Application of Environmental Quality Objectives in Regional Scale Infrastructure Projects: a Swedish Example

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Abstract

It is rarely possible to develop transport infrastructure without significant ecological impacts. A road or a railway will provide new habitat for some species, however, the overall environmental impacts, not at least on biodiversity, tend to be problematic. In order to improve the integration of transport infrastructure in its environmental and cultural settings, different strategies, methods and tools have been developed. EIA and SEA are examples of such methods. In Sweden 16 national environmental quality objectives have been formulated with the intention to guide societal development onto a sustainable path, i.e. to be used in infrastructure planning. The study reviews the experiences of the implementation and utilization of these environmental objectives in infrastructure project planning, including their influence on EIA and SEA procedures. Interviews were held with infrastructure planners, EIA and SEA consultants, representatives of permitting authorities etc.; followed by workshops and seminars. The results show that the objectives are overriding, but difficult to transfer and integrate into the different levels of project planning. Environmental concern seems currently to be driven by other factors. In order to use the official environmental quality objectives as guidance for road and railway planning, consensus on definitions, interpretations and intrinsic relations between different objectives, including the underlying environmental aspects (e.g. between biodiversity and other environmental aspects and objectives such as ‘landscape’), are urged for.

Introduction

The construction and operation of linear infrastructure such as roads and railways induce a wide range of changes in the surrounding environment. The overall impact is strongly problematic (Spellerberg 1998; Forman et al. 2003; Trombulak and Frissell 2000), in the aspect that natural habitat is reduced and lost simply by construction, the quality of the remaining habitat is altered by utilization and maintenance of the infrastructure, and overall biodiversity is reduced.

Worldwide, habitat loss is one of the main impacts caused by road and railway construction. The loss of habitat encompasses both the actual area of natural habitat converted, and the area of natural
habitat affected by secondary effects of road usage, like noise, changes in water runoff, physical barrier, increased mortality etc. (Forman et al., 2003). The research on EISs, and the EISs reviewed prior to this study, indicates that ecosystem functioning and ecosystem response to disturbance induced by linear infrastructure are extremely difficult to describe, assess and integrate into e.g. cost benefit analysis and other appraisal tools. In Sweden, handbooks and guidelines developed by the Swedish Transport Administration express awareness of both secondary effects and high levels of uncertainty in impact assessment. The suggested approach the Swedish Transport Administration is mainly objective led, hence in tune with both the national environmental objectives for biodiversity as well as targets for international frameworks for nature conservation like the Convention on Biological Diversity. Surprisingly enough, contemporary research describes the current quality and extent of EISs on infrastructural projects to barely acknowledge even direct impacts of roads or railways (Byron et al. 2000; Antonson, in press; Cooper and Sheate 2002; Geneletti 2003; Gontier et al., 2006). Consequently, the situation appears as illustrated in Figure 1: the complete environmental impact scenario is described and acknowledged in legislative and procedural documents, but the impacts described in the EIS, at least in the above mentioned studies, appear not to extend beyond the absolute spatial nor temporal vicinity of the project. The divergence between the existing and the intended procedures suggests problems/inadequacies in either the process of communicating the relevant directives to EIA professionals, in the process of integrating them into legislative guidelines, or in monitoring compliance.

In this study, professionals involved in EIA of infrastructural projects participated in interviews and inquiries into their experiences of implementing the national biodiversity objective, called “A rich diversity plan and animal life”, in impact assessment. Complemented by reviewing contemporary research on EIA of infrastructural projects, this study aims to detect where in the process of producing an EIS the practice deviates from the intended procedure, gaps in knowledge and methodology, and/or which parts, if any, of the EIA guidelines that are not recognized and understood.

The estimated size of linear infrastructure project, e.g. a road or railway, causes the loss of an area of natural habitat equivalent to the project land-take.

However, the complete area impacted by the construction extends far beyond the impacts of direct habitat loss, due to a number of secondary effects (Forman et al, 2003, among others).

Environmental legislation already accounts for the existence of secondary affects and should provide the guidelines necessary to prevent other environmental deterioration than the actual land conversion necessary for construction. How well does it serve its purpose?

Current state of the art research proposes that the magnitude of the environmental impact is seldom accounted for in EIS. The result of this study reinforces such statements.
Method

Altogether 11 interviews were conducted with a method developed at the Royal Institute of Technology called Stakeholder Opinion Assessment. In SAO, questions are divided into two main categories: 1) questions about interviewee and 2) questions about the interviewee’s opinions. The enquiries were composed of 15 both structured and semi-structured questions, and were held with stakeholders involved in different phases of regional planning processes. The results were then analyzed using content analysis (Kvale and Brinkman 2009), where answers, particular words or sentences, were grouped by similarity into different units, thus reducing diversity of answers. The frequency of conspicuous words or sentences could then be calculated and the simplified results provided a more general description of the issue.

Results

The results show that in general, the environmental quality objective “A rich diversity of plant and animal life” is normally considered or even focal in planning, except for projects with very narrow objectives or in environments with low natural values (e.g. highly contaminated or densely urbanized areas). Particular words or phrases like “the issue was brought up early”, “of focal interest” and “thoroughly investigated” were associated with questions of “when” and “how” the objective was launched in planning. The importance of landscape connectivity and green corridors for plant and animal dispersal were referred to continuously throughout the interviews, suggesting insight and knowledge about issues central to the objective. Depending on type of project, “compensational measures” and “wildlife passages” exemplifies objective acknowledgement and impact mitigation efforts.

The following bullets summarize how the objective currently is implemented, according to the study:

- “Green issues” are normally central issues in planning
- Compensatory actions are common
- The objective entered the project when discussing the scope of the environmental impact assessment
- If a municipality is pushing the objective, then measures will be taken to meet such requirements
- The county administrative boards are normally pushing implementation of the objective
- The objective is not relevant for some projects
Simultaneously, the objective appears to be difficult to apply in practice. How to integrate biodiversity guidelines into planning, and who is responsible for enforcement is not obvious. Comments like “It disappeared in the end...” “That’s a stop sign, hard to get better when it comes to exploitation” and “no idea” warrant standardized methods for assessment and implementation of the objective.

Discussion

A review of contemporary research prior to these studies, concluded that at least the main trend seem to be that most EIS failed to cover even the most fundamental impacts of linear infrastructure (Figure 1). The current research suggests that professionals working with EIA experience difficulties with implementing a landscape (large-scale, regional-scale) approach to environmental impacts assessments. In the handbooks and guidelines of the Swedish Transport Administration, the target appear to have reached all the way down to an operational level, with highly detailed recommendations and explanations of preventive, as well as mitigation, measures in the construction and design of linear infrastructure. Also, the results of the study indicate a general awareness of the importance to enforce and implement the national biodiversity target, and the objective is normally brought up early the EIA process. However, after acknowledging the task of integrating the biodiversity objective, a general problem seems to be how to actually do it. The interviewed professionals could not always explain the role of the objective or how it shaped the EIS. There might be several explanations for this confusion, but lack of knowledge of ecosystem dynamics among the professionals responsible for conducting the EIA, and lack of standardized methods for assessment of biological values are probably two of them.

To gather the knowledge necessary to make reliable predictions for each construction site on how an ecosystem would respond to the sudden existence of road or railway on each construction site, would be extremely time consuming and expensive, and would seriously postpone any project. An interesting approach to assessment is currently developed in Sweden by the Swedish Traffic Administration Agency, were a landscape is divided after natural borders between different biomes/ecosystems. Complemented with knowledge of each ecosystem types, such landscape characters could provide an accessible baseline reference for environmental assessment of projects in different settings.

How to integrate the assessment of ecological values into a unit compatible with current appraisal tools is another challenge. Geneletti describes in a paper from 2003 how to convert ecosystem attributes into numerical values, thus facilitating comparison between alternatives and overall cost benefit analysis. GIS-based tools generally provide good descriptive, and to some extent analytical material for assessment. But after an environmental impact is assessed and described, the magnitude of the impact must also be quantified in a unit that allows for comparison between the cost of the impact and the expected social economic benefits of the project. Even though such methods are developed and revised in the scientific arena, they are generally not transferred to the professionals working with EIA.
Conclusions
There appears to be a general problem in EIA of infrastructural projects. Contemporary research states that many EIS surveyed from different European countries could not account for a relevant impact scenario of the suggested construction, and the interview correspondence in this study indicates some level of confusion or misunderstanding of how to assess ecological values. One obvious reason for this is a general scarcity of site-specific ecological knowledge, and another is the lack of standardized procedures on how to assess ecological values, and how to integrate them into currently applied appraisal tools.

References


