

BIODIVERSITY ISSUES IN ROAD ENVIRONMENTAL IMPACT ASSESSMENTS: GUIDANCE AND CASE STUDIES

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Abstract

The Convention on Biological Diversity (CBD) specifically requires Environmental Impact Assessments (EIAs) to consider impacts on biodiversity (Article 14, CBD). However, while ecological assessment has always been an integral component of EIA, explicit treatment of biodiversity impacts in road EIAs is often poor or non-existent. The lack of guidance on biodiversity impacts in road EIAs is likely to be partly responsible for the failure to address these issues adequately. Hence, the provision of appropriate guidance might facilitate improved consideration of these impacts.

The key goal of this research is to provide guidance on a systematic and rigorous approach for assessing biodiversity in road EIAs. Draft guidance was developed using relevant literature and a two-stage consultation process with over 30 experts in the field of road EIAs. The experts provided a range of perspectives (government, statutory nature conservation bodies, consultants, non-governmental organisations and academics). The draft guidance is being applied to a number of actual road case studies to examine its use in practice. This paper outlines the draft guidance and discusses its application to the case studies. Evaluation of the case studies will allow the draft guidance to be further refined to produce finalised guidance for dissemination.

Introduction

The 1992 Convention on Biological Diversity (CBD) requires parties to the Convention to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity and to integrate conservation and sustainable use of biological diversity into relevant sectoral or cross sectoral plans, programmes and policies (Article 6, CBD). Environmental impact assessment could potentially play an important role in such integration and the CBD specifically requires Environmental Impact Assessments (EIAs) to consider impacts on biodiversity. Article 14 of the CBD which deals with Impact Assessment states:

"Each Contracting Party, as far as possible and as appropriate, shall:

- (a) Introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimising such effects and, where appropriate, allow for public participation in such procedures;*
- (b) Introduce appropriate arrangements to ensure that the environmental consequences of its programmes and policies that are likely to have significant adverse impacts on biological diversity are duly taken into account;"*

Several organisations have issued guidance on biodiversity and EIA (US CEQ 1993; CEEA 1996; The World Bank 1997) and work is being carried out in this area by a range of bodies, including The World Conservation Union (Bagri et al. 1998 and 1999), the International Association of Impact Assessors (IAIA) and the CBD's Subsidiary Body for Scientific, Technical, and Technological Advice (SBSTTA).

Ecological assessment has been an integral component of UK road EIA since implementation of UK EIA legislation in 1988 and is the subject of current guidance (Box and Forbes 1992; Department of Transport (DoT) 1993; English Nature 1994 and 1996). However, biodiversity is not explicitly mentioned in UK EIA legislation, or in the current guidance, which has not been updated to discuss the UK biodiversity process.

A study of 40 recent UK road Environmental Impact Statements (EISs) (Byron et al. 1999) revealed that explicit treatment of biodiversity impacts in road EIAs is often poor or non-existent. It could be argued that lack of explicit treatment of biodiversity impacts in EIAs is not necessarily a weakness, provided that EIAs cover biodiversity issues implicitly, i.e. provided ecological issues are considered the lack of use of biodiversity terminology should not be an issue. However, this implicit approach raises various concerns, principally:

1. It does not make the necessary linkages with the UK biodiversity process i.e. the UK Biodiversity Action Plan, and accompanying national, regional and local Habitat and Species Action Plans (HM Government 1994, 1995 and 1996; Wynne et al. 1995; English Nature 1998a,b and 1999a,b; Scottish Biodiversity Group 1997; UK Local Issues Advisory Group, 1997a-e; London Wildlife Trust 1998). These Action Plans set objectives and targets for the habitats/species concerned for a 20-year time scale. These targets, especially those in Local Biodiversity Action Plans (e.g. Kent Biodiversity Action Plan Steering Group 1997; Nottinghamshire Biodiversity Action Group 1998; Hampshire County Council 1998) could and should be used in EIA determination of impact significance.
2. Current UK ecological assessment practice focuses principally on designated sites and protected species and hence fails to adequately consider:
 - all of the levels of biodiversity (bioregional, landscape, ecosystem, habitat, communities, species, populations, individuals and genes) e.g. it focuses on site scale rather than the scales of each of the relevant biodiversity units;
 - the structural relationships (e.g. connectivity, spatial linkage, fragmentation, etc) and functional relationships (e.g. disturbance processes, nutrient cycling rates, energy flow rates, hydrologic processes, etc) that are considered to be vital for thorough measurement of biodiversity (Noss 1990);
 - non-designated sites and non-protected species.
4. Despite the existing guidance on treatment of ecological impacts in road EIAs, which has undoubtedly led to some improvements, there are still some aspects where current practice is poor (Trewick et al. 1993; Byron et al. 1999). In particular, lack of consideration of the full range of impacts (especially indirect and cumulative impacts), poor baseline surveys/data, poor interpretation of survey results, lack

of explanation of the criteria used to determine impact magnitude and significance, lack of consideration of possible mitigation measures, and lack of post-project monitoring.

To give an indication of the current status of UK road EIA practice, the findings of 2 recent studies in relation to mitigation and monitoring are summarised. The first study was a review of 37 road EISs published in 1993 by Treweek et al. (the 1993 Review) and the second the 1999 review of 40 road EISs (dated mid-1993 onwards) by Byron et al. mentioned above (the 1999 Review). The EISs reviewed in the 1993 Review pre-dated publication of the UK Government's good practice guidance (DoT 1993), which was available when the statements considered by the 1999 Review were being prepared.

The need for mitigation measures was acknowledged in all of the EISs in the 1999 Review, compared to 73% in the 1993 Review. All of the EISs in the 1999 Review included descriptions of the mitigation measures which would be put in place, compared to 49% in the 1993 Review. The most common mitigation measures proposed in the 1999 Review were tree planting (75%), landscaping (65%) and installation of drains/interceptors (65%). Habitat creation was mentioned in 52.5% of EISs, installation of tunnels and fences in 42.5%, and construction fencing/construction general good practice in 45% (see Figure 1). However, only 27.5% of the EISs in the 1999 Review gave detailed prescriptions for intended mitigation measures. Although this is an improvement since the 1993 Review when only 8% provided detailed prescriptions, it still means that the majority of proposed ecological mitigation measures are recommended without any indication of their feasibility or reliability.

Post-implementation monitoring is not required by UK EIA legislation, but inclusion of monitoring programmes enables the success of mitigative measures to be judged and post-development problems to be identified and rectified. Two EISs (5%) in the 1999 Review included a commitment to monitoring some aspect of the scheme (none of the EISs in the 1993 Review included such a commitment) and monitoring as a possibility for the future was discussed in a further 4 EISs (10%).

Research context

In the last decade a number of extremely controversial UK road projects (including Twyford Down and the Newbury Bypass) highlighted wildlife issues associated with road building. These projects caused many organisations and individuals to have very serious concerns about how wildlife issues are considered in the UK road planning process (e.g. RSPB 1994 and 1995). Such concerns prompted a group of UK organisations (principally the Royal Society for the Protection of Birds (RSPB), the World Wide Fund for Nature (WWF-UK), English Nature (the English statutory nature conservation agency), and the Wildlife Trusts (a network of regional voluntary nature conservation organisations)) to form the Transport and Biodiversity Group (TBG) to lobby and initiate research in this area. The work discussed in this paper is being carried out as part of PhD research jointly funded by the TBG and the UK Economic and Social Research Council (ESRC).

Research goals

The lack of guidance on biodiversity impacts in road EIAs is likely to be partly responsible for the failure to address these issues adequately. As noted above, introduction of guidance on assessment of the ecological impacts of roads (e.g. DoT 1993) does appear to have led to some improvement in the quality of road EIAs. Hence, the provision of appropriate guidance might facilitate improved consideration of biodiversity impacts.

In this context, the key goals of this research are to provide:

- guidance on a systematic and rigorous approach for assessing biodiversity in road EIAs
- further guidance on certain weak areas of road ecological impact assessment current practice.

Stages in Guidance Development Process

The guidance is being developed using a four stage process:

1. Development of draft guidance based on a review of relevant literature, the 1999 Review of road EISs (Byron et al. 1999), and consultations with a range of experts.
2. Revision of the draft guidance based on the results of a second series of consultations.
3. Evaluation of the revised draft guidance by application to a series of case studies.
4. Refinement of the revised draft guidance based on the results of the case studies to produce finalised guidance.

Each of these stages is discussed in more detail below.

Draft Guidance

A 51 page guidance booklet was developed based on information from 3 key sources: literature reviews, EIS reviews, and consultations. Relevant literature included: information on the concept, conservation and measurement of biodiversity, information about the impacts of roads on ecology/biodiversity, existing guidance on biodiversity in EIA, and guidance on ecological impact assessment. The EIS reviews provided a range of examples of aspects of current practice e.g. examples of criteria used to determine impact significance. Consultations were carried out with a range of experts in the field of road EIAs. As the EIA process involves the interface of a wide range of types of organisations, each having a differing role in the process (e.g. consultants are involved in the preparation of EIAs, governments in considering EISs as part of the information based on which development decisions are made, etc) it was considered particularly important to obtain that the views of a wide range of people. Over 30 experts with a range of perspectives were consulted (government, statutory nature conservation bodies, environmental consultants, non-governmental-organisations, and academics). These experts were asked for their views on a suggested key objective and guiding principles for biodiversity in road EIAs and on what measurements and indicators of biodiversity they thought were most relevant for EIA.

The initial research plan had been to produce a short guidance document setting out a key objective and guiding principles and proposed measurements and indicators. However, common issues raised during the consultation were the need for such guidance to be placed in context and for a systematic approach considering each of the EIA steps to be proposed. In response to these suggestions the draft guidance produced (which is described below) was of a more comprehensive nature than originally envisaged.

The draft guidance was in three parts. Part I provided the context for biodiversity in road EIAs. This discussed the concept of biodiversity, how biodiversity differs from the traditional concepts of ecology and nature conservation, the UK biodiversity process, why biodiversity must be considered in EIAs, and current treatment of biodiversity in road EIAs.

Part II provided a systematic approach for considering biodiversity in road EIAs. This explained a key objective and a set of guiding principles. It also gave detailed advice on how to deal with biodiversity at each stage of the EIA process, including the assessment of biodiversity baseline conditions, criteria for assessing the magnitude and significance of biodiversity impacts, presentation of biodiversity information in EISs, and post-project biodiversity monitoring.

Part III of the report concluded the guidance by providing a biodiversity checklist to be used as a final review to ensure that a road EIA has considered all relevant biodiversity issues thoroughly.

Revised Draft Guidance

The draft guidance booklet was circulated to a wide range of people for a second round of consultation. A three page comments sheet was circulated with the guidance to make it easier for people to respond. The comments sheet asked for comments about each of the sections of the guidance (Summary, Part I B Background, Part II B The Guidance (comprising: Introduction, Systematic Approach to Biodiversity in Road EIAs, Key Objective and Guiding Principles, Screening and Biodiversity, Scoping Biodiversity issues, Baseline Conditions, Impact Prediction and Assessment, Mitigation and Enhancement, Presentation of Biodiversity Information in EISs, Post-project Monitoring Programmes), Part III B Conclusions, and Appendices). It also asked for opinions on the guidance overall (whether the respondents thought that there was a need for this type of guidance, whether the draft guidance was user-friendly, and whether it would be used). Twenty people responded providing very detailed comments on the guidance. As with the first consultation round, the consultees represented a range of different perspectives (consultants, government, statutory consultees, non-governmental-organisations, and academics).

The consultees were universally of the opinion that there was a definite need for this type of guidance. The general consensus was that the draft guidance was relatively user-friendly and that, with some amendments, it was likely to be used. On the whole, the comments suggested relatively minor alterations to the guidance rather than substantive changes. Two emerging themes from the comments were the style of the guidance and the need for prioritisation. In relation to style, some of the consultees felt that the guidance would have more impact if it was presented in a less academic style. The guidance contains various checklists (e.g. biodiversity screening criteria, impacts to consider, biodiversity information required mitigation measures to consider). These were generally felt to be extremely useful, but several consultees thought that they could be improved by more prioritisation of the individual issues within each of the checklists.

The draft guidance was revised to take in the vast majority of the consultees' comments. Some of the key elements of the revised guidance are described below.

The guidance proposes a **Systematic Approach** to the treatment of biodiversity in road EIAs. The biodiversity issues that should be considered at each stage in the EIA process following this systematic approach are shown in Figure 2. A key element of this approach is that examination of biodiversity issues in road EIAs should take place in the context of the biodiversity Key objective and Guiding Principles. Adoption of this systematic approach will ensure that biodiversity considerations are thoroughly treated at each stage of a road EIA.

Most road projects will inevitably lead to some loss of biodiversity but this can be minimised by full use of impact avoidance, mitigation and compensation measures. Furthermore, road projects potentially offer opportunities to enhance biodiversity and contribute to the achievement of Biodiversity Action Plan targets. Road EIAs should adopt the positive approach to biodiversity outlined in the **Key Objective** which is:

ATo ensure that road schemes:

1. Do not significantly reduce biodiversity at any of its levels; and
2. Enhance biodiversity wherever possible.

The **Guiding Principles** that should guide the consideration of biodiversity in road EIAs are set out in Figure 3. These principles can act as Assessment end points for road EIAs. I.e. the final EIS can be compared to these principles to evaluate whether or not the EIA process has fully considered biodiversity issues and resulted in a scheme that will not significantly reduce biodiversity and which will incorporate biodiversity enhancements wherever possible.

To ensure that the Guiding Principles have been implemented, it is important to review the EIA and the guidance concludes with a **Checklist** of key questions to enable this (Figure 4). Ideally the answer to each of the key questions should be Ayes and where this is not the case the issue should be reconsidered.

Case Studies

For EIA guidance to be used it is essential that it is user-friendly and practical. Hence, to test the practicality of the revised draft guidance it is currently being evaluated by consideration of a series of case studies. The specific aims of the case studies are to consider:

1. How, and to what extent, biodiversity issues were incorporated in several recent road EIAs; and
2. How the revised draft guidance could be used in a real situations, i.e. whether it is useful, feasible and practical, how its use might change current EIA practice, and how it might be improved.

The case studies build on the EIS review work, allowing more detailed examination of how biodiversity issues were considered in several real projects and how the use of the systematic approach set out in the revised guidance would have altered the treatment of these issues. They involve not only looking at the relevant EISs, but also consideration of other documentation e.g. background studies, Public Inquiry information, and interviews with key people e.g. consultants, regulators, planners, non-governmental organisations, etc.

Five case studies are being studied:

- ? a 12.9 km road bridge spanning the marine waters of the Northumberland Strait between the provinces of New Brunswick and Prince Edward Island in eastern Canada (the Confederation Bridge), which opened in 1997;
- ? a 40 km online improvement (dualling) of a major road in Wales (A465 Abergavenny to Hirwaun Dualling B AHeads of the Valleys Road), which is currently in the design phase having been given approval to proceed following a Public Inquiry;
- ? a 6.2km single carriageway off-line improvement of a major road in Sussex, England (A259 Eastern Hastings Bypass), which is currently on hold pending the outcome of a Hastings area study which is considering this road in conjunction with 2 other road proposals;
- ? a 5.3km off-line improvement of a major road in Kent, England involving construction of a 4 lane road and a bridge (A249 Iwade Bypass to Queenborough Improvement), which is currently under construction; and
- ? an improvement of a secondary road in Nottinghamshire, England (A617 Rainworth Bypass), which has been completed.

Each of these projects raises biodiversity issues. This range of case studies has been selected so that the guidance can be evaluated in relation to a wide variety of different types of road projects e.g. dualling and single carriageway roads, on-line and off-line improvement projects, and projects of differing scales in different locations.

Finalised Guidance

Following completion of the case studies the revised guidance will be amended to incorporate issues which have emerged from the case studies in order to produce final form guidance. The intention is that this will be published by the TBG to make it available for use by key participants in the EIA road process; government, statutory nature conservation bodies, local government, voluntary nature conservation bodies, road project developers and proponents, and consultants and ecologists involved in the preparation of road EISs. The UK Government are currently considering tenders to update

official guidance on preparation of road EIAs (DoT, 1993) and, more strategically, working on the preparation of a multi-modal environmental appraisal framework for transport planning. Hence, the publication of the finalised guidance will also be timely in that it should be able to feed in to both these government projects.

Conclusions

The finalised guidance should aid implementation of Article 14 of the CBD. It builds on existing EIA biodiversity guidance (US CEQ 1993; CEAA 1996; The World Bank 1997 (currently being updated)). However, it is less general in nature than these publications in that it is focussed on a particular project type. It is also more detailed in content than the existing guidance which has tended to focus principally on general issues. Use of the guidance should help ensure that the potential impacts on biodiversity are thoroughly and explicitly addressed in road EIAs and that these EIAs interface more closely with the UK biodiversity process and the available research literature. As with any guidance, undoubtedly this guidance will evolve through use, but it aims to provide a starting point for systematic assessments of biodiversity in road EIAs.

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