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AEWA

# AEWA Conservation Guidelines No. 11

## Guidelines on how to avoid, minimize or mitigate impact of infrastructural developments and related disturbance affecting waterbirds

Agency for Nature & Forests

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Agreement on the Conservation of
African-Eurasian Migratory Waterbirds (AEWA)

# AEWA Conservation Guidelines No. 11

# Guidelines on how to avoid, minimise or mitigate the impact of infrastructure developments and related disturbance affecting waterbirds

**AEWA Technical Series No. 26**

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## Step Chart

Infrastructure developments can have a range of potentially significant impacts on waterbirds and their habitats. It is therefore recommended that each country should take steps to avoid, minimize or mitigate such potential impacts by applying Strategic Environmental Assessment (SEA) and project Environmental Impact Assessments (EIA) as part of a robust and transparent system for planning and implementing sustainable development. These guidelines therefore depart from others in the AEWA series by setting out two sets of steps that may need to be followed. Each country should apply the appropriate steps according to the planning stage that has been reached in the development process. However, the steps should be seen as components of a partly iterative process, such that if necessary steps are returned to and revised in response to new information and decisions. Consultations with stakeholders should also take place throughout the SEA and EIA processes as necessary.

### SEA for policies, plans and programmes: step chart

1. Set up framework for participation and stakeholder involvement.
2. Screening: identify which policies, plans or programmes should be subject to SEA.
3. Set context and focus; decide on scope.
4. Undertake the assessment.
5. Use information in decision-making, improving the policy, plan or programme as necessary.
6. Implementation of policy, plan or programme: monitor, review and take remedial actions as necessary.

### EIA for infrastructure projects: step chart

1. Project screening: determine whether significant impacts are likely and if an EIA is required.
2. Scoping: set the terms of reference for the assessment.
3. Consider alternative locations, designs, methods, timeframes to avoid or minimise adverse effects.
4. Review and define baseline population conditions for waterbirds, their habitats and other important biodiversity attributes.
5. Identify the main potential impacts.
6. Evaluate and assess impact significance.
7. Make recommendations for mitigation that aim to ensure ‘no-net-loss’ of biodiversity.
8. Produce / review the Environmental Impact Statements.
9. Use the results of the EIA to support decision making.
10. Project implementation: monitor, review and take remedial actions as necessary.

# Introduction

## Infrastructure development and impact assessment

Infrastructure developments[1] (e.g. dams, railways, roads, airports, mines, buildings, wind-turbines, powerlines and pipelines) are a major source of ecosystem damage and habitat loss, which can have a variety of impacts on waterbirds (see Appendix A for examples). Such impacts may also be exacerbated by the tendency for some waterbirds to congregate in large numbers, such as in breeding colonies or at migration and wintering sites. Furthermore, some migratory species rely on a network of a few specific sites along a flyway over their annual cycle. As a result a relatively high proportion of a flyway, or even a global population can be affected by impacts at congregatory sites. Compared with some other species groups, migratory waterbirds are more likely to be exposed to cumulative and trans-boundary effects which may need to be appraised at a strategic fly-way scale (Boere et al. 2006). Infrastructure developments therefore need to be carefully planned and implemented to avoid biodiversity losses and to ensure that viable populations of waterbird species can be maintained across their ranges. Furthermore, appropriate planning may also provide opportunities for infrastructure developments to create or enhance habitat for waterbirds (such as the creation of wetlands after gravel extraction).

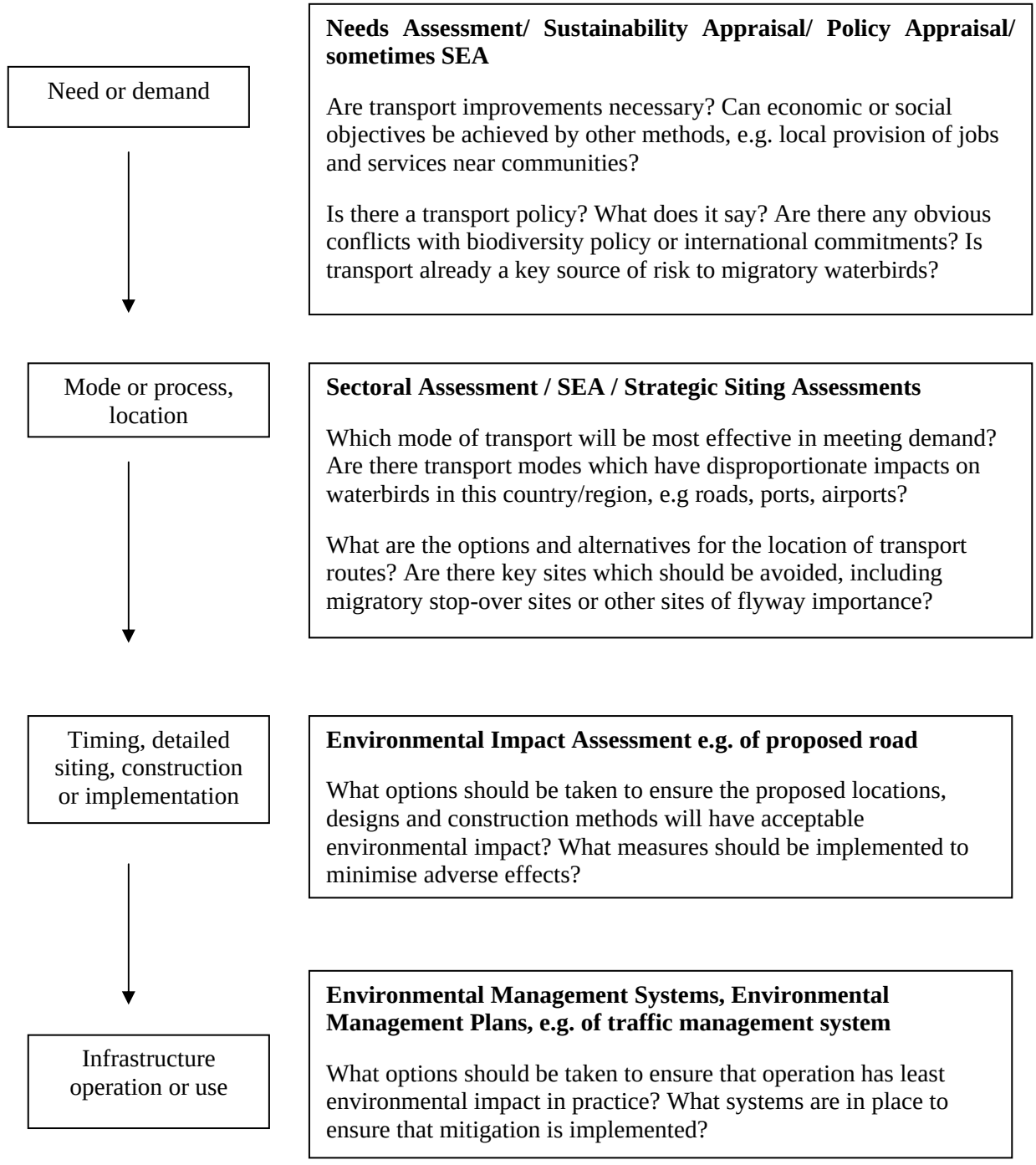
Infrastructure developments are typically initiated and controlled through planning policies and regulations, which are applied from international to local geographical scales. There is often a hierarchical or tiered process of decision making where decisions taken at one level are further developed in increasing detail down to the implementation of specific projects (see example in Figure 1). Consequently, there are opportunities at different stages of development planning, decision making and implementation to influence the need for infrastructure developments, their type, location, design, construction method and operation.

Impact assessment is an important tool for incorporating biodiversity considerations into the planning and implementation of infrastructure development. Environmental Impact Assessment (EIA) is used to identify likely significant adverse effects of individual project proposals, and to suggest ways in which these can be avoided or otherwise minimised or reduced to acceptable levels ('mitigation measures'). EIA is now mandatory in much of the world and is required by many international donor and financial institutions as part of their loan approval processes. However, the effectiveness of EIA is constrained by its focus on individual projects, which allows little opportunity to consider alternative sites/routes and cumulative impacts. The need to consider trans-boundary issues and mechanisms for inter-governmental co-operation at a flyway scale further complicates approaches to impact assessment where migratory species are concerned.

Strategic Environmental Assessment (SEA) is increasingly seen as a solution to many of the shortcomings of project EIA. SEA is 'plan-level impact assessment'. Its purpose is to ensure that the environmental consequences of a proposed policy, plan or programme (such as a regional development strategy) are appropriately addressed at earlier stages of decision-making, on a par with social and economic considerations. SEA often includes explicit requirements for cross-border consultation, allows a wider geographic frame of reference and potentially provides mechanisms for collaboration to enhance mitigation options. Importantly it provides an opportunity to incorporate the outputs of biodiversity and nature conservation policy-making into the planning of infrastructure development.

[1] Infrastructure developments are defined here as all physical human-made structures that provide or support residential, commercial or industrial functions.

**Figure 1. Key decision making and environmental assessment steps: an example for the transport sector**




SEAs and EIAs are mandatory in most countries, are required by many project donors and are recommended actions under the principal biodiversity conventions (see Appendix B and C). But despite this they are sometimes ignored and their effectiveness is often limited. A common constraint on both EIAs and SEAs is the adequacy of reliable baseline information on the biodiversity importance of sites (such as a site's flyway importance for a migratory species). Environmental Statements submitted by development proponents seeking consent for their proposals have also

highlighted a failure to consider impacts on ecological functions and processes, impacts beyond site boundaries and cumulative impacts (Byron and Treweek, 2005a, b). Furthermore, even when EIAs have been carried out effectively and have identified necessary mitigation and compensation measures, such measures may be ineffectively implemented and long-term management and monitoring is often inadequate. Such problems may be exacerbated by limited capacities and resources within governmental organisations to manage and review EIAs and for non-governmental conservation organisations and other stakeholders to scrutinise and contribute to them.

Limiting the impacts and disturbance caused by existing infrastructure is also an issue, requiring environmental management systems with mechanisms for monitoring and adaptive management. These are not always formally required as part of SEA and EIA, but can be effectively integrated with them, as can risk management procedures often used by infrastructure operators.

## Objectives and scope of these guidelines

The General Conservation Measures and Action Plan of the African-Eurasian Waterbirds Agreement (AEWA) include a number of obligations for Parties to assess and minimise the impacts of infrastructure developments on waterbirds (see Appendix C). The principal objective of these guidelines is therefore to assist Parties in meeting their obligations relating to impact assessment actions. In particular, they aim to help Parties avoid, mitigate and where necessary compensate for potential impacts of infrastructure developments on migratory waterbirds by:

- identifying the particular migratory waterbird issues that should be taken into account when assessing the impacts of different types of infrastructure development;
- highlighting the stages in SEA and EIA where waterbird issues should be taken into account;
- showing how SEA and EIA can be used to address cumulative and trans-boundary impacts;
- providing guidance on the design and implementation of practical measures that can be used to avoid, mitigate or compensate for infrastructure impacts on waterbirds;
- identifying requirements for further research and monitoring; and
- listing other sources of guidance and best practice standards for SEA and EIA, decision making and follow-up.

These guidelines focus on those issues that are particularly relevant to waterbirds and do not set out to provide detailed reviews of impact assessment principles and practices, which are extensively covered elsewhere in the literature. Some recommended sources of further information and guidance on such topics are listed in Appendix D. Although SEA and EIA are important tools, there are others which may be appropriate in some situations and which may be integrated with SEA or EIA to varying extents. These include sustainability appraisal, policy appraisal, various forms of integrated assessment and risk assessment.

The importance of SEA and EIA has been recognised by a number of international conventions and organisations, in addition to AEWA, including the Convention on Migratory Species (CMS), Convention on Biological Diversity (CBD), Espoo Convention and Ramsar Convention. Various resolutions and decisions by these conventions require parties to undertake impact assessments and some guidance has been developed on their application for the benefit of biodiversity. The European Union has also passed a number of Directives requiring SEA and EIA of various plans and projects. These existing initiatives are taken into account, but are not described in detail here.

Instead a brief summary of some of the key decisions on impact assessment is provided in Appendix B together with web links to their guidelines.

The benefits of streamlining and harmonising the recommendations and activities of the Conventions with respect to impact assessment are increasingly being recognised, hence this guidance attempts to provide advice which is in line with other key sources.

These guidelines are principally for officers in governmental institutions, responsible for implementation of biodiversity conservation and related environmental policies and regulations. However, it is anticipated that many of the recommendations will be of broader interest and of value to SEA and EIA practitioners, NGOs and others involved in waterbird conservation and environmental protection and management.

There are many different roles within the SEA and EIA processes. This guidance is primarily intended to help authorities to understand how waterbird issues can most effectively be addressed and to help clarify their expectations concerning what to expect from other 'player's whether these are proponents, practitioners or members of the public. In the case of SEA the proponent may be another government authority or department; in the case of EIA it may be a private developer. In either case the same general principles should apply.

## General Principles for Impact Assessment

It is recommended that all impact assessment should follow the general key principles developed by the International Association for Impact Assessment (IAIA 2005) with respect to biodiversity, as briefly summarised below. More detailed advice and guidance on the principles can be found in the toolkit produced by IAIA's CBBIA project and on the CBD Website (See Appendix D).

## Aim for conservation and "no-net-loss" of biodiversity

The biodiversity-related Conventions are based on the premise that further loss of biodiversity is unacceptable and this is reflected in the 2010 Targets agreed by Parties to the CBD to achieve a significant reduction in rates of biodiversity loss at the global, regional and national level; later endorsed by the World Summit on Sustainable Development and the United Nations General Assembly and incorporated under the Millennium Development Goals. Biodiversity must be conserved to ensure it survives, continuing to provide services, values and benefits for current and future generations. The following approach should be taken to help achieve no-net-loss of biodiversity.

1. Avoid irreversible losses of biodiversity (especially extinction of a species).
2. Seek alternative solutions that minimize biodiversity losses.
3. Use mitigation to reduce the severity of impacts.
4. Compensate for unavoidable losses by providing substitutes of at least similar biodiversity value.
5. Seek opportunities for enhancement as biodiversity is in global decline.

This approach can be called "positive planning for biodiversity." It helps achieve no-net-loss by ensuring:

- priorities and targets for biodiversity at international, national, regional and local level are respected, and a positive contribution to achieving them is made; and
- damage is avoided to unique, endemic, threatened or declining species, habitats and ecosystems; to species of high socio-economic value, and to ecosystems providing important services.

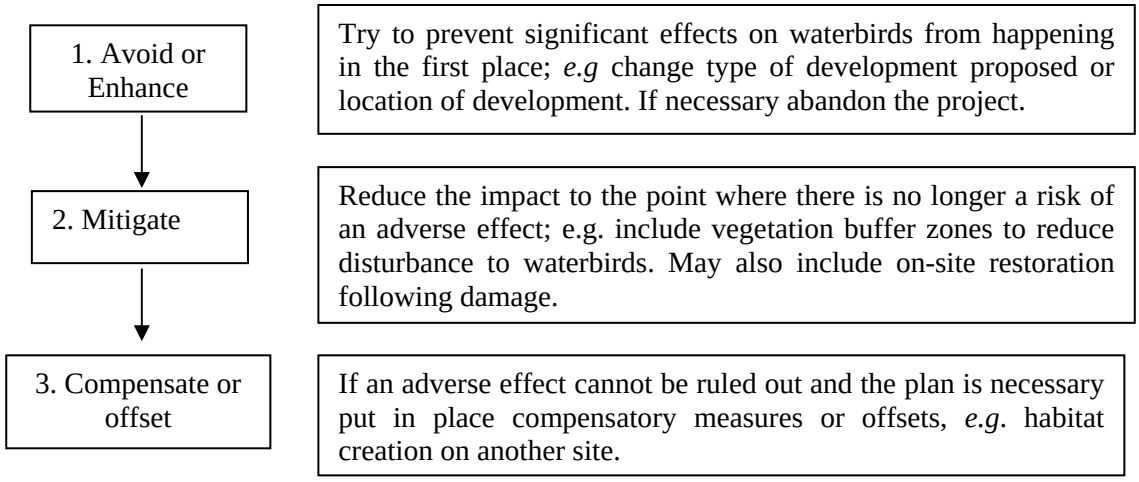
Certain general principles apply to mitigation, at whichever level or stage of planning impacts of infrastructure are assessed. Figure 2 reflects conventional good practice, with an emphasis on

avoidance of significant adverse impacts at source as the first objective, as well as seeking opportunities to enhance biodiversity. This is followed by efforts to identify mitigation measures to reduce or minimise impact and finally use of compensation or offsets to remedy unavoidable damage or loss.

However, it may not always be appropriate to follow this hierarchy rigidly because, for example, in some circumstances greater biodiversity benefits may arise from mitigation and compensation measures than avoidance measures. Similarly there is often a presumption to carry out compensation measures (e.g. the creation of a wetland) on site if this is possible. But in some cases this can lead to the creation of poor quality, fragmented or disturbed habitats. Instead it may be better to implement the compensation in a more suitable but nearby off-site location where, for example, the habitat may be more viable and may contribute to restoring habitat connectivity.

Thus the most important recommendation is to ensure that the biodiversity advantages and disadvantages of all feasible options are considered carefully and objectively.

*Figure 2. The mitigation hierarchy*




## Take an ecosystem approach

The CBD advocates an "ecosystem approach" because people and biodiversity depend on healthily functioning ecosystems that have to be assessed in an integrated way, not constrained by artificial boundaries (see Appendix B). The ecosystem approach is participatory and requires a long-term perspective based on a biodiversity-based study area and adaptive management to deal with the dynamic nature of ecosystems, uncertainty and the often unpredictable nature of ecosystem functions, behaviour and responses. Biodiversity concerns are not limited to protected areas. Elements of natural systems remain in even the most urbanized cities and play an often important role in the quality of life in those cities.

It is also important to recognize the benefits of biodiversity in providing essential life support systems and ecosystem services such as water yield, water purification, breakdown of wastes, flood control, storm and coastal protection, soil formation and conservation, sedimentation processes, nutrient cycling, carbon storage, and climatic regulation as well as the costs of replacing these services (Millennium Ecosystem Assessment 2005; Sukhdev 2008). In many cases infrastructure developments which are designed to be compatible with sustained ecosystem services have been found to be more efficient and to carry lower costs in the long-term.

## Apply the precautionary principle

The precautionary principle as defined in an environmental context in Principle 15 of the Rio Declaration states that: "*In order to protect the environment, the precautionary approach shall be widely applied by states according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation*".

Consequently it is a widely accepted view that the precautionary principle should be taken into account in impact assessment. This is particularly important because impact assessments are frequently constrained by uncertainty concerning the need for assessments (screening), which potential impacts should be assessed (scoping), the reliability of baseline information, the significance of predicted impacts and the likely efficacy of mitigation and compensation measures.

An important aspect of the precautionary principle is that the proponent of an activity should bear the burden of proof with regard to resolving uncertainty over possible impacts (Raffensperger & Tickner 1999). Thus proponents of potentially damaging infrastructure proposals should demonstrate that their proposed activities are likely to be acceptable before they can go ahead: it should not be incumbent on others to prove that the activities are harmful in order to have them stopped. Legal or policy requirements for a plan or project proponent to carry out an SEA or EIA and to provide decision makers with the information they need to decide whether environmental impacts are acceptable, are therefore important mechanisms for implementing the precautionary principle.

However, a review of the application of the precautionary principle (Tucker & Treweek 2005), concluded that the precautionary principle should be taken into account more often, more fully and more consistently in impact assessments, in accordance with the recommendation of the IAIA (2004) [final draft www.iaia.org] that the precautionary principle should be applied: "*in any situation where important biodiversity may be threatened, and there is insufficient knowledge to either quantify risks or determine whether effective mitigation could be implemented. Development consent should be delayed until best available information can be obtained in consultation with local stakeholders and experts and information on biodiversity is consolidated*".

Tucker and Treweek also made the following recommendations with respect to EIA, many of which are also applicable to SEA. The effective application of the precautionary principle should involve the following.

- 'Preventative anticipation': taking action to safeguard the environment if necessary before scientific proof is available on the grounds that a delay in the action could cause irreversible damage to biodiversity and to society.

- Preliminary investigations where necessary at the EIA screening and scoping stage to establish whether an EIA is required and what issues should be addressed within it. If any uncertainty remains that there will be impacts then an EIA should be conducted. If at the scoping stage there is uncertainty regarding a potentially significant impact then it should be included within EIA.

- Use of the best available information as the basis for impact assessment and mitigation recommendations.

- Consultation with stakeholders and interested parties to ensure that current and future dependencies on the environment are understood.

- Measures to reduce uncertainty, particularly where risks to biodiversity or the environment are high (in accordance with the draft IUCN resolution on the precautionary principle which states that, "*Subject to constraints of resources and capacity, application of the precautionary principle*

*should include efforts to seek further information and reduce uncertainties, and reassessment of the decision in the light of new information*").

- Evaluation of risks taking into account the severity of potential impacts and their likelihood of occurrence; such that the precautionary principle is invoked to avoid impacts that are: a) likely and significant, and b) unlikely but of potentially very high significance.
- Evaluation of risks on the basis of the worst-case scenario where there is significant uncertainty in impact predictions.
- Consideration of environmental risks in the absence of the proposed project.
- Restriction or banning of activities whose impact on biodiversity remains uncertain and possibly serious.
- Building in safeguards for ecosystem viability so that we protect the future ability of the environment to provide ecosystem services.
- Use of safety margins in project design, siting and management when proposing a project of a type or in an area where there is significant uncertainty about environmental outcomes.
- Proportionality of response: action and expenditure to safeguard biodiversity now may be less costly than future action.
- Duty of care: placing the onus of proof on those proposing to undertake an activity to demonstrate or provide reliable evidence that there will be no environmental harm.
- The implementation of compensation measures in advance of the project if there is significant doubt over their efficacy, and where potential impacts in their absence would be significant. The proponent must provide proof that adequate compensation has been provided before the project impacts that they are compensating for can take place. A judgement will, however, still need to be made on the long-term sustainability of the compensation, and the precautionary principle should be applied here if there is significant uncertainty regarding this.

Appendix E provides an example case study where a proposed port development in the UK was turned down in a public inquiry, partly through the application of the precautionary principle in relation to doubts over the possible effectiveness of compensatory habitat.

## Take a participatory approach

Impact assessments should always consult, and ideally involve, all stakeholders from as early as possible in the development process, e.g. to ensure that waterbird and other important biodiversity values are taken into account. In fact consultation is often built in as a part of national planning processes and legal requirements. The Espoo (EIA) Convention also has obligations for Parties to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across national boundaries (see http://www.unece.org/env/eia/eia.htm).

A fully participatory approach is recommended, going beyond limited legal requirements if necessary. Consultations should not merely consist of giving stakeholders the chance to comment on recommendations in the late stages of an SEA or EIA. Participation throughout enhances the quality of the process. For example, it can bring stakeholders together at early stages in the process to establish their interests and to identify their possible contributions to the impact assessment. They may be able to help identify important biodiversity values and ecosystem services, as well as likely impacts. Stakeholders should also be given the opportunity to discuss results and make recommendations to

decision-makers after technical assessments have been undertaken. As policy making and planning often does not follow a logical sequence of steps and the scope of plans may change over time, a flexible approach is preferable, with opportunities for iteration throughout.

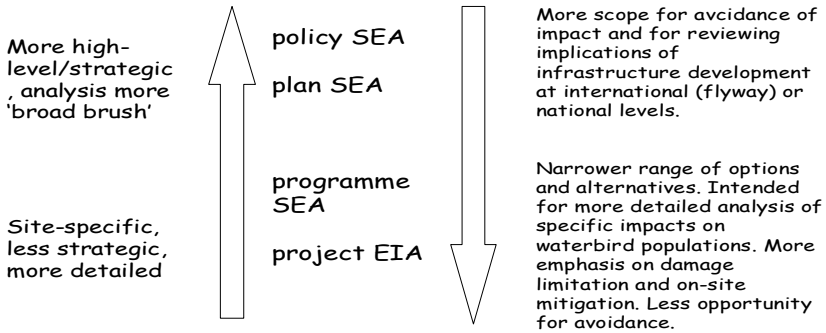
These general principles apply to impact assessment whether it is being conducted for 'plans' (SEA) or for projects (EIA). The main steps in SEA and EIA are outlined in the following sections with an emphasis on the integration of waterbird issues and concerns.

## Strategic Environmental Assessment

SEA is environmental assessment for policies, programmes and plans (hereafter referred to as 'plans') as opposed to projects. It provides a practical mechanism for planning sustainable development and is widely promoted through the environmental conventions (see Appendix B). In the EU, SEA is legally required for a wide-range of programmes and plans (but not policies) in accordance with EU Directive 2001/42/EEC on the Assessment of Effects of Certain Plans and Programmes on the Environment (known as 'The SEA Directive'); although SEA is not explicitly referred to within it.

SEA offers a number of advantages compared to project-specific EIA (see Figure 3). As it is applied at a higher level of plan and programme making, it can facilitate consideration of the environment in relation to fundamental issues (why, where and what form of development is appropriate) rather than addressing only how individual projects should be developed. The potential for environmental gain is much higher with SEA than with EIA.

*Figure 3. The relationship between Strategic Environmental Assessment of plans and project level Environmental Impact Assessment*




Guidance on the SEA Protocol produced by the UNECE (see Appendix D) lists the following general advantages of SEA:

- The opportunity to consider a wider range of alternatives and options at this level compared with the project stage.
- Influence over the type and location of development that takes place in a sector or region, rather than just the design or siting of an individual project.
- Enhanced capability to address cumulative and large-scale effects within the time and space boundaries of plans and programmes as opposed to the project level.

- Facilitating the delivery of sustainable development by addressing the consistency of plan and programme objectives and options with those of relevant strategies, policies and commitments.

- Streamlining and strengthening project EIA by 'tiering' it with SEA, thereby avoiding questions (e.g. whether, where and what type of development should take place) that have already been decided and taken into account with environmental issues.

SEA is a rapidly evolving field with numerous definitions and interpretations in theory, in regulations and in practice. Consequently approaches to SEA vary widely and their steps are less formalised than that of EIA. Nevertheless, there is a measure of agreement on the basic principles of SEA and the actions that need to be taken for its effective application.

- SEA should be undertaken by the authority responsible for a plan or programme, just as EIA is undertaken by the proponent of an infrastructure proposal. Ideally it should be a fully integrated part of the plan- or programme-making process;

- SEA should be applied as early as possible in the decision-making process when all the alternatives and options remain open for consideration;

- SEA should focus on the key issues that matter in the relevant stages of the plan or programme-making process. This will facilitate the process being undertaken in a timely, cost-effective and credible manner;

- SEA should evaluate a reasonable range of alternatives, recognizing that their scope will vary with the level of decision-making. Wherever possible and appropriate, it should identify the best practicable environmental option.

- SEA should provide appropriate opportunities for the involvement of key stakeholders and the public, beginning at an early stage in the process and carried out through clear procedures. Ideally, it should employ easy-to-use consultation techniques that are suitable for the target groups.

- SEA should be carried out with appropriate and cost-effective methods and techniques of analysis. It should achieve its objectives within the limits of the available information, time and resources and should gather information only in the amount and detail necessary for sound decision-making.

A summary of the key steps in SEA together with relevant waterbird considerations is provided in Box 1 and guidance on these steps is given below. It should be noted that a consultation step is not included. This is because, as discussed above, it is recommended that a participatory approach is carried out through the process.

## SEA Step 1: Set up framework for participation and stakeholder involvement

In order to achieve a transparent approach, an uncontroversial plan and a plan based on the best information available, it is essential to set up frameworks for effective participation by stakeholders. This may need to include stakeholders from other countries within migratory flyways. For example the Espoo Convention requires Parties to notify and consult with other Parties and to allow them to enter into consultations if it appears that the plan or programme may have significant transboundary effects, or if a potentially 'affected Party' requests it. Such transboundary consultations, (which may be done at the same time as public participation and consultation with the authorities), must lead to an opportunity for the concerned public and the environmental and health authorities in the affected Party to express their opinion on the draft plan or programme and the environmental report when it is produced.

If a plan may have a potential impact on waterbirds, then it would be clearly essential for the SEA to involve the statutory organisations responsible for biodiversity conservation as well NGOs with

interests in waterbirds, e.g. birdwatchers (especially those holding relevant data), bird conservation organisations, hunters and research organisations.

Key stages where formal consultation normally occurs are at screening/scoping stages (or at least early in the process); during the assessment of impacts and when the SEA report has been produced.

| **Box 1: Key Steps and recommendations for integrating waterbird concerns/issues in SEA** | | |
|---|---|---|
| **STEP/ PHASE** | **Tasks** | **Key waterbird considerations** |
| **Step 1: Set up framework for effective stakeholder participation and consultation** | | |
| Phase 1 | Identify the main organisations which should be involved and ensure that there are mechanisms for involvement and/or consultation. Facilitate development of a shared vision on problems, objectives and alternative actions to achieve them. | Ensure that the national agency for implementation of AEWA and other relevant biodiversity stakeholders are identified and involved.<br>If the plan has trans-boundary implications stakeholders from other countries should be contacted as early as possible and offered an opportunity to be involved. |
| Phase 2 | Examine, in cooperation with all relevant agencies, whether the objectives of the plan are in line with those in existing policies/plans, including environmental objectives (policy appraisal/ consistency analysis). NB SEA applied at the policy level requires a particular focus on the political, institutional and governance issues underlying decision-making processes (OECD/DAC). | Check the plan in relation to obligations under international and national biodiversity conventions and legislation etc, including African Convention, AEWA, Barcelona Convention, Bern Convention, CBD, CMS, Ramsar, national biodiversity strategies and, if relevant, EU Regulations and Directives etc. Review national biodiversity action plan and related policies. If the plan has trans-boundary implications similar reviews may be required for other countries. |
| **Step 2: Screening. Identify which policies, plans or programmes should be subject to SEA** | | |
| Phase 1 | Determine whether SEA is formally required for this plan. There may be legal or formal requirements to undertake SEA for certain types of plan (e.g. under the SEA Directive). Possible effects on protected areas are sometimes included as a screening criterion. | Establish whether there are possible impacts on protected waterbird sites or threatened species that may 'trigger' the need for formal SEA. |
| Phase 2 | Consider whether voluntary SEA would improve the sustainability of the plan. It may be advisable in cases where significant effects are possible or where undertaking SEA might result in a better or more sustainable plan. | Call for SEA to encourage public debate if SEA is not formally required, but important waterbird sites or threatened species are nevertheless affected (e.g. because not all important bird sites are protected). |
| **Step 3. Set context and focus; decide on scope** | | |
| Phase 1 | Set context and focus.<br>(NB baseline review can also be carried out as part of Step 4 depending on timeframe and resources). | Establish baseline information on the status and importance of waterbird populations and their sites. Then clarify the waterbird and other biodiversity conservation objectives for the area affected by the plan (see below). |

| STEP/ PHASE | Tasks | Key waterbird considerations |
|---|---|---|
| Phase 2 | Consider the spatial context of the plan, activities likely to be involved and possible effects. | Identify the possible effects of the plan and whether they constitute important direct or indirect drivers of change with implications for waterbird sites and populations. Consider the possible impacts and whether they could exacerbate any adverse trends identified in Phase 1; compare impacts with biodiversity objectives. |
| Phase 3 | Produce a conceptual framework and use this to help determine appropriate stakeholders, methods and timeframes for undertaking the assessment. If possible set criteria which will support effective assessment of effects in Step 4 (the Assessment). | Incorporate the biodiversity objectives identified in Step 3.1 into the framework. |
| Phase 4 | (Optional) Produce a scoping report to identify main issues and concerns for consultation and (also optional) hold a scoping workshop to allow stakeholders an opportunity for input. | Ensure waterbird issues are taken into account if necessary according to Step 3.1. |
| **Step 4. Undertake the assessment** | | |
| Phase 1 | Develop and compare alternatives. Identify main drivers and outcomes under alternative scenarios. Use information from consultation and other sources to confirm cases where the proposed plan might exacerbate existing adverse trends or alternatively provide opportunities for enhancement. | Compare the impacts of alternatives on waterbird sites and populations. Focus on the main direct and indirect drivers affecting waterbird populations already and in relation to the alternatives under consideration. Is the plan likely to be a significant factor in causing the conservation status of a species to decline or the integrity of key sites to be adversely affected? |
| Phase 2 | Suggest alternatives which will minimise adverse effects and maximise opportunities for enhancement or improvement. | If necessary, try to identify alternatives that avoid impacts on critical sites and species of particularly high conservation importance. Minimise other impacts and look for opportunities to contribute to waterbird conservation and other biodiversity objectives. |
| Phase 3 | Produce a report summarising key findings and provide justification for main recommendations from Phase 3. | SEA report should identify any key risks to waterbird sites or populations and suggest ways in which these can be avoided. Usually the report would be issued for consultation and review (see also Step 5) to determine whether or not the plan should be given consent to proceed. If there is a risk of significant trans-boundary impacts, consultation should take place with the relevant countries. |

| STEP/ PHASE | Tasks | Key waterbird considerations |
|---|---|---|
| **Step 5. Use information in decision making** | | |
| Phase 1 | Review SEA results. Consider how to incorporate them in the plan or how to improve the plan in the light of the results. | Ensure waterbird issues are taken into account and reflect the findings of the previous steps. |
| Phase 2 | For transparency explain results and approach taken to act on them. For example one of the responses to an SEA might be to plan mitigation or offsets in advance of future development. Under the SEA Directive the plan proponent must issue a statement. | It may be appropriate to explain how 'no-net-loss' has been achieved for key waterbird sites or populations, particularly in cases where there is high public interest. |
| **Step 6. Implementation of policy, plan or programme; monitoring, follow up and remedial action** | | |
| Phase 1 | Allow for monitoring, based on criteria identified at the scoping stage and used to assess suitability of alternatives. | Ensure that waterbird population indicators are included if there is a risk that they may subject to significant impacts. |
| Phase 2 | Review the plan at appropriate intervals to allow for any changes required to enhance the plan or reduce any unforeseen adverse consequences. | Ensure that appropriate waterbird monitoring results are available and taken into account in within the review process. |

## SEA Step 2: Screening: is SEA required for this policy, plan or programme?

Phase 1: determine whether SEA is formally required

The requirement to carry out SEA may be legally determined, as is the case under the SEA Directive, which lists those plans and programmes for which SEA is required (see Appendix B). There may be a requirement to undertake SEA for plans likely to affect important protected areas. For example, in the EU, the SEA Directive requires an SEA for any plan that triggers an Appropriate Assessment of sites that are protected under the Birds Directive or Habitats Directive, i.e. Natura 2000 sites (see Appendix B).

Phase 2: consider whether voluntary SEA should be undertaken

Irrespective of the legal requirements, a decision may be made to carry out SEA because of its potential benefits in terms of improving the sustainability of plans. SEAs can avoid significant delays later and result in significant cost savings in the long-run. For example, although carried out to meet legal requirements, a strategic assessment of potential impacts on protected areas from the German Federal Transport Infrastructure Plan showed that strategic level assessment is feasible and can avoid conflicts, costs and delays at subsequent project stages (Byron & Arnold 2008, see Appendix E for details).

Some types of plan are more likely to represent a risk to waterbird populations than others, and should therefore be subject to SEA. For example, alternative energy plans and transport plans are likely to represent a particular risk due to their scale and dispersed nature.

## SEA Step 3: Set context and focus; decide on scope

Phase 1: set context and focus

A key stage in an SEA (and for an EIA, as described below) is to identify valuable biodiversity components (such as threatened species) and ecological services that may be impacted by the plan and to quantify their baseline status. Thus in relation to waterbirds, the main aims of this step and phase would be as follows.

1. Identify species of conservation concern that may be impacted by the plan (e.g. AEWA-listed species), and then for each species:
    - evaluate the importance of the population that may be impacted in relation to its flyway population and its global population;
    - assess its recent and current status;
    - identify the key factors determining population levels; and
    - review trends in social and economic drivers to predict likely environmental pressures and impacts on each population, and then use this information to determine likely trends (in the absence of the plan). This will enable impacts to be assessed in relation to likely future events rather than a static assessment based on a ‘snap-shot in time’.
2. Identify particularly important sites for species of conservation concern (and other species that occur in large numbers), and quantify the importance of these sites in relation to their potentially impacted population, the flyway as a whole and the global population.

This step should also review and clarify the biodiversity conservation priorities for the area that is potentially affected by the plan in question. As a minimum, the plan should comply with legislative requirements and international obligations under the biodiversity-related conventions. Thus, with

respect to waterbirds and the objectives of AEWA, it would be important to select alternatives that avoid any significant population level impacts on the species covered by the Agreement. However, broader and deeper objectives should be developed that take into account and integrate all biodiversity considerations as well as waterbirds, and these should go beyond the minimum necessary to meet legal obligations.

Objectives should reflect the threat status of a species and the proportion of its population that may be affected by the plan. Priority should be given to globally threatened species, then, in turn, internationally (i.e. flyway scale for birds e.g. AEWA listed), nationally and locally threatened species (Hill *et al*. 2005). Similarly, priority should be given to species that are endemic to the area affected by the plan, followed by those with important proportions of their biogeographic population (flyway population) and then those with minor populations. Thus, the highest priority should be given to conserving globally threatened species, or habitats, that are endemic to the area affected by the plan.

A very high priority should also be given to protecting critical sites that hold a large proportion of a population. Such critical sites are particularly important for migratory waterbirds because the loss or degradation of the site may have a very large impact on the population as a whole. Indeed, some species, such as Red Knot (*Calidris canutus*) use relatively few sites as migratory staging posts and wintering areas. Therefore an impact on one such critical site could result in the loss of the flyway population if no alternatives exist.

For waterbirds within the AEWA region, it is possible to determine the proportion of the flyway population that occurs at a site (if well surveyed) by reference to various sources of published information on flyways (Scott & Rose 1996), flyway populations estimates (Delany & Scott 2004) and web-based site inventories and waterbird counts (see Annex D). See also existing AEWA "*Guidelines on the preparation of site inventories for migratory waterbirds*" and "*Guidelines for a waterbird monitoring protocol*".

A new and very important initiative aims to produce a 'one-stop shop' that will help authorities and impact assessment practitioners identify and conserve critical sites for waterbirds. This is part of the *Wings Over Wetlands (WOW) UNEP-GEF African-Eurasian Flyways Project*, which aims to "*improve the conservation status of African-Eurasian migratory waterbirds by assisting countries to take measures to conserve key critical wetland areas these birds require to complete their annual cycle, including their stop-over sites during migration and their wintering grounds*" (see www.wingsoverwetlands.org). The project is a joint effort between UNEP-GEF, the United Nations Office for Project Services, Wetlands International, BirdLife International, the UNEP/AEWA Secretariat, the Ramsar Convention Secretariat and a wide range of local partners along the African-Eurasian Flyways.

Part of the project is to establish a web-based Critical Site Network Tool. This will provide species and site data on all waterbirds in the AEWA region. Amongst other functions, it will calculate the percentage of the flyway population that occurs at a site and will identify critical flyway sites for each species. Critical sites have yet to be defined, but the tool will attempt to take into account the importance of the site in maintaining a coherent flyway network for the species (e.g. helping to maintain the coherence of SPAs in the EU). This will clearly provide an important function and all those involved with SEAs and EIAs potentially affecting waterbirds should refer to the project website and use the information as it becomes available [2].

[2] http://wow.wetlands.org/INFORMATIONFLYWAY/tabid/111/language/en-US/Default.aspx

Phase 2: Review plan

The scope of SEA may be defined by identifying:

- Likely contents and the main objectives of the plan or programme and its link with other plans or programmes (and possibly also policies);
- The geographic or spatial context of the plan and its possible effects on important sites or areas;
- Environmental objectives established at international, national and other levels that are relevant to the plan or programme including biodiversity/ waterbird objectives (as discussed above); and
- An initial list of environmental impacts that should be considered.

Phase 3. Conceptual framework

Begin to consider main alternatives (forms a basis for Phase 1 in Step 4) and produce a conceptual framework to clarify the main direct and indirect drivers of change that could have implications for waterbird populations.

Phase 4. Produce a scoping report to identify main issues and concerns for consultation

This is optional depending on the timeframe of the SEA relative to that of the plan itself; resources available and the desire or willingness of stakeholders and consultees to attend meetings.

## SEA Step 4: Undertake the assessment

Phase 1. Develop and compare alternatives.

Most SEA legislation includes a requirement to develop and compare alternatives and it can be a challenging task to identify viable and realistic options for comparison. Consideration of alternatives tends to be an iterative process in practice and it is often started early on, e.g. at the scoping stage, so that the SEA can be appropriately structured. A variety of approaches are used, with some SEAs being based on clear 'either/or' options (rail versus road, for example) and others being based on a 'mix and match' approach (integrated transport incorporating road and rail in different combinations). It is important that any assumptions or uncertainties should be clearly understood when developing scenarios for assessment. From a waterbird perspective, it is important to consider the main drivers of change and associated outcomes for waterbirds under the alternative scenarios in order to identify those most likely to represent a risk or result in a favourable outcome.

Phase 2. Suggest alternatives

Suggest alternatives that will result in a plan that minimises adverse effects on waterbird sites and populations and maximises opportunities to meet waterbird and other biodiversity conservation objectives (as outlined above in Step 3.3). This is a very important stage in the development planning process, because (as indicated in Figure 2), it provides the best opportunity for avoiding many impacts. By the time projects reach the EIA, stage, opportunities to avoid impacts 'at source' are often limited, particularly with respect to siting/ locational options.
Appendix E describes some strategic impact assessments of the Trans-European Transport Network that identified potential impacts and altered their schemes accordingly, as well as some that did not.

### SEA Step 5: Use information in decision-making

Phase 1: Use results of the assessment to modify or improve the plan

The purpose of SEA is to help develop a plan that will avoid significant adverse effects on the environment and, if possible, provide opportunities to enhance it. The ultimate goal is to help develop a 'sustainable' plan with minimal environmental costs; and there are documented cases where SEA has helped to improve plans by identifying previously hidden environmental costs/externalities. The SEA report is important as a means of communicating the main findings, but it is also important for those responsible for waterbird issues to have effective communication with the plan proponent and the opportunity to provide input to the process of plan development. SEA should be seen as an integral part of the planning process, not an adjunct.

Phase 2: Summarise how environmental considerations have been integrated into the plan and programme

To achieve transparency and 'buy in' from stakeholders, it is important for the plan proponent to show how environmental/waterbird considerations have been integrated with the plan and to explain what actions have been taken to ensure that waterbird sites and populations will be sustained following plan implementation.

### SEA Step 6: Implementation of policy, plan or programme

Phase 1. Allow for monitoring and follow up

Plans do not always work out as intended and there may be unforeseen consequences for waterbird sites/populations. Hence monitoring or follow-up is very important. Monitoring is more likely to be effective if it is structured around the same objectives and indicators used in the SEA process. If an objective-based approach has not been used, it will be necessary to suggest suitable indicators for monitoring and reporting the results.

Requirements for monitoring the impacts of plans on waterbirds should clearly be integrated with existing waterbird monitoring initiatives as much as possible, such the International Waterbird Census (Wetlands International) and monitoring of Important Bird Areas (BirdLife International) – see Appendix D. See also the AEWA *Guidelines for a Waterbird Monitoring Protocol*[3].

Phase 2. Review on a regular basis

Plans should be seen as 'live' and subject to review on a regular basis. AEWA representatives and other relevant stakeholders should be involved in such reviews if there are potential implications for waterbirds.

## Environmental Impact Assessment

EIA is a formalised process of evaluating the likely environmental impacts of a proposed development, taking into account inter-related ecological, socio-economic, cultural and human-health impacts. It is intended to provide the information needed to make a well-informed decision. EIA should explain the consequences and likely environmental outcomes of alternative options but does not necessarily provide a decision about whether or not a proposal should receive consent to proceed. EIA is not a decision-making process in itself, but aims to support decision making.

[3]http://www.unep-aewa.org/publications/conservation_guidelines/pdf/cg_9new.pdf

As a general rule, good EIA is implemented as an open, transparent and independent process. It allows for full participation by interested parties and is carried out at such a time and in such a way that its results can influence decisions and environmental outcomes.

The effectiveness of EIA in helping to deliver infrastructure projects which avoid significant adverse impacts on waterbird populations and their habitat is greatly enhanced if its principles and results are carried through into project operation and management, for example through environmental management plans and systems. As for SEA, the EIA process should be fully integrated with project design, implementation and management and should begin as early as possible, from the conceptual or pre-feasibility stage.

## EIA Steps

EIA procedures and methods vary considerably between countries but generally include the steps outlined in Box 2 together with their relevant waterbird considerations. Further guidance on these steps is given below.

In many systems, Screening and Scoping are dealt with as separate stages, which may be separated in time and all be subject to specific legal requirements or requirements for reporting and review by the authorities. In such cases the EIA may be defined as stage 3 to 6. In this guidance we treat all the steps 1-10 as being part of a linked EIA process.

It also should be noted that a consultation step is not included in Box 2. This is because, as discussed above, it is recommended that a participatory approach is implemented throughout the process.

**Box 2. The principal steps in EIA and key considerations for migratory waterbirds**

| EIA Step | Tasks | Key considerations for migratory waterbirds |
|---|---|---|
| 1: Project screening | Determine whether significant impacts are likely and whether these merit formal impact assessment. | Ensure potential impacts on waterbirds are considered, including whether these merit formal impact assessment. |
| 2: Scoping | Set terms of reference for the assessment. Review proposed project activities and likely implications in order to design an impact assessment which captures the main issues. Confirm consultation requirements. | Ensure that all potentially important impacts are to be assessed and check that the potential zone of influence includes all possible impacts on waterbirds. |
| 3: Consideration of alternatives | Consider alternative locations, designs, methods, timeframes to avoid or minimise adverse effects. | Identify alternatives that avoid the most significant impacts on highly threatened species and critical sites. |
| 4: Baseline review and population assessments | Define biodiversity distributions (temporal and spatial) and baseline conditions. Baseline = state and condition of biodiversity in the absence of the proposed project and accommodates trends, i.e. not just a static ‘snapshot’. | Review existing data, carry out surveys necessary to complete adequate assessment, identify key factors controlling populations and predict likely trends. |

| EIA Step | Tasks | Key considerations for migratory waterbirds |
|---|---|---|
| 5: Identification and prediction of main impacts | Identify ways in which the proposed project activities will drive changes in baseline conditions. Focus on key issues and provide evidence if possible. | Carefully consider all types of potential impact, including indirect impacts and off-site impacts. |
| 6: Evaluation and assessment of impact significance | Apply the precautionary principle and consider criteria/ set thresholds for determining significance. | Relate impacts to waterbird conservation obligations and broader biodiversity objectives. |
| 7: Recommendations for mitigation and compensation | Make suggestions in order to achieve 'no-net-loss' of biodiversity. Seek avoidance ahead of damage limitation or compensation. | Identify mitigation and compensation measures for waterbirds and quantify their likely effects and risks of failure. |
| 8: Production and review of Environmental Impact Statements | Produce a report documenting the results of the assessment. Ensure the EIA framework allows for consultation on the draft/ peer review. | Check that waterbird issues are clearly, objectively and accurately described. |
| 9: Decision making | Use the results of the EIA to support decision making. | Ensure that significant waterbird issues are taken into account, with obligations on the developer to implement mitigation measures with SMART objectives. |
| 10: Post-decision monitoring, auditing and follow-up | Ensure that the results of the EIA are built into environmental management systems for project implementation and operation. Review performance against any objectives and ensure mitigation measures have been implemented as proposed. Ensure there is a mechanism for remedial action if necessary. | Check that adequate before-after control-impact (BACI) monitoring is required. |

## EIA Step 1: Project screening

The purpose of the screening stage is to determine whether or not formal EIA is required. In these guidelines we are particularly concerned with whether or not EIA should be required for a proposed project from a biodiversity and especially waterbird perspective. However, screening decisions are not always made with biodiversity 'in mind' and biodiversity considerations are not always given the prominence they deserve in legislation. It is therefore essential that the competent authorities and others concerned with waterbird conservation issues ensure that project screening includes an adequate assessment of potential biodiversity impacts.

The CBD Guidance (see Annex B) gives some advice on how to set biodiversity thresholds for screening, based on the biophysical changes that will be caused by a proposal. In practice a requirement to undertake EIA for a proposed infrastructure project is most likely to be invoked if it is known that an internationally protected area or a habitat for a globally threatened species (i.e. IUCN Red Listed) will be affected. Typical EIA screening mechanisms include:

1. Listings of categories of projects for which EIA is automatically required (a positive list) or not required (a negative list). The EU EIA Directive, for example, incorporates this approach (see Appendix B).

2. Case-by-case screening based on the individual characteristics of a proposal (its size or the damaging nature of its activities) and the characteristics of the receiving environment (e.g. whether a proposal affects a designated or sensitive area).

3. Combinations of approaches.

The outcome of a screening decision might be:

- the proposed project is so damaging that it should not be allowed to proceed any further;
- full EIA is required to better understand project impacts and to design suitable mitigation because significant impacts are expected;
- a reduced level of EIA is adequate because the proposal is not expected to have significant effects; or
- no EIA is required because experience shows that effects would be negligible (i.e. the need for EIA is screened out).

Screening is generally based on existing information and there may not be much time to influence the outcome. The screening process should, as a minimum, use existing lists and maps for identifying protected areas and other important areas for waterbirds, e.g. Ramsar Sites, EU Special Protection Areas (SPAs), Important Birds Areas (see Appendix D for sources). Conservationists may support the process by proactively preparing spatial biodiversity plans, which can be used as a basis for producing 'screening maps' that indicate sensitive areas that should be avoided. A good example of this has been the production of a bird sensitivity map for onshore wind farms in Scotland (Bright *et al.* 2006).

It is therefore essential that competent authorities making screening decisions, and those with the opportunity to review or influence them, should ensure that all relevant existing information sources are taken into account (e.g. the flyway and site data sources listed in Appendix D) when deciding whether critical waterbird sites/habitat may be affected. Screening decisions (and subsequent scoping) should consider the entire potential zone of influence of a project, no matter how remote: they must not be based on arbitrary cut-off distances. The IEEM guidelines provide useful advice and an example on defining the zone of impact (see Appendix D).

Screening must also consider all the possible types of impact, as outlined in Box 3 (examples of such impacts resulting from various types of infrastructure project are given in Appendix A).

**Box 3. Potential types of impact on waterbirds**

The following types of impact may occur as on-site impacts (i.e. within the 'footprint' of the project area) or off-site (e.g. disturbance from a road or downstream pollution from a factory). The most important issue is to consider the whole zone of impact (which will vary according to habitat / species)

Infrastructure impacts may occur during construction, operation and decommissioning (removal) and may be temporary (e.g. disturbance during the construction phase of a project), long-term (e.g. a factory) or permanent (e.g. a gravel pit, even though the area may be restored to some form of wildlife habitat).

See Appendix A for examples relating to different types of project

| **Type** | **Description** | **Example impacts on waterbirds** |
|---|---|---|
| Direct impacts | Loss or degradation of the habitat or impacts on individuals resulting from the activities of the project. | Wetland loss from reclamation, mortality of birds from a wind farm, disturbance from a road. |
| Indirect impacts (including delayed impacts) | Knock-on impacts resulting from direct impacts or other indirect impacts. | Reduced breeding success of a waterbird due to reduced invertebrate food resources following loss of aquatic macrophytes as a result of eutrophication caused by sewage effluent. |
| Secondary impacts (or induced impacts) | Impacts that are not the result of the project itself, but arise because of later developments that were enabled by the original project. | Increased hunting of waterbirds after construction of a road to a previously isolated wetland. |
| Cumulative impacts | The combined result of other projects that have similar impacts, which may, by themselves, be insignificant. | Wetland fragmentation from several small housing developments and their roads, which results in the loss of species that require large areas of continuous habitat. |

As far as waterbirds are concerned, projects should always be subject to an EIA if they may have any of the following impacts.

- Impacts on threatened waterbirds, especially globally threatened species (i.e. IUCN Red listed) and other waterbirds considered to have an Unfavourable Conservation Status (as listed in Columns A or B of Table 1 of the AEWA Action Plan).

- Impacts on sites that hold large numbers of waterbirds at some point in the year (especially if the site population is a high proportion of the national population or flyway population; conventionally > 1%).

- Impacts on site that may be of critical importance because they support waterbird species (even if infrequently) that rely on a small number of sites on their flyway.

## EIA Step 2: Scoping: setting terms of reference for impact assessments which are appropriate for effective assessment of impacts on waterbird populations

The main purpose of scoping is to provide appropriate terms of reference for the EIA: identifying the issues that will be addressed, the methods that will be used to assess impacts, the proposed approach and timeframe. Scoping should also provide a basis for participation and consultation with affected parties. A participatory approach is generally seen as good practice, which may involve scoping workshops with relevant stakeholders, for example.

From a biodiversity perspective it is important to focus on key issues. There are never adequate resources available to study everything, and an all-inclusive approach can dilute key messages. On the other hand there is a risk that important issues may be 'scoped out' too soon. For this reason scoping and impact assessment should be seen as two formal rounds of iteration, allowing the EIA process to be adapted as necessary to deal with any previously unforeseen issues as more information becomes available.

Phase 1: desired outcomes for biodiversity?

As discussed under SEA Step 3.1, it is important to relate potential impacts (in this case from the project-level zone of impact) to biodiversity objectives for the combined potential zone of impact (which in an EIA is at the project level). It therefore helps to focus on desired outcomes for biodiversity from an early stage, including consideration of:

- the main biodiversity/waterbird values and ecosystem services that we wish to maintain in the environment; and
- the methods that should be used to assess the status of these and their vulnerability to proposed activities.

From the perspective of AEWA, the key objectives will be to maintain waterbird populations and contribute to other aims of the Agreement. However, these aims should form part of integrated biodiversity objectives that take into account other taxa and their habitats. For example, as a general rule, insufficient attention is often given to:

- diversity at ecosystem level;
- non-protected biodiversity; and
- ecological processes.

Phase 2: likely impacts

Scoping should identify all the activities that could arise from construction, operation or decommissioning of the project, and to consider these alongside the characteristics of the project environment that could be affected. The aim is to identify all the potentially significant impacts that should then be fully studied in the EIA. Thus scoping needs to be comprehensive, whilst screening only needs to determine if there are any impacts that should trigger the need for an EIA.

This scoping phase firstly involves identifying all the potentially important impacts of projects (see Box 3 and Appendix A). It is essential to consider all possible impacts, and not just those obviously associated with the direct footprint of the project. Because of the interconnected processes within ecological systems, initial impacts will often have knock-on or indirect effects on waterbird populations (e.g. off-site, downstream impacts on water quality, indirect effects on prey biomass mediated through food-chains). Secondary induced effects are also common (e.g. effects of

developments induced following road construction to remote areas). The European Commission has provided some guidance on this, including a scoping checklist (see Appendix B).

The second part of scoping impacts is to determine which potential impacts are likely to be sufficiently significant to require attention in the assessment. This can be difficult because the actual impacts of a project will depend on the species (and in some cases populations) involved, and this cannot be easily determined without further study. Assessment of the potential significance of impacts will be particularly difficult for novel projects, or projects in less studied regions or habitats. Thus the scoping assessment will often need to take into account high levels of uncertainty and follow an appropriate precautionary approach.

It is also important that the scoping process should stipulate appropriate methods for determining baseline conditions and assessing impacts (see Steps 4 & 5). For example, surveys must incorporate seasonality and allow adequate lead-times for the study of biodiversity. Clear decision-making criteria with respect to biodiversity/waterbirds should also be included in the scoping statement. (see also Step 6 on Evaluation).

## EIA Step 3: Consideration of alternatives: factors to consider when selecting alternatives or options compatible with waterbird conservation

EIAs should include a full consideration of alternatives, from the earliest possible stage in the development planning process. As discussed above, alternatives are more limited for EIA than SEA (see SEA Step 4), particular in terms of location. Political decisions and significant investment may have occurred by the time a project gets to an EIA, which may severely limit the scope for alternative locations.

Nevertheless, alternatives should be investigated as thoroughly as possible in an EIA. The principle aim at this stage is to avoid or minimise the most damaging impacts, e.g. as listed in the previous stage; whilst also looking for any opportunities for positive environmental benefits.

Consideration of alternatives should not be restricted to location and routing issues. All options for reducing impacts such as the timing of construction, design, construction methods and operational management should be investigated. For example, the selection of appropriate power-cable designs can significantly reduce the risks of bird collisions and electrocution (Haas *et al*. 2003).

## EIA Step 4: Baseline review and waterbird population assessments (including assessments of likely outcomes if the project does not proceed)

This step aims to define biodiversity distributions (temporal and spatial) and their importance (e.g. building on the previous identification of important waterbird populations). It is important to remember that baseline conditions are defined as the condition of biodiversity in the absence of the proposed project whilst taking into account likely trends (ie they are not a static assessment or snapshot). For example, a baseline assessment of a proposed development on a wetland that is turning to dry scrub as a result of natural succession should take into account the likely decline in waterbird numbers and increase in scrub flora and fauna.

Baseline assessments should further develop any assessments carried out as part of an SEA and should follow the same principles (see SEA Step 3.1). In an EIA the main focus will be on a specific site and therefore the assessment will typically be in more detail. However, the baseline assessment will need to assess the importance of the project site and its zone of impact in relation to local, regional, national, flyway and global populations. This will require a broader analysis of data, especially if the EIA is part of a tiered impact assessment supported by a previous SEA.

Some of the key waterbird-related questions to answer will include:

- Which species of conservation concern (e.g. species with an unfavourable conservation status) occur within the project site and its potential zone of impact in significant numbers?
- Which others species occur in sufficiently large numbers to be of importance, and, if so, where?

And for each of these species:

- How many are typically present, and are there significant differences between year, seasonal and diurnal variations, and if so why?
- What are their distributions and status elsewhere, and which populations are particularly important?
- What were their historical distributions, status and management?
- What are the key ecological requirements and factors controlling their populations?
- What are the likely trends in factors controlling their populations, and how are their populations likely to respond to future changes in these?
- Are there any other projects planned within the same area and time-frame that may contribute to cumulative effects?

Baseline assessments for SEAs are typically based on existing data (e.g. site inventories and monitoring data). Similarly an EIA should collate and analyse all relevant existing biodiversity data (see Appendix D for international waterbird data sources). This will normally need to be backed up by detailed site-specific surveys and, where necessary, ecological research. In fact a lack of suitable baseline data is one of the most common constraints on integrating biodiversity considerations into impact assessments, especially in remote regions and developing countries. The appropriate design and implementation of adequate baseline surveys is therefore a key component of a good EIA.

Although bird survey and monitoring methods are relatively well tried and tested (see Appendix D for some standard texts) there are a number of pitfalls in carrying out studies for EIAs. Box 4 lists a number of these potential pitfalls and offers some suggested solutions.

**Box 4. Baseline waterbird survey pitfalls and solutions**

| **Pitfalls** | **Possible solutions** |
|---|---|
| Important biodiversity components are not surveyed (e.g. food resources) | Consider biodiversity at all appropriate levels and ensure key components are adequately surveyed. |
| Biased and inaccurate count methods are used which produce poor data reducing the credibility of the biodiversity assessment. | Use well established appropriate techniques and sampling strategies (see Annex C), trained personnel and consistent methods. |
| Insufficient replication of counts reduces the precision of estimates and obscures temporal and spatial patterns of variation. | Establish necessary sample sizes (e.g. by preliminary surveys) and devote sufficient resources to the survey. |
| Survey methods change between years obscuring true trends. | Carefully document methods and consistently follow-them, using the same personnel if possible. |
| Surveys are carried out at inappropriate times and seasonal trends are overlooked. | Survey at the appropriate seasons and allow for enough survey time to take seasonal variations into account. |
| Assessments of importance are only based on peak-counts and do not consider turn-over of individuals. | Carry out marking studies if there is uncertainty about the importance of a site. |

| | |
|---|---|
| Analysis of use is only based on one year's data, which may result in sites of infrequent but critical importance being over-looked. | If surveys of more than one year are not possible (often the case), then check historical data sources, experts and local inhabitants to see if substantial inter-year variations occur. |
| Surveys overlook the importance of an area for night-time feeding or roosting. | Include night-time surveys. |
| Surveys do not include studies of flightlines, limiting their ability to predict collision impacts. | Include day and night flight-line surveys if the project may increase collision risks. |

## EIA Step 5: Identification and prediction of main impacts (including methods for describing and quantifying impacts)

In theory, impact assessment provides the information required to make well-informed decisions about the ecological, economic and social acceptability of a proposal. Biodiversity specialists working on EIAs have a responsibility to ensure that they exercise sound professional judgement as to the minimum data/ levels of confidence required to characterise the environment and make defensible predictions. The key challenge is to produce a sufficiently robust analysis in the face of insufficient data, uncertainty and often lack of political will.

Increasingly ecosystem services are seen as the main focus of assessments and the appropriate 'window' on biodiversity (e.g. see CBD 2006). However, it is important to remember that the provision of these services depends on the maintenance of biodiversity in a viable and functioning state. The EIA must therefore address the extent to which the sustainable provision of ecosystem services (now and in future) will be affected by a proposal. This depends on ecological processes, the 'nuts and bolts' of biodiversity structure and the 'cogs and wheels' of ecosystem functioning.

An EIA should assess impacts across the project's combined 'impact zone' as estimated for all the proposed activities during construction, operation and decommissioning. This should take account of the geographic area affected (include on- and off-site activities) and the timing, frequency and duration of each activity. Impacts should then be compared with the baseline assessment, if possible quantifying impact magnitude, extent, timing, frequency, duration and reversibility in terms of ecological outcomes. As a hypothetical example, the impact of a project might be the loss of 50% of suitable habitat of a nationally threatened AEWA-listed waterbird species, resulting in a permanent decline of approximately 50% in its wintering population within the zone of impact, (as the habitat is believed to be at carrying capacity), leading to a decline in its flyway population of at least 20% taking into account known alternative sites below carrying capacity).

In practice the prediction of impacts of an infrastructure development on a waterbird population is very difficult, particularly in relation to long-term and large-scale impacts. This is because of the complexity of ecological systems, which may provide resilience to some environmental changes but be sensitive to others. The factors controlling population levels in single species are also complex and impact assessments should ideally take the following into account;

- impacts on all population regulation factors (i.e. mortality, recruitment, immigration and emigration);
- population levels, mortality rates and recruitment levels in the flyway population as a whole, because changes in these may offset or exacerbate impacts from the project;
- the quality and carrying capacity of the impacted habitat and potential alternative habitats;

- possible density-dependent effects (e.g. improved breeding performance or survival rates following population reductions);
- site fidelity and its potential effects on the ability for displaced birds to locate and use alternative habitats;
- the role of sites in supporting functionally connected (coherent) site networks (e.g. as critical migratory staging posts or wintering sites); and
- the role of breeding sites in terms of supporting meta-populations or sink populations.

There are a range of approaches that can be used to predict impacts, which vary from expert judgements, perhaps supported by similar case histories (with post-development monitoring), to habitat based models (e.g. Goss-Custard *et al.* 1991) or individual's behaviour based models (e.g. West & Caldow 2006). It is beyond the scope of these guidelines to discuss these here, but some recommended sources of further information on impact prediction methods including modelling is provided in Appendix D.

In practice a thorough scientific examination of the above ecological processes is usually far beyond the scope of most EIAs, unless highly threatened species or sites of critical importance are involved. The most important thing is therefore to focus energy and resources on quantifying what are likely to be the most important impacts as they may actually influence planning decisions.

## EIA Step 6: Evaluation and assessment of impact significance (including application of the precautionary principle and setting thresholds for determining significance)

The key aim of this step is to relate any predicted impacts to legal obligations and environmental policies etc. Thus with respect to waterbirds, the competent authorities should ensure that impacts will not conflict with obligations relating to Ramsar, CMS Agreements for Annex I species, AEWA, Birds and Habitats Directive (if in the EU) and national legislation and biodiversity action plans etc. Thus the test of significance is not solely a scientific judgement but also relates to legal and policy issues.

Whichever method is used for predicting impacts there is likely to be considerable uncertainty, especially in relation to the long-term and large-scale impacts of a project. Thus, a key principle should always be to take a precautionary approach and assume that a reasonable prediction of an impact is valid until proven otherwise. For example, it would not be reasonable to assume that the presence of apparently suitable alternative habitat will compensate for habitat loss elsewhere, unless there is reliable supporting evidence.

## EIA Step 7: Recommendations for mitigation and compensation

Most EIA legislation requires the identification of mitigation measures for significant adverse effects where these cannot be avoided. As discussed above (see General Principles for Impact Assessment), mitigation measures should normally firstly explore all options for ***avoiding*** impacts on biodiversity before resorting to mitigation measures that seek to reduce impacts. This may entail adopting the 'do nothing' option, desisting from specific activities that may be particularly damaging or seeking alternative locations that avoid particularly important sites (e.g. critical sites for migratory waterbirds) or sensitive times (e.g. nesting periods).

It is normally only as a last resort or to reinforce any of the approaches above, that opportunities to compensate for significant residual impacts should be considered, through off-site restoration/ enhancement or through other forms of offset. For example the loss of 10 breeding pairs of a waterbird at one site, could be compensated for by the creation of suitable habitat for 10 pairs of the same species elsewhere. Or compensation could be by the enhancement of an area of degraded habitat, such that its carrying capacity is increased by 10 pairs of the target species. Such schemes are normally only

approved if they provide the same ecological values and functions as the impacted sites. They must therefore normally be near to the impacted site and should provide like-for-like habitats and/or species. They also often include additional contingency or bonus habitat, such that the amount of lost habitat is less than the area of gained habitat.

The European Commission has produced detailed guidance on compensation measures for impacts on Natura 2000 sites, in accordance with Article 6(4) of the Habitats Directive (see Appendix B). Although designed for the EU many of the principles are generally applicable and should probably be followed for other important sites for waterbirds.

The main recommendations concerning compensation measures are that they:

- have SMART biodiversity objectives (e.g. the maintenance of a breeding colony of xx pairs of species x in a defined area) that meet legal obligations and are agreed by relevant stakeholders;
- are realistic and based on sound ecological principles and evidence-based best practice species and wetland management (see Appendix D for guidance);
- take into account uncertainty in habitat restoration and management, by incorporating additional contingency habitat, contingency plans and systems for long-term adaptive management;
- have a sound legal basis such that they are mandatory and implemented if the development goes ahead and remain as appropriately managed conservation areas in perpetuity;
- have strict timetables that deliver compensation outcomes before significant detrimental impacts have occurred;
- have sufficient long-term financial arrangements to provide necessary ongoing management; and
- are adequately monitored and publicly reported on in relation to their stated biodiversity objectives.

The practice of using off-site compensation measures for wetland loss has been common in the USA and developed into mitigation banking (Bayon et al. 2007; Carroll et al. 2007). So-called mitigation banks are areas that are set-aside for wetland restoration or enhancement in perpetuity (e.g. under a trust) with a trust fund for management. Credits are then obtained in lieu of the wetland for impacts on similar wetlands nearby. The potential advantage of such schemes is that they can pool compensation measures into large areas of habitat that are more likely to be sustainable and of higher ecological quality than on-site habitat compensation measures that are often otherwise small, isolated and subject to disturbance etc. Wider approaches to biodiversity offsetting are being explored through the Business and Biodiversity Offsets Programme (see www.forest-trends.org). However, the practical benefits of mitigation banks and offsetting schemes are controversial and are beyond the scope of these guidelines.

## EIA Step 8: Production of Environmental (Impact) Statements from a waterbird perspective

An Environmental Statement (ES) is generally produced by the proponent and submitted to the competent authority for approval. The purpose of the Environmental Statement is to document the results of the EIA process and to highlight key issues.

The ES should be:

- based on the best and most up-to-date scientific data;
- clearly written in language which a non-specialist can understand; and
- made available for public review (including in other countries/jurisdictions where appropriate).

It should include:

- information on goals/objectives for waterbird conservation at different geographic scales;
- consideration of implications, which, for waterbirds, should describe how any identified impacts relate to any legal obligations and broader relevant waterbird priorities and objectives (e.g. AEWA obligations).

## EIA Step 9: Decision making

EIA has to fit into and influence a decision-making process. The EIA process is intended to identify adverse effects and to suggest ways in which these can be avoided or otherwise reduced to acceptable levels. Biodiversity may not be seen as a critical issue. It is therefore essential to deliver clear, concise messages and conclusions.

Phase: EIA review

Decisions about whether or not to give consent for infrastructure projects may rest on the adequacy of the EIA process or the information provided in the ES. It may be necessary to request further information from the proponent before reaching a decision.
In some countries, review of the ES is a mandatory step in EIA. Review may be undertaken by the competent authority or by an independent organisation on behalf of the competent authority. Where the ES is considered to be inadequate, the developer will be asked to provide additional information and the development consent decision process will not start until this information has been provided. There will usually be a procedure for appeal against requests for further information.

In other countries there is no formal requirement for review, but competent authorities will usually undertake some sort of review before starting the decision-making process, to ensure that the requirements of the legislation have been met. They will then usually have the power to ask for further information from developers before the decision-making process starts, if they consider the ES to be inadequate.

Review may also be undertaken informally by a developer prior to submitting the ES to the competent authority or by consultees after it is submitted, to check that the information is adequate. See Appendix B for EU guidance on how to undertake review of Environmental Statements (and a comprehensive review checklist).

Phase 2: Implications of results

EIA may provide evidence of irreversible and highly significant effects which cannot be avoided if the proposed project goes ahead. It is important to consider any legal requirements that might affect boundary conditions for decision making with reference to waterbirds.

As a general rule, avoid pitting conservation goals against development goals. It is important to balance conservation priorities with economically viable, socially and ecologically sustainable solutions. For important biodiversity issues, apply the precautionary principle where information is insufficient and risks are high (irreversible losses may occur) and the no-net-loss principle to ensure that key conservation interests are sustained.

Phase 3: Set any conditions on consent

Perhaps the most important limitation regarding the effectiveness of mitigation and compensation measures is that in many cases they are not implemented. This is because mitigation is not always legislated for, nor is monitoring to check whether mitigation has actually worked. It is therefore important to ensure that when developments are approved there are legal clauses in the planning permission / development licence that explicitly require the implementation of clearly defined mitigation measures and monitoring, and if necessary, adaptive management (see Step 10).

## EIA Step 10: Post-decision monitoring, auditing and follow-up

It is important to recognize that all predictions of biodiversity responses to perturbations is uncertain, especially over long time frames. Management systems and programs, including clear management targets (or Limits of Acceptable Change) and appropriate monitoring, should be set in place to establish whether the agreed SMART biodiversity objectives have been achieved.

Provision should be made for emergency response measures and/or contingency plans.

References to further guidance on monitoring strategies and methods is provided in Appendix D. An example case study of a comprehensive monitoring study of the impacts of the construction of a major road bridge is outlined in Appendix E.

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See also Appendix D for additional recommended sources of information

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# Glossary

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| **Alternatives** | These are different ways of achieving the goals or objectives of a plan or proposal. Alternatives are also referred to as options. |
| **Avoidance** | Measures taken to prevent impacts from happening in the first place. |
| **Baseline studies** | Work done to determine and describe the environmental conditions against which any future changes can be measured. |
| **Compensation** | Measures which may be taken to enhance, restore or create a habitat to compensate for residual impacts on a habitat and/or its associated species to achieve no-net-loss of habitat and/or species. Such measures are normally off-site, but as close as possible to the site. |
| **Cumulative effects** | The effects that result from changes caused by a project, plan, programme or policy in association with other past, present or reasonably foreseeable future plans and actions. Consideration of cumulative effects emphasizes the need for broad and comprehensive information regarding the effects. Cumulative effects may need to be considered at a flyway scale for migratory water birds. |
| **Environmental assessment** | Generic term used to describe the process of integrating environmental considerations into decision making by assessing the significant environmental effects. |
| **Environmental Impact Assessment (EIA)** | Environmental assessment as applied to projects. |
| **Indicator** | A measure of variables over time, often used to measure achievement of objectives. |
| **Mitigation** | Measures which aim to reduce impacts to the point where they have no adverse effects (i.e. no residual impacts). |
| **Monitoring** | Activities undertaken after the decision is made to adopt the plan, programme or project to examine its implementation. For example, monitoring to examine whether the significant environmental effects occur as predicted or to establish whether mitigation measures are implemented. |
| **Objective** | A statement of what is intended, specifying the desired direction of change in trends. |
| **Offset** | A wide range of measures that may be taken to offset residual impacts, e.g. habitat restoration, improved site protection and management, and capacity building. |
| **Plan** | A detailed proposal, scheme, program, or method worked out beforehand for the accomplishment of an objective. |

| | |
|---|---|
| **Plan-making authority** | The authority that writes the plan or project. |
| **Precautionary principle** | Prudent action which avoids the possibility of irreversible environmental damage in situations where the scientific evidence is inconclusive but the potential damage could be significant. |
| **Project programme** | 'The execution of construction works or of other installations or schemes — other interventions in the natural surroundings and landscape including those involving the extraction of mineral resources'. Defined in Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment (as amended by Directive 97/11/EC). |
| **Ramsar sites** | Sites designated as internationally important wetland habitats under the International Convention on Wetlands of International Importance (1976) (Ramsar Convention). |
| **Residual Impacts** | Impacts that remain after the effect of mitigation measures have been accounted for. |
| **Screening** | The process of deciding whether a plan or programme requires SEA or whether a project requires EIA. |
| **Scoping** | The process of deciding the scope and level of detail of an SEA or EIA, including the environmental effects and alternatives which need to be considered, the assessment methods to be used, and the structure and contents of the Report. |
| **SMART objective** | Specific, Measurable, Achievable, Relevant, Time-bound (specific) objective. |
| **Strategic Environmental Assessment (SEA)** | Generic term used to describe environmental assessment as applied to policies, plans and programmes. |
| **Sustainability Appraisal (SA)** | An appraisal of the economic, environmental and social effects of a plan from the outset of the preparation process to allow decisions to be made that accord with sustainable development. |
| **Sustainable Development** | A widely-used and accepted international definition of sustainable development is 'Development which meets the needs of the present without compromising the ability of future generations to meet their own needs'. |
| **Tiering** | The linking of assessments for policies, plans, programmes and projects to achieve a logical hierarchy and avoid unnecessary duplication of assessment work. |

## Appendix A: Summary of key impacts of infrastructure developments on migratory waterbirds (sources of impact)

This summary is based on a review of published scientific literature, environmental statements and other case study information. Although it is not comprehensive it includes the most frequent and significant impacts on migratory waterbirds within the AEWA region. This information can help in identifying the likely significant risks to waterbirds or their habitat and might be used, for example, when carrying out sectoral assessments or when scoping EIAs for particular infrastructure projects.

| Impact source / impact type | Direct mortality | Direct habitat loss (footprints) | Disturbance*a | Indirect habitat degradation | Secondary impacts | Cumulative impacts | Example references |
|---|---|---|---|---|---|---|---|
| Buildings and associated lighting*1 | Normally infrequent collisions, but tall glass and illuminated buildings can be significant hazards | Direct habitat loss often relatively low as wetlands are unsuitable for building, but some projects may involve land reclamation | Some avoidance of buildings and interruption of flight-lines etc in close to wetlands | Normally minimal | Disturbance from people; habitat alteration for aesthetic purposes (e.g. impoundment of tidal wetlands) | Significant especially along coasts and lakesides etc | (Klem 1990; Longcore & Rich 2006; Newton 2007) |
| Heavy industry, chemical plants, incinerators and power stations | Toxic pollutants can cause significant impacts | As buildings | As buildings but industry often located close to wetlands | Ecosystem disruption from pollutants can reduce food resources | | Industry often concentrates close to wetland areas | (Bull et al. 1983; Bustnes et al. 2006; Crivelli et al. 1989; Smits et al. 2007) |
| Quarries, mines (including spoil heaps) and landfill | Loss of eggs & chicks of ground-nesting birds from machinery etc | Extensive habitat areas can be lost, e.g. for peat extraction on mires and gravel extraction on | Can be substantial disturbance impacts on operational sites | Often hydrological disruption of surrounding habitats, possible impacts on water-bodies from silt-laden run-off and other pollutants | | High demands for aggregates and peat cause widespread impacts | |

| Impact source / impact type | Direct mortality | Direct habitat loss (footprints) | Disturbance*[a] | Indirect habitat degradation | Secondary impacts | Cumulative impacts | Example references |
|---|---|---|---|---|---|---|---|
| | | floodplains. Post-operation increase in some wetland habitats (but often of low quality) | | | | | |
| Transport: roads, railways, ports, airports | Some collisions may occur especially where roads cross flight-lines, but impacts relatively low | Relatively low, but often along coastal strips (causing coastal squeeze) and lakesides etc | Often substantial disturbance impacts, but waterbirds may become habituated especially if people are not visible | Hydrological disruption, polluted run-off and air-pollutants (esp NOx) can disrupt ecosystems and food resources | Increased hunting pressures and recreational disturbance if access is improved. Encourages development. | Significant growth in transport infrastructure in many countries | (Forman & Alexander 1998; Nilsson 1999; Spellerberg 2002; Trombulak & Frissell 2000) |
| Flood defences & land reclamation | | Can lead to significant loss of upper tidal habitat (coastal squeeze) | | Can have large-scale impacts on coastal geomorphology and adjacent habitat (e.g. sediment structure) and profound hydrological impacts on adjacent floodplains | Encourages developments in flood-protected areas | Climate change may increase need for flood defences (or abandonment / realignment in some areas) | (Davidson et al. 1991; Evans et al. 1979; McLusky et al. 1992) |
| Dams for hydro-power or water storage | Loss of eggs & chicks of ground-nesting birds from | Increases open water but maybe at the expense of | | Disruption of down-stream flow regime (e.g. causing low summer flows and | Reservoirs are frequently subject to significant tourism and recreational | | (BirdLife International 2004; McAllister et al. |

| Impact source / impact type | Direct mortality | Direct habitat loss (footprints) | Disturbance*[a] | Indirect habitat degradation | Secondary impacts | Cumulative impacts | Example references |
|---|---|---|---|---|---|---|---|
| | flooding | other waterbird habitats (e.g. mires). | | reduced flooding of adjacent wetlands) | impacts | | 2001) |
| Sewage works, water treatment plants and drains | | Normally small | Normally small | Often causes eutrophication which can increase food resources at low levels, but high levels cause severe ecosystem impacts | | | (Clark 2001; Mason 2002; Robledano Aymerich et al. 2008) |
| Oil and gas rigs and pipelines | Low level mortality from attraction to gas flares and collisions with rigs | Some habitat loss, but normally insignificant, esp if pipes are buried | Some disturbance related habitat loss during drilling & pipeline construction | | | | (Sage 1979; Wiese et al. 2001) |
| Wind turbines | Collisions can be significant where turbines are inappropriately placed | Normally insignificant from turbine, but service roads can be significant | Some species avoid breeding close to turbines | Can cause some hydrological disruption, e.g. as a result of service roads | | Potentially significant with increase in wind power schemes | (Drewitt & Langston 2006; Hötker et al. 2004; Huppop et al. 2006; Langston & Pullan 2003; Larsen & Guillemette 2007; Maxwell 2005) |

| Impact source / impact type | Direct mortality | Direct habitat loss (footprints) | Disturbance[*a] | Indirect habitat degradation | Secondary impacts | Cumulative impacts | Example references |
|---|---|---|---|---|---|---|---|
| Tidal barrages & impoundments | | Normally substantial loss of inter-tidal habitats (but depends on scheme and coastal topography) | Disturbance impacts near barrage structures, esp if a road is present | Changes in tidal flow will cause significant and wide-ranging changes (e.g. to sediments, salinity, nutrient loads, turbidity and oxygen levels) and ecosystem changes which affect food availability. | Barrages may be associated with road or rail bridges, which may encourage development etc | Displaced birds may not find alternative habitat if other tidal habitats are affected by infrastructure impacts | (Burton et al. 2003; Burton et al. 2006; Clark 2006) |
| Power lines, telephone lines, aerials and masts | Collisions and electrocutions can be significant, especially if placed on flight-lines near wetlands etc | Insignificant | Normally insignificant | | | Potentially significant | (Bevanger 1998; Newton 2007) |

**Notes:**

[*a] Can result in habitat loss from behavioural effects on waterbirds that result in areas becoming unused and energetic impacts (reduced feeding time and increased energy expenditure)

[*1] including housing, schools, military facilities, hospitals, shops, tourist facilities, offices, light-industrial factories.

## Appendix B: International Conventions and legislation requiring impact assessments with related guidance

***The Convention on Biological Diversity*** (CBD) (CBD 1998, 2000, 2002, 2003, 2006) directly requests Parties to carry out EIA for projects, programmes and policies likely to have a significant adverse impact on biodiversity (Article 14). It also requires Parties to integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans and programmes and SEA is an obvious tool for meeting this requirement.

There have been a series of decisions by the CBD-COP on information exchange and the development of guidelines for impact assessment. These have resulted in the production of voluntary guidelines on biodiversity-inclusive impact assessment (CBD, 2006). These were approved under COP decision VIII/28 (adopted March 2006) and Parties are encouraged to test and implement this. Key features include an emphasis on the Millennium Assessment Framework, encouraging a focus on the main direct and indirect drivers of change associated with development and on how these affect biodiversity and ecosystem services.

http://www.biodiv.org/decisions/default.aspx?m=COP-08&id=11042&lg=0

CBD Ecosystem Approach

http://www.cbd.int/programmes/cross-cutting/ecosystem/

***The Ramsar Convention*** (Ramsar Convention Secretariat 2002, 2004, 2006) also promotes SEA and EIA as tools. Ramsar's Article 3.2 requests EIA for developments affecting wetlands particularly at Ramsar sites. Ramsar guidance on impact assessment has recently been reviewed and re-issued.

http://www.ramsar.org/sc/37/key_sc37_doc22.pdf

***The Convention on Migratory Species*** (CMS) (CMS 2002) Resolution 7.2 (Impact Assessment and Migratory Species) calls for Parties to ensure that EIA and SEA include due consideration of potential impacts on migratory species, including trans-boundary effects. It also emphasises the importance of good quality environmental impact assessment (EIA) and strategic environmental assessment (SEA) as tools for implementing other Articles on protection of migratory species and species in the various Appendices to the Convention. In particular the CMS urges Parties to include consideration of possible impacts on migration, migratory ranges or migratory patterns in EIA and SEA.

http://www.wcmc.org.uk/cms/COP/cop7/proceedings/pdf/en/part_I/Res_Rec/RES_7_02_Impact_Assessment.pdf

***UNECE Convention on Environmental Impact Assessment in a Transboundary Context*** is an international agreement dealing with trans-boundary effects is the Espoo Convention (UNECE Convention on EIA in a Transboundary Context), agreed in Kiev in May 2003. The Espoo Convention Protocol includes a separate article encouraging the use of SEA in the context of policies and legislation. It will become effective once ratified by at least 16 countries.

*Protocol on Strategic Environmental Assessment* (Kiev, 2003) to the Espoo Transboundary EIA Convention.

www.unece.org/env/eia/sea_protocol.htm

### EU Directive 97/11/EC amending Directive 85/337/EEC on assessment of the effects of certain public and private projects on the environment

The European Commission (2001) has produced "*Guidance on EIA. EIS Review*", which consists of three guidance documents which cover the stages of Screening, Scoping and EIS review. The intention

is to offer practical guidance and help to those involved with EIA. Guidance has been designed to assist in better decision-making (Screening, Scoping documents) and to help production in higher quality EIS and better assessment of them (EIS review)

http://ec.europa.eu/environment/eia/eia-guidelines/g-review-full-text.pdf

**EU Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive**

Articles 6(3) and 6(4) require an Appropriate Assessment where a project or plan may give rise to significant effects upon a Natura 2000 site (i.e. sites identified as Sites of Community Importance under the Habitats Directive or classified as Special Protection Areas under the Birds Directive 79/409/EEC).

*Methodological guidance on the provisions of Article 6 (3) and (4) of the Habitats Directive 92/43/EEC* (European Commission 2001).

*Guidance document on Article 6(4) of the Habitats Directive 92/43/EEC* (European Commission 2007).

http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm#art6

European Commission Opinions relevant to Article 6 (4) of the Habitats Directive are also provided on the website.

**European Union Directive (2001/42/EC) on the Assessment of the Effects of Certain Plans and Programmes on the Environment**

Known as the SEA Directive, it came into effect in 2004 and applies to all 25 member states of the European Union. It requires an environmental assessment for certain plans and programmes at various levels (national, regional and local) that are likely to have significant effects on the environment.

Available guidance includes:

*Manual on Strategic Environmental Assessment of Transport Infrastructure Plans* (European Commission, DG Energy and Transport 2005).

*Commission's Guidance on the implementation of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment* (European Commission).

*Handbook on environmental assessment on Regional Development Plans and EU Structural Funds programmes* (European Commission 1998).

http://ec.europa.eu/environment/archives/eia/sea-support.htm

## Appendix C: AEWA requirements to consider impacts and mitigation

The fundamental principles of AEWA, as given in Article II, state that "*1. Parties shall take co-ordinated measures to maintain migratory waterbird species in a favourable conservation status or to restore them to such a status*". To achieve this they shall implement General Conservation Measures (as described in Article III) together with the specific actions determined in the AEWA Action Plan. Furthermore, in implementing the measures, "*Parties should take into account the precautionary principle*".

Of the General Conservation Measures listed in Article III, 2e is of particular relevance to actions relating to infrastructure developments and impact assessment. This states that parties shall "*investigate problems that are posed or are likely to be posed by human activities and endeavour to implement remedial measures, including habitat rehabilitation and restoration, and compensatory measures for loss of habitat*". Impact assessment measures would also support actions 2c and 2d with respect to the identification, protection and management of sites and networks of habitats of particular importance to waterbirds.

Section 4 of the AEWA Action Plan addresses the management of human activities and includes several measures that must be taken by parties that are of relevance to infrastructure impacts, including disturbance. In particular action 4.3.1 relates to impact assessments and states that "*Parties shall assess the impact of proposed projects which are likely to lead to conflicts between populations listed in Table 1* [Migratory Waterbirds] *that are in the areas referred to in paragraph 3.2* [Conservation Areas] *and human interests, and shall make the results of the assessment publicly available*".

Other measures that relate to infrastructure impacts include 4.3.5, which states that "*Parties shall, as far as possible, promote high environmental standards in the planning and construction of structures to minimize their impact on populations listed in Table 1. They should consider steps to minimize the impact of structures already in existence where it becomes evident that they constitute a negative impact for the populations concerned*".

Action 4.3.6 relates to disturbance impacts, which can arise from infrastructure developments, amongst others, and states that "*In cases where human disturbance threatens the conservation status of waterbird populations listed in Table 1, Parties should endeavour to take measures to limit the level of threat. Appropriate measures might include, inter alia, the establishment of disturbance-free zones in protected areas where public access is not permitted."*

## Appendix D: Recommended sources of information and guidance

### SEA and EIA guidelines

See Appendix B for guidance relating to conventions and EU Directives

- OECD-DAC SEA Guidance

  The OECD-DAC SEA Guidance published in 2006 presents a framework for addressing environmental risks and opportunities in the development and appraisal of policies, plans and programmes (PPP). This guidance partly arose from the Paris Declaration on Aid Effectiveness agreed in 2005, which called for improvements in the delivery and management of support to developing countries, and committed donors and their partner countries to "develop and apply common approaches for Strategic Environmental Assessment".

  http://www.oecd.org/dataoecd/4/21/37353858.pdf

- Guidance on the SEA Protocol produced by the UNECE

  http://www.unece.org/env/eia/sea_manual/documents/SEAmanualDraftFinalApril2007.pdf)

- IAIA's Best Practice Principles for Impact Assessment, Strategic Environmental Assessment and Biodiversity in Impact Assessment

  Principles generated by IAIA to encourage biodiversity-inclusive impact assessment, SEA and IA in general. Guidance to assist in the production of IA, SEA and biodiversity-inclusive IA

  www.iaia.org

- International Association for Impact Assessment (IAIA) Capacity Building for Biodiversity and Impact Assessment Project

  Guidance arising from the CBBIA-IAIA project. Outputs from the project include training manuals produced by the Southern Africa and South and Southeast Asia sections of IAIA. A wide variety of additional information on biodiversity-inclusive impact assessment is also available.

  http://www.iaia.org/modx/index.php?id=74

- *Environmental Impact Assessment legislation, policy and practice: towards global standards in relation to wetlands* (Pritchard 1995)

  Suggested guidelines for impact assessment where this may affect wetlands. The principles have been drafted after consultation with a variety of stakeholders. More recent developments in EA, such as SEA, are briefly discussed

  http://www.ramsar.org/archives/archives_pritchard.htm

- Institute of Ecology and Environmental Management's Guidelines for Ecological Impact Assessment in the United Kingdom

  Although these have been produced for the UK, they focus on ecological issue and most of the principles that are discussed are of general relevance to impact assessments. Many of the recommendations can be adapted for other countries.

  http://www.ieem.net/ecia/index.html

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**Bird survey and monitoring techniques**

- **AEWA Guidelines**

  *Guidelines for a waterbird Monitoring Protocol.*

  *Guidelines on the preparation of site inventories for migratory waterbirds*

  http://www.unep-aewa.org/publications/conservation_guidelines.htm

- **Wetlands International** – Information for waterbird counters

  http://www.wetlands.org/articlemenu.aspx?id=b436a507-3e14-4bfc-87d4-661a16a3c9b5

- **COWRIE** (Collaborative Offshore Wind Research Into The Environment) - Marine Bird Survey Methodologies

  A comparison of ship, aerial sampling methods for marine birds, and their applicability to offshore windfarm assessments. See also Camphuysen *et al* (2004) below.

http://www.offshorewindfarms.co.uk/Research/ResearchAreas/MarineBirdSurveyMethodology.aspx

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**Waterbird flyway and site data**

- Wings Over Wetlands: The African-Eurasian Flyways Project (UNEP-GEF, UNOPS, Wetlands International and BirdLife International)

  Part of the project is to establish a web-based Critical Site Network Tool, which will provide species and site data on all waterbirds in the AEWA region

  http://csntool.wingsoverwetlands.org/csn/default.html#state=home

- Flyway and site data for AEWA species

  http://bure.unep-wcmc.org/imaps/AEWA/viewer.htm?Title=AEWA

- International Waterbird Census (Wetlands International)

  http://www.wetlands.org/articlemenu.aspx?id=e661dd2b-3a70-4147-844e-a16ed86468ec

- Ramsar Sites Information Service

  http://www.wetlands.org/RSDB/Default.htm

- BirdLife International's Important Bird Area data

  http://www.birdlife.org/datazone/index.html)

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*Gratis copies of these books may be obtained by conservationists in developing countries. For more information, see http://www.nhbs.com/Conservation/gratis-books.php

**Habitat creation, restoration and management for compensation measures**

- Ramsar Convention principles and guidelines for wetland restoration

  http://www.ramsar.org/key_guide_restoration_e.htm

- Conservation Evidence

  A web-based information tool that aims to make conservation more effective by sharing knowledge as to which management interventions work and which do not. This is achieved in two ways:

  - Conservation Evidence - an online, peer-reviewed journal. This comprises original, previously unpublished observations. Each paper is a case study documenting the effectiveness of a conservation management intervention.
  - Summaries of previously published papers or reports that document the effectiveness of conservation interventions.

  http://www.conservationevidence.com/

- Coastal Habitat Restoration - Towards Good Practice

Guidelines produced from 'Living with the Sea', a four-year, UK based and EU LIFE Nature funded project. It is specifically designed to provide information to help deliver coastal habitat restoration, re-creation and creation.

http://www.english-nature.org.uk/livingwiththesea/project_details/good_practice_guide/Home.htm

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## Appendix E: Example case studies

### Proposed port development at Dibden Bay, UK

Associated British Ports proposed the construction of a major container shipping port, with a 1,850m deep water straight line quay capable of taking six container ships simultaneously. The proposed location was 202 ha of mudflat and open grazing land on the western shore of Southampton Water. The site and surrounding area is subject to international, national and local environmental designations. The foreshore is designated as a Ramsar Site (Wetland of International Importance) and a Special Protection Area under the Wild Birds Directive. The adjacent waterway is designated as a Special Area of Conservation (SAC).

The proposal was turned down after a long Public Inquiry. Uncertainty about the adequacy and sustainability of proposed ecological compensation in relation to adverse effects on the integrity of European designated sites was a key factor.

Permission for port developments that might affect a European designated site, i.e. a SPA or SAC, can only be granted if the integrity of those sites will not be adversely affected. Where adequate mitigation of adverse impacts is not possible, development can only be permitted if there are no alternative solutions and where imperative reasons of overriding public interest can be demonstrated. Should a proposal meet these criteria, there is a statutory requirement for Member States to ensure that compensatory measures are undertaken to protect the coherence of the network of SPAs and SACs (Article 6(4) of the EU Habitats Directive). In the UK the government has stated a commitment to ensuring that justified ecological losses are balanced with equivocal gains through the planning system.

However, compensation provided to offset losses of habitat associated with other port developments has not always been successful and there can be long delays between impacts and remediation. There are many risks and limitations associated with ecological compensation due to incomplete knowledge of ecosystem behaviour.

The documented failure of previous compensation attempts, combined with uncertainty about habitat creation and enhancement techniques, was a significant factor in the decision to turn down the proposal and to apply the precautionary principle in this case.

**Source:** Tucker, G., and J. Treweek. 2005. The precautionary principle in impact assessment: an international review. Pages 73-93 in R. Cooney, and B. Dickson, editors. *Biodiversity and the precautionary principle*. Risk and uncertainty in conservation and sustainable use. Earthscan Publications, London.

### Trans-European Transport Network Priority Projects and Natura 2000

BirdLife International recently completed a new study of the potential conflicts between the Trans-European Transport Network Priority Projects (TEN-T projects) and the Natura 2000 network of protected areas. The Natura network comprises Special Protection Areas (SPAs) designated under the EC Birds Directive and Sites of Community Importance (SCIs) identified under the EC Habitats Directive. When completed, the Natura 2000 network is expected to cover more than 20% of the territory of the European Union.

The TEN-T is the European Union's Transport Infrastructure Framework and now includes Priority Projects on 30 international axes plus wider transport projects. By 2020 it is envisaged that the TEN-T will include 89,500 km of roads, 94,000 km of railways, 11 250 km of inland waterways including 210 inland ports, 294 seaports and 366 airports.

The new study found that 379 SPAs (8.0% of all the SPAs in the EU25[4]) and 935 Sites of Community Importance/potential Sites of Community Importance (SCIs/pSCIs) (4.4% of all SCIs/pSCIs in the EU25) are likely to be affected by the twenty-one TEN-T Priority Projects analysed.

The study concludes that both strategic and detailed project level planning that fully integrates Natura 2000 considerations is required to avoid potential impacts. Indeed, this is required under existing EU environmental laws and the report describes the following positive examples that demonstrate that this is possible.

- The Habitats Directive Article 6(3) assessment of German Federal Transport Infrastructure Plan, which shows that consideration of Natura 2000 at the strategic level is feasible and can avoid conflicts, costs and delays at the project stage.

- The Integrated water management project on the Flemish part of the River Scheldt, which demonstrates that it is possible to plan integrated projects that reconcile transport development with nature and achieve a net gain for Natura 2000.

- The Øresund fixed link, which shows that it is possible to design projects, which reconcile transport and environment and minimise impacts on Natura 2000. In this case an International Expert Panel was established which prioritised consideration of environmental impacts and resulted in major changes to the project as originally conceived in response to negative effects.

- The Feasibility study on Rail Baltica railways, which demonstrates coordinated strategic planning and how environmental assessment can be incorporated.

However, unfortunately the report also lists the following examples where the impact assessment process needs to be improved.

- The Danube inland waterway axis, where the piece meal approach to project planning and lack of strategic planning/Strategic Environmental Assessment for the whole axis could result in basin-wide ecological impacts undermining the coherence of the Natura 2000 network and achievement of the objectives of the EU Water Framework Directive.

- The Via Baltica in Poland, where the lack of strategic planning and 'salami-slicing' of projects on a corridor has led to court challenges and delays/higher costs at the project level due to Natura 2000 conflicts.

- The lack of rigorous Habitats Directive Article 6(3) assessments of Spanish strategic infrastructure and Operational Programmes for EU funding, means that transport projects with potential impacts on Natura 2000 sites could be included in plans for spending EU funds.

**Source**: Byron, H., and L. Arnold. 2008. *TEN-T and Natura 2000: the way forward. An assessment of the potential impact of the TEN-T Priority Projects on Natura 2000*. RSPB, Sandy, UK. http://www.birdlife.org/eu/ten-t.html

**Monitoring of the impacts of the construction and operation of the Øresund Bridge between Denmark and Sweden on waterbirds**

In 1991, the Danish and Swedish governments signed an agreement to establish a fixed link across the Øresund between Sweden and Denmark. Øresundskonsortiet, a joint venture between A/S Øresund

[4] The first 25 countries to join the EU, thus in 2008 excluding Romania and Bulgaria.

and Svensk-Danska Broförbindelsen SVEDAB AB, constructed the permanent link. The link comprises a 16.4 km road and rail link between Copenhagen and Malmö consisting of a tunnel a 7.85 km bridge (including approach bridges) and an artificial island (approximately 4 km long and mainly made up of dredged material from the Øresund seabed). Construction started in 1993 and was completed at the end of 1999.

The Øresund is an important staging and wintering area for a number for waterbirds and there was clearly the potential for significant impacts from the link's construction (e.g. disturbance, sedimentation and pollution) and ongoing disturbance from road and rail traffic. Impacts on waterbirds were therefore monitored in relation to maximum acceptable impacts, which were set by the Danish environmental authorities. The monitoring was commissioned by Öresundskonsortium and carried out by NERI (Denmark) and Lund University (Sweden) scientists by comparing counts across three zones and time periods: for 2 years before the start of the main construction works, during construction and operation; within the expected impact zone, in a potential impact zone and an outer zone beyond impacts (i.e. control area). Other available bird monitoring and ecological data were also used to supplement the pre-construction period data and comparisons. The monitoring included general birds surveys and more detailed surveys of four key indicator species.

- Tufted Ducks (*Aythya fuligula*) were counted to assess disturbance and possible effects from sedimentation on their food supply.
- Mute Swans (*Cygnus olor*) were counted as an indicator of potential impacts on the benthic plant food supplies.
- Moulting Greylag Geese (*Anser anser*) were counted and neck banded on the nearby island of Saltholm to assess disturbance impacts.
- Detailed studies (including numbers, foraging locations and breeding success) were also made on the breeding colony of Eiders (*Somateria mollissima*) on Saltholm.

The results showed that a number of waterbird species including Tufted Ducks and Mute Swans avoided the areas close to the link during the construction phase, probably as a result of disturbance because food resources appeared to be adequate. However, waterbird numbers returned to similar pre-construction levels after completion of the works in the first operational season with traffic. Greylag Geese on Saltholm did not appear to be affected by the bridge construction works or operation. Similarly, the Eider monitoring studies found no evidence of significant impacts from the works, apart from some short-term possible disturbance affects from construction activities. Although, the number of breeding Eiders on Saltholm did decrease during the monitoring period, analysis of the demographic data and modelling suggested this was not related to construction activities.

**Sources**: Leif Nilsson pers comm.

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http://www.roadtraffic-technology.com/projects/oresund/

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