

Strategic Environmental Assessment and Biodiversity: Guidance

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Strategic Environmental Assessment and Biodiversity Summary

Strategic Environmental Assessment (SEA) has been identified as an important tool for helping to ensure that development is planned and implemented with biodiversity 'in mind' by the Convention on Biological Diversity, the Ramsar Convention and the Convention for Migratory Species.

This guidance aims to ensure that biodiversity considerations are appropriately addressed in SEA, so that the conservation and sustainable use of biodiversity is pursued as a fundamental objective of strategic decision-making.

It is hoped that it will assist in the preparation of plans and programmes in a wide range of sectors, the practice of SEA and the preparation of SEA reports. It should also assist individuals and organizations to commission and review biodiversity inputs to the SEA process.

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1. The purpose and content of this guidance

Chapter aim:

To explain the purpose, structure and intended application of this guidance

Strategic environmental assessment (SEA) involves predicting, evaluating and mitigating the environmental impacts of development policies, plans and programmes. SEA has been identified in international agreements, (notably the Convention on Biological Diversity, the Ramsar Convention and the Convention on Migratory Species) as an important tool for ensuring that development is planned and implemented with biodiversity ‘in mind’.

This guidance aims to ensure that biodiversity considerations are appropriately addressed in SEA, so that the conservation and sustainable use of biodiversity is pursued as a fundamental objective of strategic decision-making.

The principles set out in this guidance should be applicable in any country where SEA is practiced. However additional, country-specific guidance may be required to complement it and to ensure that specific biodiversity needs and issues are appropriately addressed.

The guidance is set out as follows:

Chapter 1 (this chapter) explains the purpose and structure of the guidance.

Chapter 2 explains what SEA is, defines biodiversity and discusses what SEA can do for biodiversity.

Chapter 3 explains step by step how biodiversity implications can be considered in SEA.

Chapter 4 is a bibliography (including websites) and glossary

1.1 ***How to use this guidance***

The colours below are used to highlight sections of particular relevance to the different parties involved in the SEA process. These include:

Responsible authorities: the authorities responsible for preparing the plan, carrying out the SEA (either internally or through consultants), and integrating the results into their plan-making processes. These may be government departments or other agencies. Responsible authorities may employ their own biodiversity specialists, or external Consultants to write some or all of the SEA report, or carry out specialist studies on biodiversity.

Regulatory authorities may have to comment on the content of SEA and decide whether biodiversity concerns have been adequately addressed.

eg scoping the SEA – advising on what biodiversity issues the SEA should cover, how, and in what depth.

They may also be involved in proposing alternatives to the plan, assessing the impacts of the alternatives, and proposing ways to minimise negative impacts on biodiversity.

Important biodiversity information may be obtained from other interested parties and organisations including museums and herbaria, environmental NGOs, universities, and local specialists.

The public can be involved at most stages of the SEA process. At a minimum they should be able to comment on the draft plan and SEA report; and have their comments taken into account in decision-making.

Other stakeholders – eg non-government organisations – are sometimes consulted instead of (or in addition to) the wider public at early stages in SEA.

Other countries that might be affected by the plan should also be consulted on the draft plan and environmental report.

2. Introduction

<p>Chapter aim:</p> <p><i>To explain what SEA is and why biodiversity should be included in it</i></p>	<p>Chapter structure:</p> <ul style="list-style-type: none"> • <i>What is SEA?</i> • <i>The SEA process</i> • <i>What is biodiversity?</i> • <i>Why biodiversity should be included in SEA</i> •
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2.1 What is SEA?

The ultimate aim of SEA is to help protect the environment and promote sustainable development by integrating of environmental considerations into strategic decision-making:

"SEA is a systematic process for evaluating the environmental consequences of proposed policy, plan or programme initiatives in order to ensure they are fully included and appropriately addressed at the earliest appropriate stage of decision making on a par with economic and social considerations" (Sadler and Verheem, 1996).

SEA can apply to a wide range of actions and development sectors. A distinction is often made between policies, plans and programmes:

"a policy may... be considered as the inspiration and guidance for action, a plan as a set of co-ordinated and timed objectives for the implementation of the policy, and a programme as a set of projects in a particular area" (Wood and Djeddour, 1992).

This guidance uses 'plan' as a generic term to refer to policies, plans and programmes.

2.2 The SEA Process

The basic SEA process is similar to that of environmental impact assessment (EIA) for projects, but SEA is generally more broad-brush, less detailed and quantitative, and more focused on broad directions of change (see Figure 1). This is largely due to the need for SEA to keep pace with the decision-making process, which may need to consider many ideas and options in a short period of time. However if inadequate time is allowed for effective SEA, important biodiversity considerations may be screened out too early due to lack of time to obtain adequate information or understanding.

Figure 1 Characteristics of SEA

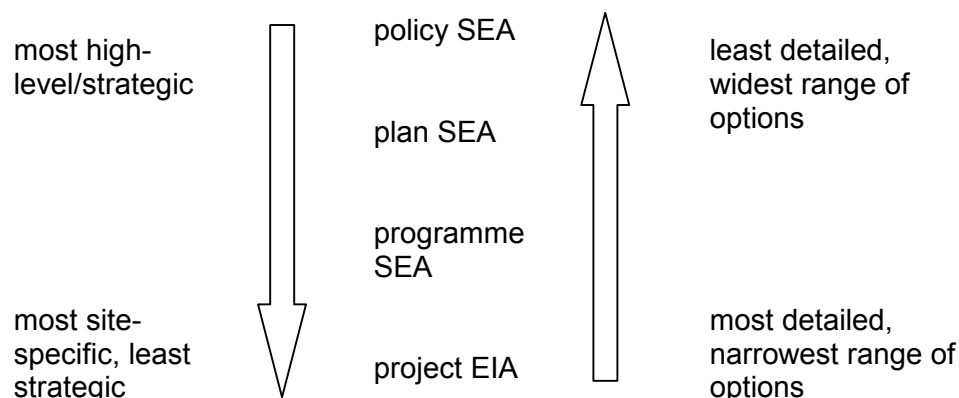


Table 1 summarises the kinds of requirements, procedures and outputs that might be required by SEA legislation (based on the EU SEA Directive).

Table 1 SEA Requirements (based on EU SEA Directive)

<p>An environmental report in which the likely significant effects on the environment of implementing the plan, and reasonable alternatives taking into account the objectives and geographical scope of the plan, are identified, described and evaluated.</p> <p>The report should include:</p> <ol style="list-style-type: none"> An outline of the purpose, contents and main objectives of the plan, and relationship with other relevant plans and programmes; The relevant aspects of the current state of the environment and how these would be expected to develop without implementation of the plan; The environmental characteristics of areas likely to be significantly affected; Any existing environmental problems which are relevant to the plan including, in particular, those relating to any areas of a particular environmental importance, including protected areas; The environmental protection objectives, established at international or national level, which are relevant to the plan and the way those objectives and any environmental considerations have been taken into account during its preparation; The likely significant effects on the environment, (eg including impacts on issues such as biodiversity, human health, soil, water, air, climatic factors, material assets, cultural heritage). Effects or impacts should include secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative effects; The mitigation measures envisaged to prevent, reduce or offset any significant adverse effects of the plan on the environment; An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information; a description of measures envisaged for monitoring; a non-technical summary of the information provided under the above headings <p>The report must include the information that may reasonably be required taking into account current knowledge and methods of assessment, the contents and level of detail in the plan, its stage in the decision-making process and the extent to which certain matters are more appropriately assessed at different levels in that process to avoid duplication of the assessment</p>
<p>Consulting with:</p> <ul style="list-style-type: none"> authorities with environmental responsibilities, when deciding on the scope and level of detail of the information which must be included in the environmental report authorities with environmental responsibilities and the public, to give them an early and effective opportunity within appropriate time frames to express their opinion on the draft plan and the accompanying environmental report before the adoption of the plan other states or countries where the implementation of the plan is likely to have significant effects on the environment in these countries
<p>Decision-making Taking the SEAI report and the results of the consultations into account in decision-making</p>
<p>Providing information on the decision: When the plan is adopted, the public and any countries consulted must be informed and the following made available to them:</p> <ul style="list-style-type: none"> the plan as adopted a statement summarising how environmental considerations have been integrated into the plan and how the results of consultations have been taken into account, the reasons for choosing the plan as adopted, in the light of the other reasonable alternatives dealt with; and the measures decided concerning monitoring
<p>Monitoring the significant environmental effects of the plan's implementation</p>

SEA laws, requirements and procedures vary worldwide but follow the same general pattern. For any given policy¹, plan or programme that requires SEA, the "responsible authority" generally carries out the following general SEA process:

- identify the current baseline conditions and problems in the area, including relevant biodiversity objectives and other relevant policies, plans and programmes;
- identify and assess the likely impacts of the policy/plan/programme on the environment, including on biodiversity;
- consider relevant alternatives to the policy/plan/programme;
- reduce or avoid any significant negative impacts ("mitigation") and enhance positive benefits where possible;
- produce an environmental report;
- involve the public and other organisations;
- take the environmental information and public/organisation comments into account in decision-making;
- publish information about the decision;
- monitor the impacts of implementing the policy/plan/programme.

2.3 **What is biodiversity?**

Biodiversity is:

'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 includes diversity within species, between species and of ecosystems.' (Convention on Biological Diversity (1992), Art. 2)

In other words, it is the variety of life on earth at all levels, from genes to worldwide populations of the same species; from communities of species sharing the same small area of habitat to worldwide ecosystems. It encompasses the different forms of life that are represented within a defined study area and also their relative abundance.

Box 1 explains some of the different components and levels of biodiversity.

At each of these levels, it is necessary to evaluate biodiversity components in terms of:

- composition: what there is and how abundant it is
- structure: how biological units are organised in time and space
- function: the role different biological units play in maintaining natural processes and dynamics.

¹ Policies are not always included in SEA legislation, but can have significant impacts on biodiversity and should be addressed through SEA as a matter of best practice.

Box 1. Levels and components of biodiversity

Biodiversity depends fundamentally on a variety of ecological functions and processes. Many of the processes that reduce biodiversity – eg loss or isolation of habitats - operate at the ecosystem and landscape level. The Convention on Biological Diversity advocates an 'ecosystem approach' to assessment of impacts on biodiversity. This helps to ensure that the ecosystem processes that drive or support biodiversity are understood and that ecosystem health and viability can be maintained for the benefit of biodiversity. For example maintenance of river water quality in riverine ecosystems.

Where developments cross ecosystem boundaries (e.g. between watersheds), or affect large areas of land or water, it may be necessary to consider impacts on biodiversity at the landscape scale. Landscapes include overlapping or inter-related habitats for many different species. Many species have large ranges, so movement and exchange of genes can take place over considerable distances. For instance migratory species may rely on critical habitat that they do not use for most of the year, and that is located far from their other seasonal habitats. Environmental changes can also operate at very big scales (e.g. climate change).

Habitat amount, quality and spatial organisation affect genetic and species diversity. Habitat diversity describes the number and variety of habitats available within the landscape: landscapes with a large number and range of habitats usually support higher levels of species diversity than landscapes with a more limited range of habitats, but this does not necessarily make them more important. The Mongolian steppes, for example, have low habitat diversity, but support some very rare, threatened and endangered species, including the snow leopard. Landscapes with low habitat diversity can therefore still have a critical role in conserving biodiversity.

Members of species (individuals) exist in populations and these may also be genetically distinct and locally adapted. Populations need to be of a certain size to remain stable, and must be distributed so they can interact with other populations to maintain genetic diversity. Loss of local populations can pose a global threat to a species.

There are estimated to be between about 10 and 100 million species on earth: it is impossible to derive a precise figure. Species diversity is the variety of species within a community, a habitat or an ecosystem: some habitats (e.g. fynbos) are inherently species-rich, whilst others (e.g. deserts) are relatively species-poor. *Which* species are present is important, not just how many there are: the species-richness of a habitat may be increased by invasion of alien plants or weeds, but these species will not add to the habitat's biodiversity value, because its characteristic assemblage of species will have been altered.

Species share a distinct and recognisable genome, but within species-genetic variation may be considerable. Genes are the basic building blocks of biodiversity. Genetic diversity is a measure of the variety of genes within a species or a population. Genetic diversity is important because it allows species to adapt to changing environmental circumstances: the poorer its genetic base, the more vulnerable a species is to extinction. For instance crop monocultures can be wiped out by one pest or pathogen, whereas genetically diverse crops may have some resistant individuals.

2.4 ***Why biodiversity should be included in SEA***

The conservation and sustainable use of biodiversity is crucial because biodiversity is:

- a vital, integral part of the planet's life support system;
- essential to maintain clean water, fertile soil and clean air, thereby providing essential ecological services that are the basis of existence;
- an important source of crops, medicines, building materials, fuel and tools;
- an important source of revenue e.g. through leisure and recreation or tourism;
- the basis for evolution and adaptation to a rapidly changing environment and therefore provision of a functioning environment for future generations;
- fundamental to spiritual wellbeing and quality of life;
- valued by people for its own sake;
- what people fall back on to survive when there is nothing else.

Biodiversity decline worldwide is affecting the supply of environmental goods – water, clean air, food and productive and fertile soil – that support people's livelihoods and quality of life. Biodiversity decline has a significant impact on the physical, spiritual and cultural wellbeing of the people who depend on it for their existence. Its decline is also beginning to affect critical global processes. For example loss of vegetative cover worldwide is a major contributory factor in escalating levels of carbon dioxide in the atmosphere and associated climate change.

The main threats to global biodiversity are associated with human activities causing habitat loss or damage. Worldwide, people use 40-50% of all primary production and an unprecedented number of species (more than 12,000) are now threatened with extinction as a direct result of human activity. Natural resources are being extracted faster than they are replenished, and ecosystems are being degraded. Many species-populations are being reduced and fragmented below viable sizes. Rates of extinction are more than ten times 'normal' or recorded historical rates.

Conserving biodiversity is a global, long-term challenge and requires global, long-term solutions. There are several international agreements and conventions that promote biodiversity conservation and its sustainable use, and these help shape biodiversity policy/legislation in countries that have signed them.

SEA is intended to *help achieve a high level of environmental protection* and is identified in key international agreements (notably the Convention on Biodiversity and the Ramsar Convention) as an important tool for promoting the conservation and sustainable use of biodiversity.

2.5 ***What SEA can do for biodiversity***

EIA has arguably been less effective for ecological and biodiversity considerations than for any other impact category (Treweek, 1999). One problem is the frequent mismatch between administrative/project boundaries and patterns of biodiversity. To understand the significance of impacts on biodiversity within a small development site, it may be necessary to understand its status within a whole catchment, ecosystem, or even country. Within the timeframes and geographic limits normally associated with EIA it is difficult to set up biodiversity studies that capture:

- Longer term trends
- Landscape- or ecosystem-scale impacts

- Cumulative effects
- Information about all relevant threats and pressures acting on biodiversity resources
- Information about the processes and functions that influence biodiversity
- The monitoring data needed to understand baseline trends or predict impacts

SEA is often seen as a way of overcoming these limitations. It also addresses wider or more fundamental considerations such as alternative solutions, strategic locational issues or cumulative impacts. It identifies threats and opportunities for biodiversity at an earlier stage in the decision-making process, and thus helps to avoid significant adverse impacts on biodiversity and identify opportunities to enhance biodiversity.

SEA is particularly suited to protecting and enhancing biodiversity because it can

- build biodiversity objectives into plan development;
- provide an opportunity for those with an interest in, and responsibility for, biodiversity to influence plan-development;
- identify biodiversity-friendly alternatives;
- focus on the longer term and larger scales;
- consider all the threats affecting biodiversity in an area, enabling identification and assessment of cumulative threats and impacts;
- suggest effective mitigation strategies to ensure no net loss of biodiversity throughout the development and implementation of plans, allowing sufficient 'lead-time' to ensure that effective mitigation can be put in place;
- establish monitoring to provide necessary biodiversity data and to enable remedial measures to be taken.

SEA can help to promote the conservation and sustainable use of biodiversity in various ways. Some of these are listed below.

2.5.1 Helping to implement biodiversity policy

Decisions made by governments, agencies and other public bodies should be shaped by any biodiversity policies that are in place. SEA can help to ensure that plans are consistent with policies and priority actions for biodiversity conservation, protection and sustainable use. In many countries these are set out in National Biodiversity Strategies and Action Plans (NBSAPs).

SEA must take account of all relevant biodiversity strategies and action plans, and review the extent to which a plan proposal is consistent with these.

2.5.2 Helping to ensure the requirements of protected areas, habitats and species are met

SEA is an important tool for ensuring that the requirements relating to protected areas and species are met (see Table 2). There are a number of stages in the SEA process where these requirements should be addressed, including screening (determining the need for SEA), scoping (agreeing the scope of the study), developing and selecting alternatives and designing mitigation.

SEA must take account of the requirements of protected areas and species, including the reasons for designation/protection and current status/condition.

Table 2 Protected Areas

Internationally and nationally designated sites:

- Ramsar sites
- National Parks
- Biosphere Reserves (UNESCO Man and Biosphere Programme)
- Marine Environmental High Risk Areas (sensitive areas prone to oil pollution from shipping)
- Sites identified and designated under international agreements, eg OSPAR Marine Protected Areas (MPAs)...

Sites of local importance, including cultural sites:

- Sacred sites, groves..
- Areas of high biodiversity in the vicinity of areas of high settlement
- Areas which are of particular value in the context of built up areas (e.g. urban green spaces and 'brownfield sites' of demonstrable nature conservation value).

Sites and areas hosting or used by protected species:

- Sites hosting species listed under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals)
- Sites hosting species listed under the Berne Convention (Annex 1 and 2 of the Convention on the Conservation of European Wildlife and Natural Habitats, 1979)
- Important Bird Areas (IBAs) identified by BirdLife International on the basis of internationally agreed criteria
- Sites hosting ...

Areas of high biodiversity outside protected areas

Areas with high biodiversity outside protected areas may include those that:

- ✓ Act as a corridor, link-habitat or 'stepping stone'.
- ✓ Act as a buffer or play an important part in maintaining environmental quality or critical ecosystem processes.
- ✓ Have important seasonal uses or are critical for migration.
- ✓ Support habitats, species populations, ecosystems that are vulnerable, threatened throughout their range and slow to recover.
- ✓ Support particularly large or continuous areas of relatively undisturbed or wild habitat.
- ✓ Support habitats that take a long time to develop characteristic biodiversity. Eg old-growth forest that has never previously been felled
- ✓ Support biodiversity for which mitigation is difficult or its effectiveness unproven.
- ✓ Are currently poor in biodiversity but have potential to improve, particularly where this may enhance availability of biodiversity resources for people

Plan alternatives that are likely to damage a protected area should not be selected, or should be selected only for reasons of overriding public interest if effective, proven mitigation or compensation is possible. Mitigation proposals for unavoidable impacts must ensure the integrity of protected areas and the viability of their habitats and species populations is maintained or restored.

SEA can also be used to address the requirements of protected species and their habitats *outside* protected areas. Biodiversity is not static: many species range widely, and systems of site protection do not always adapt quickly enough to keep pace with environmental change, e.g. to respond to climate change. SEA should therefore also identify and recognise areas without formal protection which make a significant contribution to the habitat requirements of protected species, or which link such habitats

(wildlife corridors). The role of an area in supporting the species should be considered, regardless of whether the species is actually present at the time when the SEA is carried out.

2.5.3 Supporting and enhancing wider biodiversity interests

Not all areas that are particularly rich in biodiversity may be formally protected or recognised as critical for the conservation of protected species.

SEAs may provide opportunities to consolidate and implement biodiversity initiatives pursued by local stakeholders, NGOs and other partnerships.

2.5.4 Building biodiversity into plans

SEA can provide an opportunity to integrate biodiversity enhancement into plans, whether as mitigation or compensation for biodiversity damage or loss associated with the plan or in the form of wider enhancements. Such opportunities include:

- consolidation, enlargement or buffering of biodiversity-rich areas;
- improvements in environmental quality, eg securing a fresh water supply or reducing levels of pollution;
- creating new habitat;
- enhancing management in and around protected areas;
- identifying opportunities to allow spontaneous recovery of damaged or degraded sites to take place (particularly important for marine environments where restoration can be difficult, if not impossible);
- improving management to enhance biodiversity in unprotected habitats and sites;
- developing biodiversity-based opportunities for tourism, amenity or recreation

Opportunities for enhancing biodiversity in and around protected areas may be identified through consultation, or suggested as mitigation for losses of biodiversity associated with a plan-proposal. There may also be opportunities to seek biodiversity enhancements that perform wider functions, eg by promoting ecotourism, attenuating floods or reducing soil erosion.

2.5.5 Encouraging an ‘ecosystem approach’

SEA enables an ‘ecosystem approach’ to be taken to land use planning and management, as promoted by the Ramsar Convention and Convention on Biological Diversity. This approach recognises that biodiversity depends on healthily functioning ecosystems and processes that have to be assessed and managed in an integrated way, not constrained by artificial boundaries. The ecosystem approach aims to ensure that human activities and uses of biodiversity do not undermine the ecosystem functions and processes that sustain biodiversity in the longer term.

Some plan alternatives that involve biodiversity enhancements may also be technically and economically preferable/ more sustainable in the longer term.

Stakeholders and biodiversity organisations should check that their plans and objectives for biodiversity have been taken into account and that opportunities for enhancement are optimised in identifying and selecting plan alternatives.

2.5.6 Encouraging public awareness and participation

SEA can provide an opportunity for those with an interest in biodiversity to review the implications of a plan for their objectives and initiatives, and to have early input into the development of alternatives that maximise opportunities for biodiversity.

This includes statutory consultees

....and other interested parties and organisations.

The public should be given an opportunity to comment on the draft plan and environmental report, but can also be involved in earlier stages of the SEA process, e.g. scoping or identification of alternatives.

Most funding for biodiversity management is allocated to activities which maximise the global values of biodiversity – usually conservation of globally rare species and habitats. But biodiversity is also valued locally. Many people have strong immediate dependence on biodiversity and long-standing rights over local natural resources. Local people often have more understanding of their local biodiversity, and the problems it faces, than external “experts”. Public involvement may generate better conservation of local biodiversity, some of which will contribute to national and international conservation efforts and can promote democratic governance.

Taking account of people’s views regarding what they would like in relation to “their” biodiversity necessitates some form of survey and/or public meetings. It may also require information provision to the public about biodiversity and its benefits. Public participation techniques may be time-consuming, particularly where many participants or survey respondents are involved. Special techniques may be required to elicit understanding of biodiversity values from indigenous people or people unaccustomed to formal consultation.

Example of public participation:

The South African Institute for Environmental Assessment (SAIEA) is currently running a project to enhance public participation in impact assessment and land use planning, called the ‘Calabash’ Project. This will also explore techniques to elicit biodiversity values.

2.5.7 Streamlining EIA

A plan or programme may set a framework for projects requiring EIA. EIAs and SEAs can share baseline data, monitoring systems, and impact predictions, as long as assumptions are correct and the data are up to date. SEA can reduce the need for some EIAs and improve the availability of baseline information. Requiring EIA for specified projects, project types or locations can act as a mitigation measure in SEA. SEA can also provide advance planning for mitigation for biodiversity at EIA-level. Table 3 shows some of the links between SEA and EIA:

Table 3 Links between SEA and EIA

	SEA affects EIA	EIA affects SEA
screening	SEA can identify specific projects that require EIA, or areas in which proposed projects should be accompanied by EIA. It can also "scope out" impacts, i.e. identify impacts that do not need to be covered at the EIA level	The SEA Directive (art. 3.2(b)) requires SEA to be carried out for plans and programmes that are likely to have significant environmental effects and that set the framework for future development consent of types of projects that require EIA.
baseline data	Baseline data collected for EIAs can inform SEAs and vice versa (though care should be taken to ensure that the baseline is up to date)	
impact prediction	Predictions made in EIAs can inform SEAs and vice versa (though care should be taken to ensure that assumptions etc. are still correct).	
mitigation	One form of plan-level mitigation is to require EIA for specific types of projects or locations	
monitoring	EIA monitoring data can inform SEA and vice versa	

2.6 ***Principles for incorporating biodiversity in SEA***

This section sets out principles to follow when addressing biodiversity in SEA. (also refer to IAIA's Best Practice Principles.)

- The *precautionary principle* implies a presumption in favour of biodiversity protection where the knowledge required to ensure effective mitigation or compensation for a significant adverse impact is lacking. It should also apply in situations where there is sufficient evidence to suggest that adverse impacts are possible, but not enough to confirm 'no significant impact'.
- The '*no net loss*' principle requires the status quo to be maintained in terms of quantitative and qualitative aspects of biodiversity (how much is there, what there it, how it is structured and distributed). The CBD is firmly based on the premise that further losses of biodiversity must be arrested.

SEA should take the following sequential approach to planning and plan-making to ensure these principles can be adopted:

1. avoid biodiversity loss or damage
2. enhance biodiversity where possible or secure opportunities for recovery
3. compensate for unavoidable loss of biodiversity
4. consolidate information on biodiversity (RTPI 1999, Oxford 2000).

Damage should always be avoided in the first instance if possible, mitigating only where impacts cannot be avoided and there are no alternative solutions. In particular, damage and loss should be avoided where biodiversity is particularly valued by people or important for their welfare and livelihood and where it is rare, threatened and difficult to replace or substitute.

Opportunities to enhance biodiversity should be sought wherever possible. Development and biodiversity can complement one another. Often approaches that benefit biodiversity also benefit business.

Table 4 summarises mechanisms to promote 'positive planning' for biodiversity.

Table 4 Examples of mechanisms to achieve 'positive planning' for biodiversity

Objective	Possible mechanisms	Examples of relevant legislation/policy
<p>1. Protect existing habitats and species, particularly those with protected status or identified in NBSAPs. Mitigate for significant adverse impacts</p>	<p>Use SEA to evaluate national and regional development plans in relation to NBSAPs and other formal biodiversity objectives and targets.</p> <p>Use development plans, policies and restrictive conditions to amend plans and working methods or exclude areas important for biodiversity; use conditions or agreements on design, methods, timing etc.; obtain information from surveys, SEA etc.</p>	<ul style="list-style-type: none"> • <i>Planning policy</i> • <i>Development plan policies</i> • <i>Development control processes, use of planning conditions and obligations</i> • <i>SEA Laws and requirements</i> • <i>EIA Laws and requirements</i> • <i>Wildlife conservation and protection legislation</i>
<p>2. Enhance existing and currently degraded habitats, create new habitat</p>	<p>Use NBSAP or other similar biodiversity planning processes to identify biodiversity opportunities, eg to improve management of existing habitats, create new habitat, introduce species, reduce fragmentation through corridor development, etc</p>	<ul style="list-style-type: none"> • <i>Berne Convention Article 11.2a</i> • <i>Planning policy</i> • <i>Development strategies</i> • <i>Development control processes; conditions/obligations</i>
<p>3. Compensate for biodiversity losses where damage is unavoidable</p>	<p>Only where loss can be justified. Use precautionary principle</p>	<ul style="list-style-type: none"> • <i>Use of planning conditions and obligations</i> • <i>SEA/EIA mitigation</i>
<p>4. Monitor and enforce to assess the success of enhancement, mitigation and compensation-measures</p>	<p>Most SEA legislation asks for monitoring recommendations and requirements</p>	<ul style="list-style-type: none"> • <i>Development control processes</i> • <i>SEA/EIA monitoring</i>

SEA should:

- Promote strategic thinking and action on biodiversity.
- Help to implement the precautionary and 'no net loss' principles and ensure that biodiversity is protected and enhanced where possible
- Ensure that mitigation is provided where biodiversity losses are unavoidable BEFORE these losses are incurred
- Help ensure that where biological resources are used, such use is sustainable.
- Ensure that non-renewable resources are used wisely.
- Help to develop and provide reliable baseline information about biodiversity.
- Ensure that conservation practice and policy is based upon a sound knowledge base.
- Ensure that the conservation of biodiversity is an integral part of programmes, policy and action.
- Ensure that legal obligations are met with regard to biodiversity.
- Help ensure that plan proposals are consistent with international and national, targets for protection and enhancement of biodiversity, in particular those set out in NBSAPs.
- Identify critical biodiversity issues that should be addressed through project-level EIA.
- Help to identify opportunities for enhancement, including consolidation of existing designated sites, enhanced connectivity between biodiversity hotspots.
- Help to ensure that mitigation is planned in advance of adverse impacts on biodiversity.
- Help to identify ongoing monitoring and survey requirements.
- Promote partnerships and consultation with a view to increasing awareness of biodiversity concerns and the role of planning in ensuring that biodiversity objectives are met.
- Ensure that individuals and communities as well as Governmental processes are involved in strategic decision-making and the conservation of biodiversity.

3. Biodiversity in the SEA process

<p>Aim:</p> <p><i>To explain the main stages in the SEA process and identify key biodiversity considerations at each stage</i></p>	<p><i>This chapter is structured around the following stages in the SEA process:</i></p> <ul style="list-style-type: none"> • <i>Screening</i> • <i>Links to other plans and programmes</i> • <i>Scoping</i> • <i>Setting objectives, targets and indicators</i> • <i>Describing the baseline</i> • <i>Identifying options/alternatives</i> • <i>Impact identification, prediction and evaluation</i> • <i>Mitigation</i> • <i>Monitoring</i> • <i>Consultation and decision-making</i>
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3.1 Screening

Aim	Questions to ask	Checks to carry out
<p><i>Determine whether formal SEA is required</i></p>	<ul style="list-style-type: none"> • <i>Does the legislation automatically require SEA for this kind of plan?</i> • <i>Does the plan require SEA because it is likely to have significant effects on biodiversity?</i> 	<ul style="list-style-type: none"> • <i>Has biodiversity been fully considered during the screening process?</i> • <i>Does the plan have direct or indirect effects on protected areas or areas rich in biodiversity?</i> • <i>Is the plan likely to have a significant effect on biodiversity?</i>

Box 1 shows examples of some plans and programmes for which SEA might be required.

Box 1 Examples of plans likely to require SEA

<ul style="list-style-type: none"> • <i>Poverty Reduction Strategies</i> • <i>National Park Management Plans</i> • <i>Offshore oil and gas licensing plans</i> • <i>Catchment or watershed management plans</i> • <i>Waste Management Plans</i> • <i>National or regional development plans</i> • <i>Sectoral development plans, eg for mining, tourism, transport, water resource management, farming, forestry</i> • <i>Integrated coastal zone management plans</i> • <i>Housing strategies</i>

Most SEA laws set out categories of plan for which SEA will be required. For other plans and programmes, the decision of whether they require SEA may have to be made on a case-by-case basis. The key biodiversity input into this "screening" decision is the determination of whether a plan or programme is likely to have significant effects on biodiversity.

Table 5 summarises some of the factors that should be taken into account when screening a plan in relation to biodiversity interests.

Table 5 Biodiversity issues to consider when determining likely significance of effects

Key issues to consider	Biodiversity considerations in screening: "Might the plan..."
Influence of the plan in terms of sustainable development goals	...influence how environmental issues, including biodiversity, are dealt with in other policies, plans and programmes? This could include existing plans to enhance biodiversity. ...affect other plans that protect or enhance environmental quality?
Influence of plan in terms of environmental quality/ health	...exacerbate existing threats to biodiversity? ...involve activities already posing a threat to biodiversity in the study area?
The probability, duration, frequency and reversibility of the effects	... have relatively certain effects? ... have long-term effects (taking into account lengths of lifecycles)? ...have repeated impacts on the same biodiversity resources at such a frequency that their recovery might be compromised? ... have irreversible impacts on biodiversity, ie impacts from which spontaneous recovery is impossible and there are no known effective mitigation techniques?
Cumulative effects	...affect areas where biodiversity is already exposed to significant threat, eg through habitat loss or fragmentation? ... exacerbate space-crowding with significant effects on certain components of biodiversity or on a high proportion of the resource within the study area? ...exacerbate environmental deterioration such that critical thresholds may be reached? ...make a significant contribution to 'in-combination' or cumulative effects on biodiversity?
The magnitude and spatial extent of the effects	... lead to projects that are space- or resource-hungry, eg occupying large areas or using large volumes of water?
The value and vulnerability of the area likely to be affected	... affect areas of high biodiversity (whether protected or not)? ...affect areas covered by NBSAPs?
Effects on areas or landscapes which have a recognised national or international protection status	... affect protected areas or areas of important, threatened or vulnerable biodiversity?

3.2 *Links to other policies, plans and programmes*

Aim	Questions to ask	Checks to carry out
Determine how this plan will influence the implementation of other plans and vice versa; clarify biodiversity policy and objectives	<ul style="list-style-type: none"> • What are relevant environmental / biodiversity policies and objectives? • What other plans and programmes could affect, or be affected, by this plan? • Does the plan conflict with any of these? If so, what should be done about it? 	<ul style="list-style-type: none"> • Is the plan consistent with policy-requirements? • Have links to all relevant environmental objectives, and other plans been considered? • How should any conflicts be dealt with?

This stage is normally carried out by the responsible authority..
 ... possibly with input from the consultation bodies.

The SEA report should explain the plan's relationship with other relevant plans and relevant environmental protection objectives at local, national and international level. The responsible authority must consider any implications for their plan and identify potential conflicts and opportunities. This stage promotes coordination of planning and decision-making, both in the same and in other sectors and can help identify opportunities to improve the management of biodiversity within the area affected by the plan. Failure to realise these opportunities will affect ability to manage biodiversity effectively through other mechanisms. As such, this stage should be carried out early in plan-making. It involves four steps:

1. Identify biodiversity objectives that might affect or be affected by the plan.

Relevant biodiversity objectives may be included in a wide range of policies and plans including:

- relevant national, regional and local Biodiversity Action Plans
- Sustainable Development Strategies
- Development plans

These may differ from the specific objectives ultimately selected for the SEA (which will be derived from these), in which case critical differences need to be identified and explained in the SEA report.

2. Identify other plans that might affect or be affected by the plan under consideration.

These can include:

- relevant land use plans
- plans from the same and other sectors that affect the plan in question (e.g. transport plans affect energy plans; minerals and waste plans often affect each other; water resource plans can affect land use plans).

Links should be considered for current plans, plans in preparation and proposed future plans. Links may not be immediately obvious; for example, transport plans resulting in an expanded road-programme could have significant implications for mining of aggregate in sensitive locations. The relevant 'rule of thumb' tests should be:

- does the plan being assessed set a framework/context or constraints for my plan?
- does my plan set a framework/context or constraints for the plan being assessed?

3. Identify how each relevant objective/plan affects or is affected by the plan. This is typically summarised in the form of an external compatibility matrix. An *external compatibility matrix* plots the strategic plan/action (normally as a whole) against other relevant (normally higher- and equal-level) strategic plans/actions. Matrix cells are filled in by listing those components of the strategic action that fulfill the requirements of the other strategic actions, or explaining how the evolving strategic action should take the requirements into account. Where no components in the strategic action fulfill the others' requirements, or where they conflict, then this may need to be redressed. Compatibility appraisal can help to clarify trade-offs and is easy to understand. However it is subjective and can be time consuming.

4. Identify conflicts, constraints or problems between the plan being assessed and other policies, plans etc. and decide what to do about them.

This could be where there are conflicting objectives, or where actions proposed in one plan could constrain another. In such a case a choice needs to be made whether to:

- adjust the relevant plan to be consistent with the other policy/plan/etc.
- accept the conflict/constraint and document it in the SEA
- seek dialogue with other plan-makers and attempt to identify opportunities to adjust the other policy/plan/etc. to be consistent with the plan.

Compatibility appraisal aims to ensure that the strategic action is internally coherent and consistent with other strategic plans/actions. An *internal compatibility matrix* plots different components of the strategic plan on one axis and the same components on the other axis. Matrix cells are filled in by asking 'is this component compatible with that component or not?' Where incompatibility is found, one or both statements may need to be changed:

Example of internal compatibility appraisal

The matrix below shows the compatibility of some SEA objectives for a Local Plan. The possible conflict between biodiversity and economic objectives in this plan is clear.

1								
2	✓							
3	✓	✓						
4	✓	✓	✓					
5	?	?	-	-				
6	-	-	-	-	-			
7	?	?	?	?	✓	-		
8	X	X	?	✓	X	-	?	
	1	2	3	4	5	6	7	8

- compatible
- ✓ incompatible
- no link

- 1 To conserve and enhance biodiversity at ecosystem, species and genetic levels
- 2 To conserve and enhance the present number of designated sites
- 3 To minimise the amount of waste going to landfill
- 4 To reach and maintain standards for ecological, biological and chemical water quality
- 5 To reduce the need to travel by private car
- 6 To actively encourage all sections of communities to participate in decision-making
- 7 To support and enhance the economies of main town centres
- 8 To promote diversification of rural enterprises

3.3 Scoping

Aim	Questions to ask	Checks to carry out
Determine the "boundaries" and coverage of the SEA: key issues, assessment methods, data needed, level of detail needed, and who should be consulted. Scoping also provides an early opportunity to consult relevant organisations.	<ul style="list-style-type: none"> • What are the main biodiversity implications of the plan and its proposed activities? • How should they be addressed (methods, level of detail)? • Which biodiversity experts need to be involved? • What alternatives should be considered to optimise biodiversity benefits and minimise harm? 	<ul style="list-style-type: none"> • Have all relevant biodiversity interests and values (including economic, social and spiritual) been identified? • Does the study area allow critical biodiversity interests to be 'captured'? • Are the proposed techniques and methods appropriate? • Will suitable specialists be used? • Is there enough time to carry out surveys and studies, and are they appropriately scheduled?
		<ul style="list-style-type: none"> • Will the biodiversity concerns of the consultation bodies be addressed in the SEA? • Are there opportunities to enhance biodiversity that can be promoted? • Are there alternatives that should be included?

Scoping is a key stage in SEA. It is normally carried out jointly by the responsible authority...
... and the consultation bodies.
It is good practice to involve NGOs and the public at this stage, to ensure that all matters of concern are identified early and addressed appropriately in the SEA.
It is good practice to hold scoping meetings or workshops early in the SEA process to give all parties the opportunity for input into the design of the SEA; and/or to circulate a scoping report for comment recording the findings of the scoping process and setting out the proposed way forward.

Table 6 lists questions that may assist in scoping for biodiversity: they set the framework for the following stages of baseline description, impact prediction and mitigation. The questions should be discussed with relevant consultation bodies and stakeholders early in the plan-making and SEA process. Table 7 explains how to decide what level(s) of biodiversity should be addressed.

The *study area* for addressing impacts on biodiversity may need to go beyond the boundaries of the area to which the plan applies. The larger the area covered by the proposed plan the more likely it is that it will be necessary to consider biodiversity impacts at wider (landscape)-scales. (Inter)national and regional-level plans could affect considerable geographic areas, making it essential to consider wider spatial implications and potential trans-boundary effects. For such plans consultation with representatives from other countries or regions may be necessary.

Table 6 Scoping Checklist for Biodiversity

Are there any protected areas or species within the plan-area?

Formal protection tends to apply predominantly at the habitat and species level, but communities and individuals may also be protected.

Consider biodiversity components at the following levels. Which levels are represented in the plan in question? Are there possible impacts at these levels? Which level(s) can be studied most effectively?

bioregion	habitat	population
landscape	community	individual
ecosystem	species	gene

Address the following questions to determine the scope of the SEA in relation to biodiversity composition, structure and function:

Composition

- What are the main components of biodiversity in the area affected by the plan (see above)?
- What is the distribution pattern and richness/abundance of biodiversity?
- How does biodiversity composition in the study area compare with that outside the study area (are there biodiversity components that are particularly unique, eg locally adapted populations? Are there components that are poorly conserved or represented elsewhere, or are they relatively ubiquitous?)
- Are there any flagship (popular, charismatic) biodiversity components in the area?
- Which biodiversity components are particularly vulnerable/sensitive to proposed plan-activities?
- What are trends in composition (eg. is biodiversity organization and composition stable or subject to rapid change, eg long term declines in species or habitat diversity?)

Structure

- Structural relationships include: connectivity, patchiness, fragmentation, vertical habitat differentiation, distribution of key physical features, availability of niches, seasonal availability of habitat, water availability.
- How are biodiversity components organised in time and space (location, distribution, variation)?
- What are the requirements or 'drivers' for high, or characteristic biodiversity to be maintained (e.g. environmental gradients)?

Function

- Consider how current levels and types of biodiversity are being maintained. Take an ecosystem perspective to identify important functional relationships, eg dependence of wetlands on hydrological processes; threat to semi-natural grassland communities from nutrient enrichment; relationship between aquatic invertebrates and water quality.
- What role do biodiversity components play in maintaining processes and dynamics, or supporting other biodiversity components (e.g. role of vegetative cover in retarding surface water run-off, habitat in providing a refuge for certain species)?
- What processes maintain boundaries and structure (competition, herbivory, predation, dispersal)?
- Are any threatened components present? What is their functional role? What are their requirements?
- What are the demographic processes determining the status of species populations (eg do populations rely on recruitment of new individuals from elsewhere, requiring the maintenance of mobility through the landscape?)

Detailed analysis of genetic level impacts is unlikely to be possible for SEA. However it is important to review risks and identify circumstances in which significant impacts could occur at this level.

It is important to discuss the *objectives and indicators* to be used in the SEA at the scoping stage, to ensure that the SEA captures the information required to measure and monitor indicators. For example the reasons for which sites have been designated should be taken into account: clearly defined objectives that reflect the biodiversity interest of the area focus the SEA on clearly defined and measurable attributes, and help to ensure that statutory obligations will be met following plan-implementation.

Consult with:

- Museums and herbaria
- Local specialists
- Universities
- Industry representatives
- NGOs
- Local and Regional Biodiversity Partnerships

As appropriate about relevant levels of assessment, suitable approaches. Include early discussion about biodiversity objectives, indicators and targets

Scoping workshops with key consultees and perhaps the public can be held to allow early discussion of issues, including biodiversity. Clarify stakeholder values for biodiversity (e.g. economic, social and aesthetic values) and identify relevant objectives and indicators. It is good practice to issue a scoping report for early consultation on the coverage of the SEA and to inform the development of alternatives for more detailed appraisal. Although this has resource implications, the benefits are likely to outweigh the costs.

Table 7 What level(s) of biodiversity should the SEA address?

Level	Reason for inclusion	Typical impacts, activities or circumstances for which assessment at this level might be appropriate
Bioregion	The plan may have implications for biodiversity within a whole bio-region, eg all habitats and species in mountain situations	Disproportionate effects on one bioregion due to its restricted nature. e.g. plans involving increased access to remote mountainous regions with increasing levels of disturbance, or significant cumulative impacts on a species or habitat restricted to one bioregion, from a range of similar developments..
Landscape	The plan will have wide-spread implications, affecting relatively large areas or the distribution and spatial organisation of habitats. Assessment at the landscape scale is the only way to identify and address cumulative threats and impacts on biodiversity.	<ul style="list-style-type: none"> • Barrier effects, restricting species-mobility • Habitat fragmentation or isolation • Land use changes • Widespread disturbance • Dispersed activity and/or development • Opportunities to enhance connectivity of habitat • Opportunities to buffer or consolidate areas of high biodiversity value
Ecosystem	The plan may affect environmental quality with possible effects outside the immediate area of influence. Assessment at the ecosystem level is important where changes in environmental quality at one location could have implications for habitats, communities and species at other locations.	<ul style="list-style-type: none"> • Pollution of soil, air or water • Hydrological changes • Impacts on air or water • Impacts on species that perform critical roles in an ecosystem (eg a top predator) • Disruption to the structure and/or function of physical, chemical and/or ecological systems and processes <p>Particularly appropriate for Catchment Flood Management Plans and to meet the requirements of the Water Framework Directive.</p>
Habitat	The plan will alter the amount, quality or distribution of habitat for species. Some of the habitat may be protected.	Any impacts on the amount, quality or distribution of semi-natural habitat: land-take for development, disturbance, pollution, fragmentation and barrier effects.
Community	The plan may change the characteristic composition of communities. Although usually driven by impacts on individual species, impacts on communities may give early-warning of impacts at the species-level. Also some communities are of acknowledged conservation value in their own right ('farmland birds', specific types of grassland community).	<p>Areas where important communities occur should be identified as 'constraints' or identified as important for biodiversity.</p> <p>Plant and invertebrate communities are often under-recorded and under-protected.</p> <p>Ecosystem changes often influence community-composition.</p>
Species	Assessment at the species level is essential for rare, declining, threatened or protected species.	<p>Impacts at the species-level may be caused by:</p> <ul style="list-style-type: none"> • Habitat loss or any change in the quality or distribution of habitat

	<p>The SEA should also consider potential impacts on species that are known to be declining and generally threatened within the area of influence of the plan.</p> <p>Species can be useful as indicators and as a basis for monitoring, one being used to infer possible responses of others.</p>	<ul style="list-style-type: none"> • Disturbance • Pollution • Land use and management changes • Changes in spatial arrangement of habitat within the landscape <p>SEA for key species should address any possible impacts on their conservation status and distribution. These might include species of high conservation value and species useful as indicators.</p>
population	<p>The plan may affect locally adapted populations.</p> <p>Local changes in populations may have implications at the species-level.</p>	<p>A variety of cumulative impacts</p> <p>Any isolated population of a rare or declining species should be assessed in terms of population status and dynamics</p>
individual	<p>Assess at this level if individuals of rare or protected species may be affected, or if the individual's taxonomic identity is unclear (eg it is not clear exactly what species it is).</p>	<p>Localised impacts on habitat, eg for breeding: isolated roosts or nesting sites</p>
Gene	<p>Assess implications at the genetic level in any case where uniquely adapted genetic resources may be affected, including rare and declining species (typically Red Data Book species)</p>	<ul style="list-style-type: none"> • Location-specific impacts on threatened genetic resources • Climate change causing suitability of habitat to decline for populations that are already isolated • Isolated populations of rare and declining species • Locally adapted populations

3.4 Setting objectives, targets and indicators

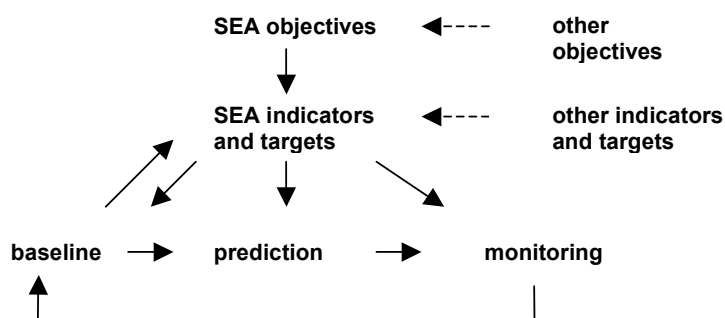
Aim	Questions to ask	Checks to carry out
Set a framework for describing the baseline environment and carrying out impact prediction, evaluation and monitoring	<ul style="list-style-type: none"> Do existing objectives for biodiversity incorporate all important biodiversity interests relevant to this plan? Are plan-specific objectives required to assess impacts? Is it possible to establish clear indicators and targets that allow objectives to be measured? 	<p>Are the plan's biodiversity objectives, indicators and targets consistent with those of other existing initiatives and plans)?</p> <p>Reasons for any significant differences need to be explained in the SEA report.</p>

This stage is normally carried out by the responsible authority
..possibly with input from the consultation bodies.
The results of public participation exercises may also provide useful input.

An *objective* is a statement of what is intended, specifying a desired direction of change. The achievement of objectives is normally measured by using *indicators*. Objectives can be expressed so that they are measurable, i.e. as *targets*. Setting SEA objectives, indicators and targets makes collecting data, making predictions, and monitoring the impacts of plans much easier (see Figure 2).

Where possible or practical "biodiversity" objectives should be complemented by objectives for the abiotic factors on which biodiversity depends: air, water, soil, climate change. This supports an 'ecosystem approach'.

Figure 2 Links between objectives, indicators and other aspects of SEA



Objectives must be sufficiently detailed to ensure that all critical biodiversity issues can be addressed. However they must also be measurable *primarily* on the basis of existing information and/or new information which can readily be collected for the SEA. To allow objectives or targets to be monitored, and assess whether they have been met, they should ideally be formulated following the SMART principle (Specific, Measurable, Achievable, Realistic, Time bound).

SEA objectives, indicators and targets can be related to outcomes (the state of the environment that should be reached) or inputs (how they can be reached; e.g. designations, management plans, funding for biodiversity). Generally outcome indicators are more appropriate for biodiversity as they represent "objective" environmental quality and stress the importance of actually achieving eg 'no net loss' of biodiversity. Authorities may prefer to use input indicators as these show more clearly what actions they are taking for biodiversity, but these should always be linked to clear outcomes.

Some objectives and indicators for biodiversity are likely to apply to any SEA (for example 'meet relevant NBSAP targets'). However specific objectives and indicators that reflect the particular activities associated with a plan may also be required. It may be necessary to set objectives at different levels, to ensure that plans are consistent with international, national and local requirements for biodiversity. Examples of plan-specific objectives are given in Box 5. Figure 3 shows that, for hierarchical or 'nested' plans, it may be necessary to establish corresponding 'cascading' objectives.

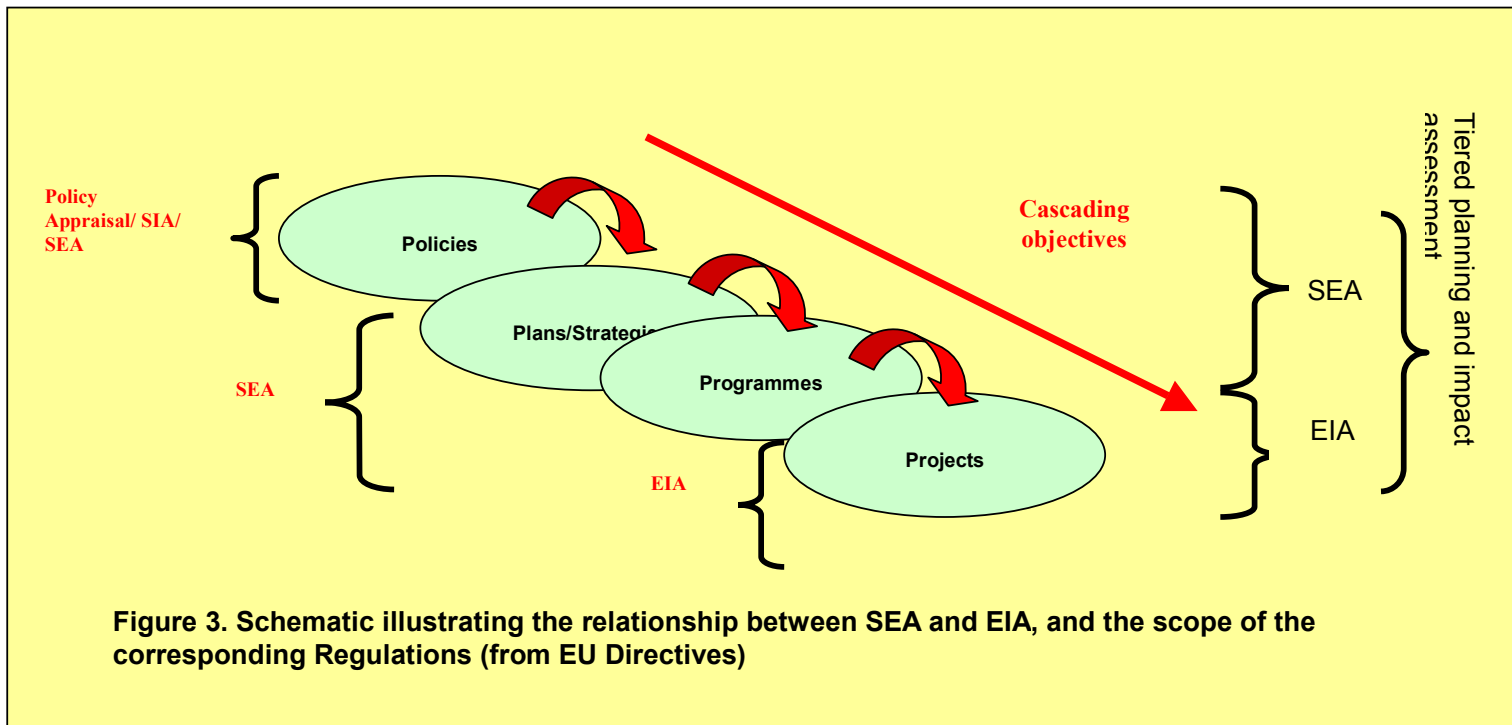


Table 7 lists some generic objectives and indicators which can be used as a starting point to develop biodiversity objectives and indicators.

Table 7. Example biodiversity objectives and indicators

Objectives	Indicators
<i>International/ national</i>	
<ul style="list-style-type: none"> • Avoid damage to protected areas (national, international) and protected species 	<ul style="list-style-type: none"> • Reported levels of damage to designated sites
<ul style="list-style-type: none"> • Meet NBSAP objectives • Achieve a favourable condition on internationally and nationally important wildlife sites 	<ul style="list-style-type: none"> • Reported condition of internationally and nationally important sites (area in favourable or satisfactory condition) • Site integrity based on condition of designated features of interest (eg number of species represented, population size, threat status)
<ul style="list-style-type: none"> • Contribute to sustainable development 	<ul style="list-style-type: none"> • National headline indicators, eg populations of key species
<i>Local biodiversity interests</i>	
<ul style="list-style-type: none"> • Maintain local biodiversity 	<ul style="list-style-type: none"> • Number and area of important sites, including cultural sites, maintained
<ul style="list-style-type: none"> • Encourage local access to and ownership of biodiversity 	<ul style="list-style-type: none"> • Number of visits to sites, use of biodiversity sites as an educational resource
<ul style="list-style-type: none"> • Maintain carrying capacity of habitats 	<ul style="list-style-type: none"> • Number and abundance of species represented • Environmental quality measures
<ul style="list-style-type: none"> • Restore the full range of characteristic habitats and species to viable levels • Safeguard genetic resources by protecting species populations, and the habitats and ecological processes on which they depend 	<ul style="list-style-type: none"> • Number of characteristic rare species and priority habitats • Area and quality of habitat in relation to range-size requirements

It may also be useful to set targets for each indicator (quantified and/or directions of change) which can be used to help assess the nature and significance of impacts during impact assessment and for monitoring.

3.5 Describing the baseline

Aim	Questions to ask	Checks to carry out
Establish a clear picture of: <ul style="list-style-type: none"> • biodiversity present and how it is organised in time and space • How it works (key functional relationships and interdependencies) • Why it is important (including protected status but also wider importance) • What condition it is in and how it would develop in the absence of the plan 	<ul style="list-style-type: none"> • What data on biodiversity exist and who holds them? • Do we have all available information? • Are there any important information gaps? How confident can we be in our conclusions? • Are there additional data requirements to understand biodiversity impacts? 	<ul style="list-style-type: none"> • No important baseline data have been missed • Important impacts on biodiversity can be quantified, or information requirements have been identified

This stage is normally carried out by the responsible authority or their consultant
...with input from consultation bodies
.. and possibly other bodies and the public.

The SEA report must describe the current state of the environment in the study area and how this would be expected to change in the absence of the proposed plan. In other words, baseline conditions are those that would be expected under the 'no action' or 'minimum action' alternative. Biodiversity in areas likely to be significantly affected must be described in sufficient detail for impacts to be identified and evaluated. The baseline assessment should focus on the components of biodiversity "scoped in" by using the scoping checklist. This is likely to involve the steps identified in Box 6.

Some aspects of biodiversity description may apply to any plan affecting that geographic area. Increasingly regional biodiversity partnerships and planning authorities are seeking to develop biodiversity maps and databases that can be used to clarify the locations and distributions of important biodiversity resources (status, distribution, risks, opportunities). The types of information likely to be required are summarized in Table 8. However each plan will have specific aspects and characteristics that may require assessment of particular sub-sets of the overall biodiversity resource, or a focus on biodiversity components that will be effective indicators of impacts due to plan-activities. Therefore even where biodiversity base maps and databases are available, additional or more focused biodiversity information is likely to be required.

Baseline data can be structured in a matrix format. Ideally matrices will be supported by maps showing key biodiversity interests. The *level of detail* should correspond with the plan and its proposed actions. SEAs of programmes are therefore likely to require more detailed information than SEAs for plans, as the former generally include site-specific actions.

Box 2 Checklist for baseline description

1. **Consult widely** to obtain existing information. Baseline description normally carried out primarily using existing data and information. Some additional study and analysis may be required to predict how biodiversity might develop and change (for example under climate change) in the absence of the plan;
2. **Clarify locations and distributions** of protected and other important areas for biodiversity and summarise main interests and produce maps if possible;
3. **Review plan-related activities** and identify areas and biodiversity resources likely to be affected. The baseline should inventory known threats and pressures on important components of biodiversity within the study area, including:
 - Land-take
 - Invasion of non-native or overly dominant species
 - Pollution (direct and diffuse)
 - Lack of management or changes in traditional use
 - Habitat isolation and fragmentation
 - Disturbance
 - Climate change
4. If appropriate (e.g. at smaller scales) carry out walk-over surveys or inventories for areas where biodiversity interest is high and activities are expected to occur.
5. **Confirm key biodiversity interests and considerations**, including the critical ecosystem functions and processes on which biodiversity depends, with consultation bodies and stakeholders;
6. **Identify key risks for biodiversity**. These include:
 - negative trends in biodiversity over time
 - existing threats
 - aspects of biodiversity that are worse than, or likely to become worse than, relevant standards, thresholds and targets
 - issues where there are not enough data to be able to judge the likely significance of future impacts.
7. **Identify opportunities** to enhance biodiversity

Table 8 Types of information likely to be required

Requirement	Additional considerations
What is the number, distribution and extent of protected areas or designated nature conservation sites in the area covered by the plan?	Map locations and if possible boundaries of nature conservation sites
What is the distribution and extent of key biodiversity resources within the area covered by the plan?	Define the habitats to be included. Review the need for more up-to-date information (e.g. additional aerial photography)
What is the distribution of internationally important species, Nationally important species) and locally important species within the area covered by the plan?	Bear in mind the need to identify potential habitats for these species as well as habitats known to be used by them
What are the locations and distributions of endemic, rare and declining species?	Map locations and review status
Where are the hotspots and critically important areas for maintaining the status of 'important' species within the area covered by the plan?	It is important for a consensus to be reached about priorities for biodiversity within the plan-area. Conflicting priorities make it difficult to establish clear objectives.
Are there any critical ecosystem processes or aspects of environmental quality/ condition?	Review the environmental factors/conditions that promote high levels of biodiversity or that might cause a decline. These should be included in monitoring recommendations
If data to address the questions above are not yet fully available for the plan-area, can probable distributions be inferred from data that are available, or can new data readily be collected?	Clarify requirements for future monitoring and data collection

3.6 Identifying options and alternatives

Aim	Questions to ask	Checks to carry out
<ul style="list-style-type: none"> Help identify options or alternatives for a plan that avoid, minimise, reduce or compensate for loss of or damage to biodiversity Help identify opportunities for biodiversity protection and enhancement or recovery. 	<ul style="list-style-type: none"> Are development activities needed or can the plan obviate this need (no/minimum action alternative) What would be the best alternative for biodiversity? If key problems for biodiversity have been identified during baseline assessment, what are the best ways of ameliorating the problems? Can alternatives be fine-tuned to enhance biodiversity or minimise impacts on it? 	<ul style="list-style-type: none"> Have appropriate alternatives been considered at the strategic as well as the detailed stages of plan-making? Have the alternatives that we have proposed been considered? Are the alternatives considered "real", or are they being used to justify the preferred alternative?

The identification of strategic alternatives is a key stage in SEA.

It is normally carried out by the responsible authority..
With possible input from the consultation bodies.
It may also be useful to involve NGOs and the public at this stage, to ensure that an appropriate range of alternatives is considered.

SEA reports should outline the reasons for selecting alternatives and explain how alternatives were selected and assessed. Alternatives can be considered at several stages of plan-making: strategic alternatives early on, and more detailed ones later. For instance the early stages of the development of a minerals plan could consider

possibilities for recycling minerals, for sustainable transport of minerals, and for broad areas where extraction might be appropriate. The later stages would focus on appropriate sites.

Alternatives can be "either/or" alternatives or "mix-and-match" alternatives that can be put together in different combinations. The former need to be compared in the SEA; the latter need to be assessed one by one, or in differing combinations, to determine whether they should be included in the plan or not (see Box 3).

This guidance emphasises that plan-making should follow a sequential approach:

- *avoid* impacts where possible;
- *reduce* them if this is not possible;
- *compensate* for any remaining ones; and
- seek opportunities to *enhance* biodiversity at all times, eg by consolidating or connecting habitats.

Box 3 Types of alternative for a coastal flood management strategy

'Either/or':

To manage coastal flooding, we could:

Either construct or raise tidal banks

Or use coastal wetlands to absorb wave energy: which is the best alternative?

'Mix and Match':

The best solution is to implement a range of measures including:

- √ Raise tidal banks;
- √ dredge tidal reaches;
- √ widen watercourses to speed up evacuation of floodwater;
- √ increase area of coastal wetland

The plan/SEA should assess which measures are acceptable and how they should best be combined.

Alternatives should also be chosen according to this hierarchy. Alternatives should be identified that *avoid or minimise* biodiversity impacts, for instance through demand management, choice of types and locations of development, and layout within particular sites:

- Conditions for achieving no net loss should be agreed
- Biodiversity damage should be avoided at source where possible
- Important habitats, species and landscape features should be retained and incorporated in the plan, and protected during plan-implementation
- Provision must be made for future management and monitoring.

Where possible, opportunities to *enhance* biodiversity should be sought at different scales e.g.:

- Identifying land suitable for biodiversity enhancement in development plans, areas within proposed development sites that can be managed for improved biodiversity, new areas of local nature conservation importance, and/or new wildlife corridors
- Creation and management, or restoration, of threatened habitats or habitats that support a threatened species
- Design principles agreed at the strategic level with detailed design being considered later at the project level.

- Restoration to nature conservation use of structural earthworks or excavations for construction materials, once operations are complete.

It is important to take a flexible approach, taking advantage of opportunities as they arise, as well as planning for long-term enhancement. The need for ongoing management of new wildlife areas must also be considered.

Where there is an over-riding need for development and loss or damage to biodiversity is unavoidable, *compensation* of similar quality and quantity to the biodiversity affected should be provided. Habitat creation and restoration are often proposed to mitigate adverse ecological impacts. However re-created or 'new' habitats rarely substitute for existing habitat in terms of biodiversity. Most of today's rare habitats are the result of low intensity intervention or the prolonged absence of disturbance, and cannot be recreated in a short time. For this reason compensation should be regarded only as a last resort.

3.7 *Impact identification, prediction and evaluation*

Aim	Questions to ask	Checks to carry out
<ul style="list-style-type: none"> • Predict and evaluate the impacts of the plan and alternatives, including cumulative and indirect impacts • Help to identify preferred alternative(s) 	<ul style="list-style-type: none"> • What are impacts on biodiversity associated with this plan and alternatives? • Are the impacts significant? • Are cumulative impacts on biodiversity expected from the plan jointly with other activities (historic, current or planned)? • What are the relative risks and opportunities for biodiversity associated with available alternatives? • What is the preferred alternative? 	<ul style="list-style-type: none"> • Have impacts on biodiversity been quantified and evaluated in local, regional, national and international contexts? • Do we agree with the impacts identified as being significant? • Do we agree with the preferred alternative?

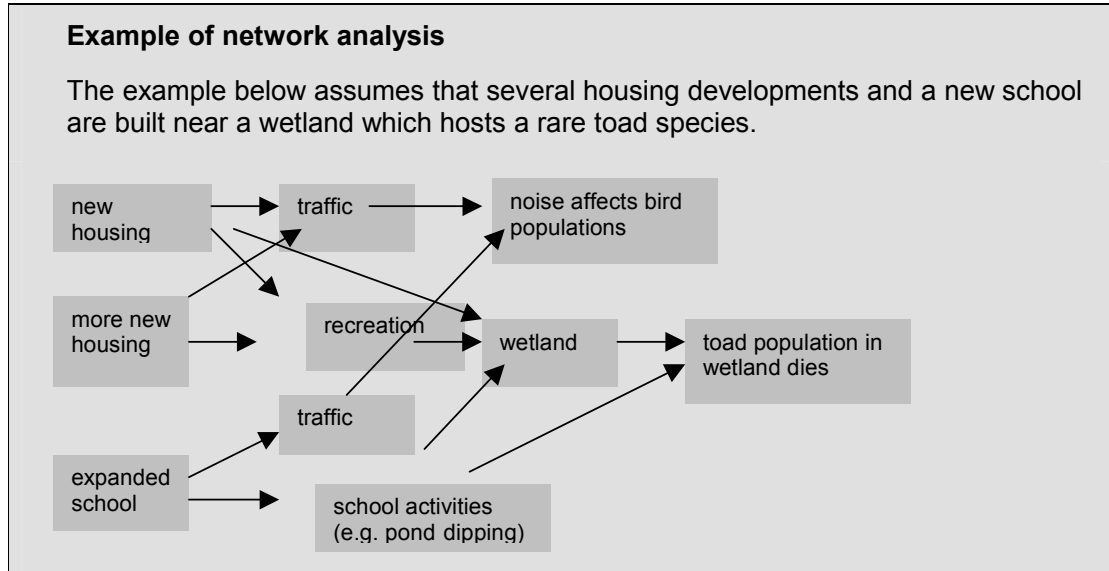
Impact prediction is normally carried out by the responsible authority, possibly in discussions with the consultation bodies.

SEAs should identify the likely significant effects of the plan on the environment. Biodiversity is one aspect of the environment that must be considered. The SEA should also include assessment of possible significant effects of the plan on other environmental factors that influence biodiversity (eg soil, water, air, climatic factors and landscape). Inter-relationships should be considered, as well as any relevant cumulative, synergistic, short, medium and long term, permanent and temporary, positive and negative effects.

One technique for investigating inter-relationships is 'network analysis' (Therivel, 2004). Also called cause-effect analysis or causal chain analysis, this recognizes that environmental systems consist of a complex web of relationships, and that many activities' impacts occur at several stages removed from the activity itself. It aims to identify the key cause-effect links which describe the pathway from initial action to ultimate environmental outcome. It involves drawing the direct and indirect impacts of an action as a network of boxes (activities, outcomes) and arrows (interactions between them). This can help to identify assumptions made in impact predictions, unintended consequences of the strategic action,

cumulative impacts, and possible constraints to effective implementation of a strategic action.

Network analyses are easy to understand, quick and cheap, and can be used in public participation. However they can miss important impacts if not done well, and do not deal well with spatial impacts or impacts that vary over time.



3.7.1 Predicting impacts

The scoping stage will have identified activities associated with the plan that might give rise to significant environmental effects. These must be reviewed in relation to the biodiversity interest of the study area as a whole and those areas where critical activities are concentrated. SEA should identify:

- the plan's impacts on all relevant levels of biodiversity (from the bio-regional to the gene level). Table 9 summarises the likely key impacts of plans in a range of sectors.
- the environmental conditions required to conserve or promote biodiversity; and
- the availability of restoration techniques.

What the impact predictions look like will depend on the scale of the plan and how strategic it is (see Figure 1). Predictions can be expressed in broad terms, represented by symbols such as tick/cross, smiling/frowning face, green/amber/red, through to more detailed, quantitative approaches. Policy and plan-level SEA will generally be less detailed and quantitative than programme-level SEA, although even at these less detailed levels it is good practice to accompany any symbols with written descriptions of impacts to enable them to be better understood.

Table 9 Likely impacts of different sectoral plans on biodiversity

Sector	Habitat loss caused by land-take	Habitat isolation or fragmentation	Alteration of water or hydrological regime	Alteration of soil composition	Pollution (direct and diffuse)	Disturbance (e.g. by presence of people, vehicles, noise)	Introduction or invasion by non-native or overly dominant species	Edge effects	Genetic impacts	Behavioural impacts	Elevated mortality
Agriculture	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Forestry	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Fisheries	✓				✓	✓	✓		✓	✓	✓
Energy	✓	✓			✓	✓				✓	✓
Industry	✓	✓	✓	✓	✓	✓		✓		✓	✓
Transport	✓	✓	✓		✓	✓	✓	✓		✓	✓
Waste management	✓		✓		✓						✓
Telecommunications	✓	✓		✓		✓				✓	✓
Tourism	✓	✓			✓	✓				✓	
Urban expansion, new development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Water and flood management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

How much information and certainty is needed for adequate impact prediction will depend on the issue. As a rule of thumb, predictions should be as simple as they can be whilst fulfilling the precautionary principle, which implies that additional data on biodiversity should be sought where impacts or risks cannot be predicted with certainty. Carrying out SEA in accordance with the precautionary principle creates a need for biodiversity data, and presents an opportunity for enhanced coordination of existing biodiversity data and for collection of new data in relatively poorly studied situations (for example in marine contexts). The plan should consider how data collection could be improved.

Many processes that reduce genetic diversity – e.g. loss or isolation of habits - operate at the ecosystem, landscape or global scale and SEA must capture these processes as well as more local ones. Different levels of detail may be needed for different aspects of a plan, e.g. general policies as opposed to specific proposals.

3.7.2 Assessing cumulative effects

SEA provides opportunities for a plan's wider cumulative and synergistic effects to be assessed. Definitions are given in Box 4. Cumulative effects may occur if:

- Repeated similar actions affect the same biodiversity resource (e.g. noise disturbances)
- Numerous different actions affect the same biodiversity resource within a certain area or timeframe (e.g. within a development zone)

- Actions take place that can reasonably be expected to lead directly to other, related actions

Biodiversity is particularly vulnerable to cumulative threats and pressures. Natural systems rarely react in a simple, direct or straightforward way to external pressures. At certain thresholds additional disturbances can cause sudden decline or collapse in biodiversity. Cumulative effects occur when such thresholds of stability or viability are exceeded, causing biodiversity decline that cannot be attributed to any single action. Actions that appear insignificant when considered individually, in isolation, may nevertheless cause significant loss of biodiversity. An important benefit of SEA is that it can allow remedial action for cumulative effects to be undertaken before critical thresholds are reached.

Box 4 Cumulative and indirect effects

Cumulative effects on biodiversity result from the in-combination effects of a plan together with other past, present or reasonably foreseeable actions and processes. These may be insignificant when considered in isolation, but have a significant collective impact. Many threats to biodiversity may not form part of formal plans (eg negative effects on farmland birds caused by general changes in farming activity).

Cumulative effects can be:

- *Additive*: the simple sum of all effects (e.g. repeated pollution spills into a river);
- *Neutralising*, where effects counteract each other to reduce the overall effect
- *Synergistic*: effects interact to produce a total effect greater than the sum of the individual effects. Synergistic effects often occur as carrying capacity or critical thresholds are reached, eg progressive habitat fragmentation and isolation of populations combined with disease can cause a catastrophic decline
- *Time crowding*: frequent, repetitive, and simultaneous impacts on environmental resource;
- *Space crowding*: high spatial density of different threats and impacts

To assess cumulative effects on biodiversity, it is necessary to understand:

- What other plans, projects and activities are likely to take place
- Threats to biodiversity associated with these other plans, projects and activities
- Other background threats
- Vulnerability of biodiversity to additional threats
- Thresholds, 'limits of acceptable change', carrying capacity, 'points of no return'
- Recovery mechanisms and time required for recovery from impacts.

3.7.3 Evaluating significance

When evaluating the significance of impacts on biodiversity, it is necessary to consider:

1. characteristics of the biodiversity resource affected (including importance and value),
2. the environmental changes that would occur as a result of the plan activities (from the prediction stage), and

Important *characteristics of the biodiversity resource* include:

- its value and importance
 - its state or condition (including measures of rarity, trends)
 - its recoverability or replaceability
 - the extent to which it can be substituted
- (Note that recoverability may be influenced by the proportion of the resource affected, biological life-cycles in relation to duration of impacts etc).

Important *aspects of impacts* include:

- types of change and their severity
- the scale and magnitude of environmental changes caused by the plan
- duration
- reversibility.

Box 5 illustrates some of the factors that are likely to increase the significance of impacts on biodiversity. Thresholds or targets can be used to evaluate impacts. This might be relatively straightforward for species and habitats with formal targets (eg on an NBSAP), but less easy for 'wider biodiversity interests'. Determining significance often requires expert judgment and is therefore likely to require specialist input from professional ecologists.

Box 5 Factors likely to increase significance of impacts on biodiversity

Activities or environmental changes that:

- ...are of a similar type to and exacerbate existing threats to biodiversity
- ... have repeated impacts on the same biodiversity resources at such a frequency that their recovery might be compromised
- ...have long-term effects in relation to species-lifecycles
- ...have irreversible impacts on biodiversity, ie impacts from which spontaneous recovery is impossible and there are no known effective mitigation techniques
- ...affect areas where biodiversity is already exposed to significant threat, eg through habitat loss or fragmentation
- ... are crowded in one location, or have significant effects on certain components of biodiversity or on a high proportion of the resource within the study area
- ...exacerbate environmental deterioration such that critical thresholds may be reached
- ...make a significant contribution to 'in-combination' or cumulative effects on biodiversity
- ... result from projects that are space- or resource-hungry, eg occupying large areas or using large volumes of water
- ...affect areas covered by BAPs
- ...affect areas that were previously relatively 'wild' or undisturbed

3.7.4 Comparing alternatives

Where the SEA considers either/or alternatives, it should summarise, compare and document them. This is often done using a matrix.

To specifically address the biodiversity implications of alternatives the following stepwise approach is recommended:

1. Identify and review all feasible alternatives;
2. If viable alternatives are available, screen out any alternatives likely to affect a site of international or national importance for biodiversity: an alternative option damaging such a site should only be selected for reasons of overriding public interest if no other suitable alternative is available;
3. For remaining alternatives, identify any significant impacts on biodiversity and review these. Consider whether impacts can be avoided by altering the design, timing or location of proposed activities;
4. Where it is not possible to re-design aspects of the plan to avoid impacts on biodiversity, consider whether the biodiversity affected will be able to recover independently or whether mitigation and/or compensation will be required;
5. If mitigation/compensation is required, are there tried and tested techniques available which can be used? Consider the likely recovery time for biodiversity with and without mitigation. Also consider the possible need for advance implementation of mitigation to avoid temporary loss of biodiversity during plan implementation.

Only rarely will a plan lead to decisions that improve all aspects of sustainability - social, economic and environmental. In most cases hard choices and trade-offs will have to be made. SEA does not determine decisions, but informs them. Making trade-offs is not part of the SEA process, but identifying the need for trade-offs and suggesting possible solutions that achieve as many plan objectives as possible is. Nevertheless, there are likely to be circumstances where choices have to be made between very different biodiversity interests. For example, creation of new saltmarsh to compensate for losses due to climate change and coastal squeeze might result in the loss of coastal and floodplain grazing marsh.

MCA -- also called multiple attribute analysis or multi-objective trade-off -- is one technique that can be used to analyse and compares how well different alternatives achieve different objectives, and can help to identify a preferred alternative. MCA involves:

1. For each type of impact/indicator, choosing relevant assessment criteria.
2. Identifying alternatives for consideration, for instance different approaches to managing a habitat or different development scenarios.
3. Scoring how each alternative affects each indicator.
4. Assigning a weight (value of importance) to the indicator.
5. Aggregating the score and weight of each alternative.

MCA acknowledges that society is composed of diverse stakeholders with different goals and values and that impacts "matter" more to some people than others. It can be used in a variety of settings, including public participation; and can compare alternatives. On the other hand, it can also be used to 'twist' data; and it can lead to very different results depending on who establishes the weightings and scoring systems (Therivel, 2004).

The impacts of a strategic plan, or the relative benefits of different options often depend on variables outside the plan's control. For instance whether biodiversity targets are achieved under a strategic plan may depend on whether a new road is constructed or whether agricultural subsidies change. In this case 'Scenario or sensitivity analysis may be required (Therivel 2004). Scenarios can be generated to describe these different possibilities, and the strategic action's impacts can be predicted based on these scenarios. Comparison of the strategic action's impacts for different scenarios -- sensitivity analysis -- allows an analysis of the strategic action's robustness to different possible futures. Scenario-testing/sensitivity analysis reflects uncertainties, gives ideas for reducing uncertainties, leads to more robust strategic actions, and supports the precautionary principle. However it can be time and resource intensive.

3.8 *Mitigation*

Aim	Questions to ask	Checks to carry out
<ul style="list-style-type: none"> • Avoid, reduce, ameliorate or compensate for adverse impacts where appropriate • Determine significance of impacts after mitigation (residual impacts) 	<ul style="list-style-type: none"> • What opportunities are there for avoiding impacts on biodiversity, reducing the severity of impacts, restoring existing damage, and enhancing biodiversity? • What significant impacts on biodiversity remain after mitigation? • Are there opportunities to compensate for these, e.g. through habitat restoration elsewhere? 	<ul style="list-style-type: none"> • Will implementation of recommended mitigation measures result in biodiversity objectives being met? • Are the recommended measures tried and tested and known to work? • Will there be any temporary or permanent loss of biodiversity interest?
		<ul style="list-style-type: none"> • Are there opportunities for enhancement of biodiversity interest in the 'wider countryside'? • Have all available mitigation opportunities been identified?

Mitigation measures are actions taken to alleviate adverse effects, whether by controlling the sources of impacts, or the exposure of ecological receptors to them

(Treweek, 1999). One of the main benefits of SEA is that it allows mitigation action to be taken earlier in the decision-making process, so that significant adverse impacts on biodiversity can be avoided.

Mitigation can take a wide range of forms, but due to the limited effectiveness of many ecological restoration measures, every effort should be made to avoid significant adverse impacts on biodiversity before resorting to other measures (using the avoid-reduce-compensate-enhance sequence). Some adverse effects might be *avoided* through changes to the plan, such as adding, deleting or refining aspects of the plan or bringing forward new alternatives. Where environmental impacts cannot be avoided, it may be possible to *limit damage*. In some cases biodiversity would recover spontaneously if affected by proposed plan, and no "mitigation" other than time is required. In other cases, mitigation could be put into effect through provisions in later plans, requirements to carry out EIA for specific types of projects, etc.

Habitat creation and restoration are often promoted to mitigate adverse ecological impacts. However they are often ineffective or take a long time for satisfactory results to be achieved. *Compensation* should therefore only be used as a last resort, if loss of biodiversity is considered unavoidable. Mitigation banking can also be considered, possibly tied to BAP targets. This requires developers to compensate for loss or damage to any natural or semi-natural habitat by providing equivalent replacement habitat in terms of both quantity and quality). This technique is extensively used in the US for wetlands.

Biodiversity *enhancements* should be sought wherever possible, and provision of compensatory habitat through SEA offers significant opportunities for this.

Mitigation should aim to:

- Keep options open and flexible, so that further measures or other strategies can be put in place in the future;
- Involve 'no-regret' options which deliver benefits that exceed their costs;
- Find win-win options that contribute to the plan's desired outcomes and also improve biodiversity;
- Avoid decisions that will make it more difficult to improve biodiversity in the future.

SEAs should provide outline descriptions of the proposed mitigation measures, indicate how and when they would be implemented, and propose how they might be modified if unforeseen post-project ecological impacts manifest themselves. Where appropriate, authorities should make use of planning conditions or planning obligations to secure mitigation, compensation, or new benefits for nature conservation interests.

Once strategic-level decisions have been made, the impacts of specific projects or operations on biodiversity can be mitigated using

- Spatial measures, e.g. enhancing representative networks of protected areas
- Agreeing permanent or temporary 'no-go' or 'no exploitation' areas
- Level controls, e.g. limits on extraction of a resource or on volume or concentration of a discharge;
- Best practice (including appropriate technological advances).

3.9 Monitoring

Aim	Questions to ask
Propose a monitoring programme and auditing procedures	<ul style="list-style-type: none"> • What biodiversity issues need to be monitored? • What indicators/measures are to be used as a basis for monitoring and who will be responsible for data collection? • Is there a high level of uncertainty about predicted impacts or plan-outcomes for biodiversity? If so, recommend monitoring to reduce uncertainty.

Monitoring in SEA:

- allows the implementation of the plan to be checked, and remedial action to be triggered if unforeseen or undesirable negative impacts occur;
- helps to ensure that sufficient information about biodiversity is available for reliable impact predictions to be made in subsequent EIAs;
- helps to fill data gaps for the next round of SEAs;
- makes it possible to compare predicted and actual effects for auditing and quality assurance of SEA; and
- increases the general availability of biodiversity data.

An SEA monitoring framework should be established setting out:

- What biodiversity information is needed to check whether the plan is being implemented correctly, and whether it is having unforeseen effects
- How much of this information is available or needs to be collected; by whom; and how often
- Thresholds for triggering remedial action, and what the remedial action should be
- Mechanisms for disseminating biodiversity information collected, e.g. in EIA or second-generation SEAs.

Table 10 shows how a monitoring framework could be structured.

Table 10 Possible framework for SEA monitoring

SEA objective	What to monitor (indicator)	Where do monitoring data come from?	How often	When should action be considered?	What could be done if a problem is identified?
protect biodiversity at ecosystem, species and genetic levels	condition of protected areas and other sites of biodiversity importance	NBSAPs, other BAPs Universities, museums, herbaria, NGOs	every 2 years	When condition gets worse	consider ways of improving biodiversity protection, e.g. provision of wildlife corridors
improve air quality	air quality at monitoring points A, B and C	environmental health	monthly	When national air quality standards are exceeded	implementation of voluntary Air Quality Management Area

3.10 Consultation and decision-making

Aim	Questions to ask
Ensure that the opinions and information held by stakeholders are taken into account. Avoid conflict and enhance 'buy-in'.	<ul style="list-style-type: none"> • Have we been consulted? • Have our concerns and interests been taken into account? • Has consultation influenced the content and direction of the plan to benefit biodiversity interests?

Plan-makers should provide early and effective opportunities for relevant 'environmental authorities' and the public to express their opinion on the draft plan or programme and the SEA report before the adoption of the plan. It is good practice for the responsible authority to publish a statement when their plan is adopted which summarises how biodiversity issues have been taken into account in the plan-making process.

SEA feeds into all stages of the plan-making process. As such, several rounds of SEA consultations may be necessary for a given plan, for instance:

- Screening: determining if a plan or programme requires an SEA
- Scoping: deciding on the scope and level of detail of the information which must be included in the environmental report
- Consulting more widely on the draft plan and accompanying environmental report
- Decision to adopt: Information must be made available on the plan adopted, consultations, decisions made, and monitoring measures.

It can be helpful to record the results of consultation and to include them in the SEA report. Table 13 shows a possible structure for this.

Table 11 Possible structure for recording consultation responses

Organisation	Issue	Concern/ comment	How addressed in the SEA process	SEA report reference/ page number

3.11 Summary of tools and techniques

Table 12 summarises possible applications of tools used in identifying, predicting, evaluating and mitigating strategic-level impacts on biodiversity (after Therivel 2004).

Table 12 Possible applications of SEA tools

Type of technique	Technique	SEA stage					
		Describe baseline	Identify impacts	Predict impacts	Evaluate impact significance	Suggest mitigation	Ensure plan is internally coherent
Qualitative, participatory	Expert judgment	✓	✓	✓	✓	✓	✓
	Public participation	✓	✓	✓	✓	✓	✓
Mapping and simple spatial analysis	Spatial analysis techniques	✓	✓	✓	✓	✓	
	Land use partitioning or zoning analysis			✓			
Impact prediction and evaluation	Network analysis	✓	✓	✓		✓	
	Scenario/sensitivity analysis			✓		✓	
	Multi-criteria analysis				✓		
	Vulnerability analysis	✓		✓	✓		
	Risk assessment			✓	✓		
Sound planning	Compatibility appraisal					✓	✓

4. Bibliography, Useful Websites and Glossary

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Useful Websites

- **Convention on Biological Diversity.** Up to date information on action resulting from the 1992 and 2002 Summits. www.biodiv.org
- **Global Biodiversity Information Facility,** www.gbif.org
- **Quality of Life Assessment:** Approach promoted by English Nature, English Heritage, the Countryside Agency and the Environment Agency as a tool for maximising environmental, economic and social benefits in land-use planning: www.qualityoflifecapital.org.uk

Glossary

Biodiversity	'The variability among living organisms from all sources including, <i>inter alia</i> , terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.' (Convention on Biodiversity (1992), Art. 2)
Biodiversity Action Plan (BAP)	Any formal inter-agency plan produced by Parties to the Convention on Biodiversity, setting out actions to restore or enhance the status of species and habitats of conservation importance and concern. May be local, regional or national. Each Biodiversity Action Plan works on the basis of partnership to identify local priorities and to determine the contribution they can make to the delivery of the national targets.
Conservation objectives	the interest or conservation features for which a site is designated or protected. The conservation objectives for the site ensure that interest features are being maintained in a satisfactory condition on a site. The objectives define what constitutes favourable condition for each feature by describing broad targets, which should be met if the feature is to be judged favourable.
Consultation bodies	Organisations who must be consulted in the SEA process.
Cumulative impacts	Impact(s) resulting from the incremental effects of an action when added to other past, present and reasonably foreseeable future actions and processes.
Environmental impact assessment (EIA)	The process by which information about the environmental effects of a project is collected, analysed, and taken into account by the relevant decision making body before a decision is given on whether a development project should go ahead.
Favourable conservation status	<p>For habitats, status is considered favourable when: the natural range and area it covers are stable and increasing; and, the specific structure and functions necessary to its long term maintenance exist and are likely to exist into the foreseeable future.</p> <p>For species, status is considered favourable when: population dynamics data indicate that it is maintaining itself on a long term basis as a viable component of its natural habitat; the natural range is neither being reduced or is likely to be reduced into the foreseeable future; and, there is, and will continue to be, sufficient required habitat to maintain its populations on a long-term basis.</p>
Indicator	A measure of variable over time.
Indirect impacts	Impacts that are not a direct result of the strategic action, but occur away from the original impact and/or as a result of a complex pathway.
Mitigation	A measure to avoid, reduce or compensate for significant adverse impacts.
Mitigation Banking	A formal mechanism for compensating for environmental damage. It involves the identification of land similar to that affected by the proposal in terms of type, area and quality. Developers can set up

	their own 'banks' or purchase credits in banks established by others to compensate in advance for any adverse effects associated with their intended actions.
Monitoring	Surveying and interpretation of results carried out for the express purpose of detecting trends over time. For purposes of SEA monitoring is carried out to determine whether impacts occur as predicted, to detect unforeseen changes and to provide a basis for remedial action. Monitoring usually focuses on certain key indicators.
Objective	A statement of what is intended, specifying a desired direction of change.
Plan	A set of co-ordinated and timed objectives for the implementation of a policy.
Policy	The inspiration and guidance for action, setting a framework for subsequent plans and programmes.
Programme	A proposed set of linked projects or a series of similar or related projects proposed within a particular area.
Project	A set of works or measures implemented to meet a specific development need
Responsible authority	The authority responsible for preparing a plan and carrying out the SEA.
Strategic Environmental Assessment (SEA)	A systematic process for evaluating the environmental consequences of proposed policy, plan or programme initiatives in order to ensure they are fully included and appropriately addressed at the earliest appropriate stage of decision making on par with economic and social considerations (Sadler and Verheem, 1996).
Target	Detailed, quantitative objectives that can be monitored.