage to ecosystems from acidification, ozone and, in particular, nitrogen pollutants, is still considered a significant threat to nature conservation.
- 1.5 The effects of acidification on freshwaters are well documented and have had widespread impacts in sensitive catchments. There is evidence of chemical recovery in some acid-sensitive waters, as a result of reduced inputs of sulphur, but biological recovery may take decades.
- 1.6 In the terrestrial environment, Countryside Survey 2000 has demonstrated a widespread eutrophication signal across habitats. This is correlated with

increased deposition of reduced nitrogen, but the cause and effect relationship remains poorly understood.

- 1.7 Changing patterns of ozone exposure may have severe consequences for sensitive upland plant communities, which were previously thought to be less at risk than southern lowland communities.
- 1.8 A major thematic programme sponsored by NERC and the Government has recently completed. The Global Nitrogen Enrichment programme assessed the effects of nitrogen pollution on ecosystems, particularly terrestrial and freshwater, in the UK. It has emphasised that nitrogen deposition is one of the major threats to ecosystems alongside climate change and biodiversity loss.
- 1.9 The main policy tool for assessing the effects of atmospheric deposition is the use of critical loads. These are a threshold for pollution effects. Where deposition exceeds the critical loads (referred to as critical load 'exceedance') there is a risk of harm to the ecosystem. About 59% of 1x1 km grid squares containing semi-natural habitat in the UK currently exceed the nutrient nitrogen critical load.
- 1.10 The UK Government is committed to further reductions in emissions of sulphur dioxide, oxides of nitrogen and ammonia by 2010. However, even with these declines, large areas of semi-natural habitat will remain in exceedance of critical loads. It is evident that much greater, and more targeted, reductions in emissions of the key pollutants, especially ammonia, are required in order to secure protection to biodiversity in the UK.

## **2. Tackling the impacts on nature conservation – the legislative and policy mechanisms**

### ***2.1 Controlling industrial sources – the Habitats Regulations and the Integrated Pollution Prevention and Control Directive***

- i. The Habitats Regulations contain very strict site protection provisions and enshrine the precautionary approach. They require an 'appropriate assessment' for all new 'plans and projects' which are likely to have a significant effect on a Natura 2000 site. Except in specific circumstances, such plans and projects can only be authorised if they will not adversely affect the integrity of a European site. The Regulations also require a review of existing consents. The Integrated Pollution Prevention and Control Directive is an integrated approach to pollution regulation and permits emissions to air, water and land from industrial installations. It is being implemented over seven years, 2000-07. The country nature conservation agencies are statutory consultees under both the Habitats Regulations and Integrated Pollution Prevention and Control Directive, and the implementation of these pieces of legislation requires the nature conservation agencies to work with the environment agencies to review and assess permits for industrial processes.

- ii. As part of a collaborative project with the environment agencies, methodologies for site assessment have been developed to meet the requirements of the stringent 'tests' of the Habitats Regulations. A major assessment of the risk to all Natura 2000 sites in the UK has been undertaken, and pollutant deposition at sites has been apportioned to major industrial processes as well as to diffuse, unregulated sources. This work has been led by the Environment Agency, in partnership with English Nature and CCW, with the inter-agency Air Pollution Lead Co-ordination Network providing technical advice. The assessment was expanded in 2003 to include Scotland and Northern Ireland, facilitated by the Scotland and Northern Ireland Forum for Environmental Research (SNIFFER). As a result of this assessment, a picture has been built up of the 'stock at risk' for Natura 2000 sites.
- iii. The implementation of the Integrated Pollution and Prevention Control Directive and the application of the 'tests' of the Habitats Regulations for new 'plans and projects' provides an excellent opportunity to address air pollution impacts from industrial processes. A major programme of work to assess the impacts of coal- and oil-fired power stations is currently underway. However, what is very apparent from the assessment so far, is that action on industrial processes alone will not lead to the non-exceedance of critical loads at Natura 2000 sites. Substantial reductions in emissions from diffuse sources, such as transport, but particularly ammonia emissions from agriculture, are also required.
- iv. Recognising that ammonia is a key issue and one that cuts across different policy areas (from air quality policy to agricultural policy and operation), Defra have set up a Nutrient Management Unit to consider nutrient management in agriculture and diffuse water and air pollution. English Nature has been asked to sit on the steering group for this work. JNCC and the country agencies believe that Government should make a commitment to targeted emission reductions for ammonia, such that the overall integrity of Natura 2000 sites can be secured.

## **2.2 *The UK Air Quality Strategy***

- i. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland is the major policy document driving action to improve local air quality in the UK. It sets out plans by UK Government and the devolved administrations to improve and protect ambient air quality. It is largely focused on the protection of human health rather than ecosystems, and includes human health standards for nine key pollutants which local authorities are required to meet by specified dates. In addition, the Air Quality Strategy includes national objectives for the protection of vegetation from SO<sub>2</sub> and NO<sub>x</sub>. These are more stringent than the associated human health standards. However, the Strategy states that these objectives do not apply in areas around urban conurbations, industrial processes and motorways. We have termed these areas 'exclusion zones'. Following advice from the country

agencies, through the Air Pollution LCN, that the exclusion zones mean that large numbers of protected sites remain vulnerable to impacts from these pollutants, Defra commissioned work to examine the costs of a number of potential options to enhance the objectives for the protection of ecosystems. In 2010, it is predicted that 11 SSSIs in the UK will exceed the SO<sub>2</sub> objective and 294 will exceed the NO<sub>x</sub> objective.

- ii. Defra is currently undertaking a review of the Air Quality Strategy. The focus of this review is on measures to meet the current objectives. However, Defra have also agreed to include a review of the ecosystem objectives. JNCC have strongly advised that this review should incorporate a removal of the exclusion zones, at least for sensitive sites, and that ecosystem protection should be given a much more prominent position in the strategy, e.g. by including targets for critical load exceedance and ammonia. This would make it more consistent with the new framework indicator for critical load exceedance under the UK Sustainable Development Strategy.

### **2.3 *Reducing emissions of transboundary air pollutants – European drivers***

- i. The protection of ecosystems is one of the principal drivers behind the EU National Emissions Ceilings Directive and the Gothenburg Protocol (a protocol under the United Nations Economic Commission for Europe Convention on Long-range Transboundary Air Pollution).
- ii. The National Emissions Ceilings Directive introduces legally binding limits on national emissions of NO<sub>x</sub>, SO<sub>2</sub>, ammonia and volatile organic compounds from 2010. The aim of the Directive is to move towards the long-term objectives of not exceeding critical levels and loads for acidification, soil eutrophication and ground-level ozone.
- iii. The UK's commitments under the Gothenburg Protocol require reductions of the same pollutants. The emission ceilings set by The National Emissions Ceilings Directive are the same as, or more stringent than, those in the Protocol. In both cases, the emission reductions required for ammonia are very small compared to the other pollutants.
- iv. A number of existing and agreed measures will help to meet these ceilings, including the revised Large Combustion Plant Directive and the Integrated Pollution and Prevention Control Directive. However, despite the significant emission reductions there will still be significant areas that exceed the critical loads for acidity and nutrient nitrogen in 2010.
- v. In June 2005 the European Commission will publish its strategy for future air quality policy. This has been developed as part of the Clean Air for Europe programme, which is one of the thematic strategies established under the Sixth Environmental Action Programme. The Air

Pollution LCN will be providing a consultation response on the thematic strategy during the early part of the summer. JNCC believes that the strategy must include air pollution impacts on biodiversity as a core consideration. It is essential that there is a commitment to further, and more targeted, reductions in ammonia emissions and a more holistic consideration of air pollution impacts on ecosystems in air quality policy.

#### **2.4 *Development of indicators for nitrogen – European and national initiatives***

- i. Under the auspices of the Convention on Biological Diversity, a major pan-European programme of work is currently being undertaken to ensure co-ordination of the development and implementation of indicators for assessing, reporting on and communicating progress towards the 2010 target to reduce the rate of biodiversity loss. Simon Bareham has been appointed to chair an EU expert group tasked with producing a nitrogen deposition indicator. He is also providing input to the development of a nitrogen indicator within the parallel UK BAP indicator framework.
- ii. This work provides an excellent framework to consider nitrogen deposition at a range of spatial and policy levels. The Air Pollution LCN is involved in the assessment of nitrogen, and other pollutants, from the local site level through to national and international scales. A priority is to ensure a consistent approach to nitrogen assessment, scaling up from site-level assessments to broad-scale indicators at the European level. Whilst the Air Pollution LCN's involvement in local assessments (for example, through casework support) and at the national level is well established, work on nitrogen in a European and international context is at an early stage of development.

### **3. Priorities for JNCC and the country agencies**

- 3.1 Based on the information in section 2 of this paper, the following medium-term priorities are proposed for influencing air pollution policies in the UK and internationally:
  - i. to encourage Government to adopt stronger measures to address ammonia emissions from agriculture and other diffuse sources;
  - ii. to advocate that the review of the UK Air Quality Strategy should remove the existing 'exclusion zones' in which environmental objectives do not apply, and should give pay greater attention to ecosystem protection;
  - iii. to advocate that the Clean Air for Europe programme adequately addresses impacts on biodiversity;

- iv. to ensure that there is a consistent approach to nitrogen assessment, scaling up from site-level assessments to broad-scale indicators at the European level.

#### **4. Monitoring the environmental impacts of air pollution**

- 4.1 Despite the considerable cuts in emissions of the major air pollutants, there remains an unacceptable risk to the integrity of semi-natural ecosystems. However, it is increasingly costly to achieve further emission reductions from industrial sources. Increasingly, as Government moves towards more evidenced-based policy, JNCC and the country agencies require a better science base to inform their policy advice and support their advocacy for emission reductions.
- 4.2 Whilst the critical loads approach is an essential policy tool and one that is scientifically and politically accepted, it still only provides a predictive measure of risk. This is an essential basis for formulating policy, but it needs to be underpinned by evidence of ecosystem changes attributable to air pollution.
- 4.3 The Acid Waters Monitoring Network, established over 15 years ago, provides just this for freshwaters. In addition, the Environmental Change Network provides an integrated environmental monitoring and research programme for freshwater and terrestrial sites. It monitors responses to environmental change in physical, chemical and biological systems. However, there are only 12 terrestrial sites in the Network and only a proportion of these are on semi-natural habitats.
- 4.4 The conservation agencies' Common Standards Monitoring programme provides a useful assessment of the status of interest features on protected sites. However, the assessment of the condition of terrestrial features is not designed to take account of air pollution impacts. Furthermore, it does not provide a mechanism to attribute air pollution as a cause, or contributory cause, of unfavourable condition. The inclusion of attributes that would enable a consistent and robust assessment of air pollution impacts and their effect on feature condition is largely beyond the scope and resources of Common Standards Monitoring .
- 4.5 Elucidating the role of air pollution in causing unfavourable condition is challenging. In particular, there is the issue of timescales: some sites may have been impacted for decades and major vegetation changes have already occurred prior to designation, while on the other hand there may be substantial time lags in the response of some systems. Furthermore, air pollution may result in complex interactions with other factors such as grazing and climate.
- 4.6 It is essential that the agencies' reporting of site condition and wider biodiversity reporting makes clear the difficulties in accounting for air pollution, as well as climate change and other pollution stresses. The risk of not doing so is to provide anomalous advice to Government and the pollution regulators: on the one hand, risk assessment approaches such as critical loads

and other predictive models show substantial numbers of sites at risk, whilst on the other hand, evidence of effects on the condition of sites is not being reported. As a partial solution to this problem, the Air Pollution LCN is investigating ways of reporting the risk status of SSSIs, most likely based on the critical loads approach.

- 4.7 More fundamentally, the Air Pollution LCN believes that there must be a more integrated effort to detect and attribute air pollution impacts (and other drivers of environmental change) on the UK's protected site series. This is essential to underpin advice on emissions policy and also to assess the effectiveness of current policies and whether the UK is meeting its legislative and policy commitments for nature conservation.
- 4.8 JNCC, English Nature and EHS have recently funded a scoping study, with Defra and the Environment Agency, to recommend a framework for the monitoring of air pollution impacts on terrestrial semi-natural habitats in the UK. The recommendation is for a more intensive suite of measurements to be taken at a subset of SSSIs to supplement the data collected as part of Common Standards Monitoring. This network of sites would provide a more robust assessment of the causes and effects of air pollution, with a focus on nitrogen. A key part of the scoping study was to review the large number of existing monitoring and surveillance programmes and consider how they may be used as part of this network.
- 4.9 In parallel, consideration is being given to setting up a series of secondary Environmental Change Network sites (a 'biodiversity network') to monitor the impacts of climate change. The Air Pollution LCN is working closely with the Inter-Agency Working Group on Climate Change to ensure integration of the work on air pollution with that on climate change, where appropriate. It is recommended that there should be an over-arching integrated network including a suite of SSSIs (most practically these might be National Nature Reserves) on which climate and/or air pollution parameters and responses are monitored. The Air Pollution LCN can make significant progress on the design and operation of the network. However, its implementation will require substantial support from the country agencies and other partner organisations.