

Facilitating the Incorporation of Biological Diversity in Impact Assessments

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Abstract

Sweden has ratified the Convention on Biological Diversity (CBD) and is therefore obliged to abide by the objectives of the convention. According to national reports Sweden does not fulfil the intentions of article 14 *Impact Assessment and Minimizing Adverse Impacts* in CBD. To improve this, the Swedish Government has given focal responsibility to the Swedish EIA Centre. The Centre has translated the document *Biodiversity in EIA & SEA Background Document to CBD Decision VIII/28* into Swedish, with main purposes (1) to increase focus on the obligations the CBD implies; (2) to facilitate the incorporation of biodiversity in impact assessments; (3) to create a framework of concepts in Swedish. On the basis of this document two workshops were held with invited representatives from several Swedish agencies. The workshops resulted in various suggestions on how to improve the impact assessment processes with respect to biodiversity in projects as well as in municipality planning. One interesting suggestion was to combine the levels of biodiversity, i.e. landscape, ecosystem, species and genotypes, with composition, structure and key processes in a matrix. If applied in the EIA process it would improve the incorporation of biodiversity values in impact assessments considerably.

Summary statement of main points

A matrix of the levels of biodiversity in combination with composition, structure and key processes applied in the EIA process could improve the incorporation of biodiversity values in impact assessments.

Key words

Biodiversity; EIA; Convention on Biodiversity; Matrix

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Introduction

Sweden has ratified the Convention on Biological Diversity (CBD) and is therefore obliged to abide by the objectives of the convention. Distinct from many other countries, there are no circumstances in Sweden that make it difficult to fulfil any part of CBD (Swedish Environmental Protection Agency, 2006). Nonetheless, according to national reports Sweden does not fulfil the intentions of articles 8 (especially 8 h), 10, 11, 14 and 15¹ in CBD (ibid). The main hindrances to carry out these articles are related to organisation, lack of knowledge and conflicts of interests. To improve this situation, the Swedish Government has given focal responsibility to various institutes or agencies depending on the current article in CBD. The Swedish EIA Centre has received the focal responsibility for article 14, *Impact Assessment and Minimizing Adverse Impacts*. In order to deal with this task the Centre has among other things translated the document *Biodiversity in EIA & SEA Background Document to CBD Decision VIII/28: Voluntary Guidelines on Biodiversity-inclusive Impact Assessment* (Commission for Environmental Assessment, 2006) into Swedish (Swedish EIA Centre, 2007). The main purposes for the translation are (1) to improve focus on the obligations the CBD implies according to article 14; (2) to facilitate the incorporation of biological diversity (biodiversity) in impact assessments; (3) to create a framework of concepts in Swedish.

On the basis of the translated document two workshops were held with invited representatives from several Swedish agencies, viz. the Swedish Road Administration, the Swedish Rail Administration, the Swedish Environmental Protection Agency and the Swedish International Development Cooperation Agency, three county boards, and in addition, a number of consultants. Among the participants there was consensus of the need for guidance on how to deal with biodiversity in EIA and SEA. Guidance will not only improve the assessment process but also help for example the county boards to guide stakeholders in a more uniform way independently of where situated in Sweden. The workshops resulted in several suggestions on how to improve the impact assessment processes with respect to biodiversity in projects as well as in municipality planning. One interesting example was to combine the levels of biodiversity, i.e. landscape, ecosystem, species and genotypes, with composition, structure and key processes in a matrix.

Biological Diversity

The Convention on Biological Diversity (CBD) defines biodiversity as follows:

“Biological diversity (or biodiversity) means the variability among living organisms from all sources, including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this

¹ Article 8: In-situ Conservation, 8 h: Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species; Article 10: Sustainable Use of Components of Biological Diversity; Article 11: Incentive Measures; Article 14: Impact Assessment and Minimizing Adverse Impacts; Article 15: Access to Genetic Resources.

includes diversity within species, between species and of ecosystems” (UNEP, 1992).

We can see that CBD defines three levels of biological diversity, viz. genetic, species and ecological diversity. Countries that have ratified the CBD are required to implement policies to protect biodiversity at these three levels (Commission for Environmental Assessment, 2006, page 19):

- *“Ecosystems containing rich biodiversity, large numbers of threatened or endemic species, with social, economic, cultural or scientific significance, or relevant for key processes such evolutionary processes, and ecosystems of relevance to migrating species.*
- *Species and communities of species that are threatened in their existence, related to domesticated or cultivated species, and species with medicinal, agricultural, or other economic, social, cultural or scientific significance, and indicator species.*
- *Genotypes with social, scientific or economic significance.”*

The composition, structure, and processes linking organisms and their non-biological environment in the ecosystem have been identified as important aspects of biodiversity (Noss, 1990). The term *composition* comprises of, for example, the ecosystem's formation of organisms, and the amount of e.g. old trees and different non-organic elements; whereas the term *structure* refers to the physical organisation or the pattern of a system, i.e. from the complexes of habitats to the physical distribution of patches on a landscape level. Examples of ecological *processes* are vegetation changes, water exploitations, species reproduction and mortality (Table 1). Biodiversity is not static. Changes take place continuously through the origin of new genetic variation and the reduction of species through, for example, loss of habitat (Heywood, 1995). The concept refers to the quality or degree of differences between biological units. Thus, biodiversity is a distinguishing feature, or a condition, in nature rather than a resource (ibid). Humans as an organism are also as other organisms incorporated in the definition of biodiversity, for example, the tremendous world-wide migration of people to urban areas is an example of a process.

Environmental Impact Assessment

Environmental impact assessment (EIA) is spread all over the world and is practiced in more than 120 countries. Sweden has an extensive use of EIA for activities and measures as well as for certain plans and programmes. According to Swedish law, the purpose of an EIA for an activity or a measure is to identify and describe the direct or indirect effects of what a planned activity or measure can bring, partly on people, animals, vegetation, ground, water, air, climate, landscape and cultural environment, partly on economizing with land, water and the physical environment in other respects, and partly on economizing material, whole foods and energy. Furthermore, the purpose is to facilitate a compounded estimate of the effects on people's health and environment (The Environmental Code, 1998).

Sweden is since 1995 a member of the European Union and is obligated to follow the directives of the Union. The directive 2001/42/EC of the European Parliament and the Council of June 27 2001 on the assessment of the effects of certain plans and programmes on the environment states that:

“Environmental assessment is an important tool for integrating environmental considerations into the preparation and adoption of certain plans and programmes which are likely to have significant effects on the environment in the Member States, because it ensures that such effects of implementing plans and programmes are taken into account during their preparation and before their adoption”. (European Commission, 2001).

Table 1. The compositions, patterns, and processes of ecosystem attributes at four levels of organisation, with reference to the urban ecosystem in form of green spaces (see also Larsson et al., 2001)

Level of organisation	Compositions	Patterns	Processes
Landscape diversity	Community types and significant characteristics (e.g. species diversity); hydrological features; abiotic factors (e.g. soils, climate); land use types (e.g. amount of hardened and non-hardened/green space surface)	Variety of communities; connectivity and fragmentation; sizes, shapes, and distributions of green space; framework of barriers (e.g. built-up areas, motorways)	Disturbances (e.g. converse of green spaces to built-up areas by humans) and their characteristics (e.g. frequency, size); long-term changes in vegetation and hydrologic features (e.g. water exploration); nutrient flows
Ecosystem diversity	Native or alien species; key habitat resources (e.g. green spaces, surface and groundwater, big and old trees, dead wood, inorganic compounds)	Vegetation structure (e.g. vegetation layers, density canopy closure) distribution of species and habitat resources; connectivity between green spaces	Smaller-scale disturbance and their characteristics; albedo (e.g. amount of built-up surface); pollution of air and soil; vegetation changes; human uses and impacts
Species diversity	Absolute or relative size of populations	Number and distribution of populations; distance between populations; migration patterns; population structures; social (e.g. relation to presence of human)	Reproduction, mortality (also traffic related), and regeneration; movement abilities and characteristics; migration in populations; local pollution/lethal outlets; human disturbances
Genetic diversity	Variety of gene forms	Diversity within individual populations; variations among populations	Rate of genetic change (due to e.g. pollution)

Although legislation and practice vary in different member states, the fundamental components of an EIA should involve, among others, screening and scoping stages. As a consequence, national activities, measures as well as certain plans and programmes, must involve a screening stage to determine which of the projects or developments should be subject to an EIA and which could be considered not to have harmful environmental impacts. In the screening process it is common to apply criteria and these criteria should include biodiversity measures. Otherwise there is a risk that proposals

with potential significant impacts on biodiversity will be missed. It is very common that Swedish screening processes lack criteria for biodiversity and accordingly this concept is missing in the process.

One way to deal with this is to apply a matrix in the screening stage where the levels of biodiversity, i.e. landscape, ecosystem, species and genotypes are combined with composition, structure and key processes in accordance with Table 1. For example, in a procurement of EIA-consultants a demand from the principal could be made to apply the matrix in the EIA-process. The matrix could serve as a check list for both parties, viz. the principal and the contractor. The principal will know if composition, structure and processes are taken into consideration on all levels of organisation of biodiversity while the contractor can use the matrix to make sure that all of these attributes of biodiversity are taken into consideration. This would improve the incorporation of biodiversity values in impact assessments considerably. The matrix could also continuously be used in an EIA-process, for example in the scoping stage.

Selection of ecosystems in an EIA depends on the area extension of the project. For example, a project for a railway will influence large areas, i.e. landscapes, which means that several ecosystems will be affected, while a smaller project like house building maybe affect only one or a few ecosystems. Accordingly, the spatial scale is very important. The selection of species in the EIA-process should take into consideration both animals and plants, and preferably species with restricted distribution range, or endemic or rare species. The biodiversity impact assessment at the genetic level is not justified under all circumstances. In fact, to conduct genetic studies for determining the impact of a project at the genetic level is very difficult and is usually not realistic within the time frame of an EIA (Rajvanshi et al., 2007).

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