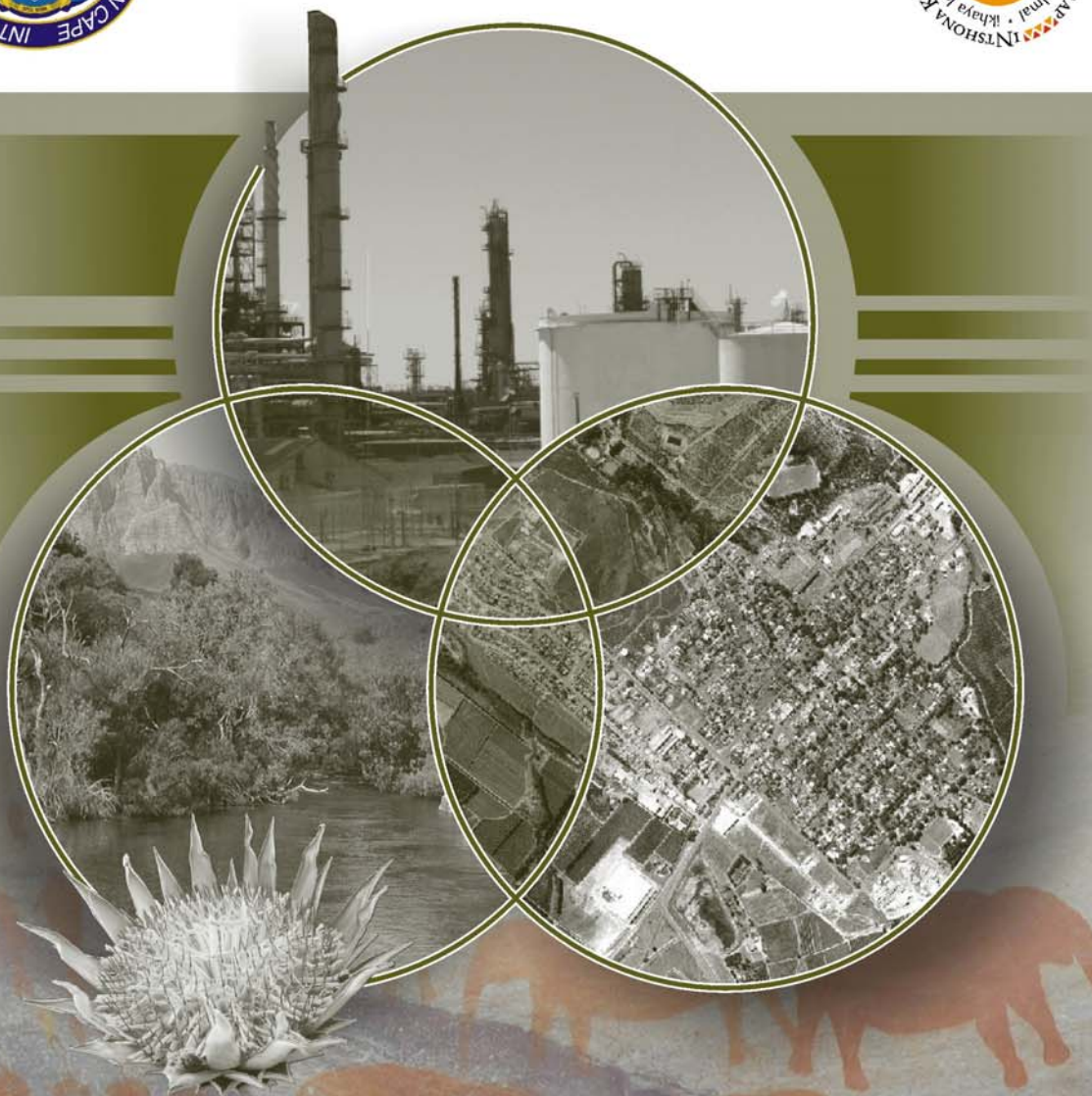
GUIDELINE FOR INVOLVING BIODIVERSITY SPECIALISTS IN EIA PROCESSES

PROVINCIAL GOVERNMENT OF THE WESTERN CAPE:
DEPARTMENT OF ENVIRONMENTAL AFFAIRS
AND DEVELOPMENT PLANNING



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PREFACE

The purpose of an Environmental Impact Assessment (EIA) is to provide decision-makers (be they government authorities, the project proponent or financial institutions) with adequate and appropriate information about the potential positive and negative impacts of a proposed development and associated management actions in order to make an informed decision whether or not to approve, proceed with or finance the development.

For EIA processes to retain their role and usefulness in supporting decision-making, the involvement of specialists needs to be improved in order to:

- Add greater value to project planning and design;
- Adequately evaluate reasonable alternatives;
- Accurately predict and assess potential project benefits and negative impacts;
- Provide practical recommendations for avoiding or adequately managing negative impacts and enhancing benefits;
- Supply enough relevant information at the most appropriate stage of the EIA process to address adequately the key issues and concerns, and effectively inform decision-making in support of sustainable development.

It is important to note that not all EIA processes require specialist input. Broadly speaking, specialist involvement is needed when the environment could be significantly affected by the proposed activity, where that environment is valued by or important to society, and/or where there is insufficient information to determine whether or not unavoidable impacts would be significant.

The purpose of this series of guidelines is to improve the efficiency, effectiveness and quality of specialist involvement in EIA processes. The guidelines aim to improve the capacity of roleplayers to anticipate, request, plan, review and discuss specialist involvement in EIA processes. Specifically, they aim to improve the capacity of EIA practitioners to draft appropriate terms of reference for specialist input and assist all roleplayers in evaluating whether or not specialist input to the EIA process was appropriate for the type of development and environmental context. Furthermore, they aim to ensure that specialist inputs support the development of effective, practical Environmental Management Plans where projects are authorised to proceed (refer to the *DEA&DP Guideline for Environmental Management Plans*).

The guidelines draw on best practice in EIA in general, and within specialist fields of expertise in particular, to address the following issues related to the timing, scope and quality of specialist input. The terms “specialist involvement” and “input” have been used in preference to “specialist assessment” and “studies” to indicate that the scope of specialists’ contribution (if required) depends on the nature of the project, the environmental context and the amount of available information and does not always entail detailed studies or assessment of impacts.

	ISSUES
TIMING	▪ When should specialists be involved in the EIA process; i.e. at what stage in the EIA process should specialists be involved (if at all) and what triggers the need for their input?
SCOPE	▪ Which aspects must be addressed through specialist involvement; i.e. what is the purpose and scope of specialist involvement? ▪ What are appropriate approaches that specialists can employ? ▪ What qualifications, skills and experience are required?
QUALITY	▪ What triggers the review of specialist studies by different roleplayers? ▪ What are the review criteria against which specialist inputs can be evaluated to ensure that they meet minimum requirements, are reasonable, objective and professionally sound?

The following guidelines form part of this first series of guidelines for involving specialists in EIA processes:

- Guideline for determining the scope of specialist involvement in EIA processes
- Guideline for the review of specialist input in EIA processes
- Guideline for involving biodiversity specialists in EIA processes
- Guideline for involving hydrogeologists in EIA processes
- Guideline for involving visual and aesthetic specialists in EIA processes
- Guideline for involving heritage specialists in EIA processes
- Guideline for involving economists in EIA processes

The *Guideline for determining the scope of specialist involvement in EIA processes* and the *Guideline for the review of specialist input in EIA processes* provide generic guidance applicable to any specialist input to the EIA process and clarify the roles and responsibilities of the different roleplayers involved in the scoping and review of specialist input. It is recommended that these two guidelines are read first to introduce the generic concepts underpinning the guidelines which are focused on specific specialist disciplines.

Who is the target audience for these guidelines?

The guidelines are directed at authorities, EIA practitioners, specialists, proponents, financial institutions and other interested and affected parties involved in EIA processes. Although the guidelines have been developed with specific reference to the Western Cape province of South Africa, their core elements are more widely applicable.

What type of environmental assessment processes and developments are these guidelines applicable to?

The guidelines have been developed to support project-level EIA processes regardless of whether they are used during the early project planning phase to inform planning and design decisions (i.e. during pre-application planning) or as part of a legally defined EIA process to obtain statutory approval for a proposed project (i.e. during screening, scoping and/or impact assessment). Where specialist input may be required the guidelines promote early, focused and appropriate involvement of specialists in EIA processes in order to encourage proactive consideration of potentially significant impacts, so that negative impacts may be avoided or

effectively managed and benefits enhanced through due consideration of alternatives and changes to the project.

The guidelines aim to be applicable to a range of types and scales of development, as well as different biophysical, social, economic and governance contexts.

What will these guidelines not do?

In order to retain their relevance in the context of changing legislation, the guidelines promote the principles of EIA best practice without being tied to specific legislated national or provincial EIA terms and requirements. They therefore do not clarify the specific administrative, procedural or reporting requirements and timeframes for applications to obtain statutory approval. They should, therefore, be read in conjunction with the applicable legislation, regulations and procedural guidelines to ensure that mandatory requirements are met.

It is widely recognized that no amount of theoretical information on how best to plan and coordinate specialist inputs, or to provide or review specialist input, can replace the value of practical experience of coordinating, being responsible for and/or reviewing specialist inputs. Only such experience can develop sound judgment on such issues as the level of detail needed or expected from specialists to inform decision-makers adequately. For this reason, the guidelines should not be viewed as prescriptive and inflexible documents. Their intention is to provide best practice guidance to improve the quality of specialist input.

Furthermore, the guidelines do not intend to create experts out of non-specialists. Although the guidelines outline broad approaches that are available to the specialist discipline (e.g. field survey, desktop review, consultation, modeling), specific methods (e.g. the type of model or sampling technique to be used) cannot be prescribed. The guidelines should therefore not be used indiscriminately without due consideration of the particular context and circumstances within which an EIA is undertaken, as this influences both the approach and the methods available and used by specialists.

How are these guidelines structured?

The specialist guidelines have been structured to make them user-friendly. They are divided into six parts, as follows:

- **Part A**: Background;
- **Part B**: Triggers and key issues potentially requiring specialist input;
- **Part C**: Planning and coordination of specialist inputs (drawing up Terms of Reference);
- **Part D**: Providing specialist input;
- **Part E**: Review of specialist input; and
- **Part F**: References.

Part A provides grounding in the specialist subject matter for all users. It is expected that authorities and peer reviewers will make most use of Parts B and E; EIA practitioners and project proponents Parts B, C and E; specialists Part C and D; and other stakeholders Parts B, D and E. Part F gives useful sources of information for those who wish to explore the specialist topic.

SUMMARY

This guideline deals with specialist input on biodiversity to the Environmental Impact Assessment (EIA) process.

The guideline gives an introductory background to, and key concepts underpinning, consideration of biodiversity in EIA. It looks at the role and timing of specialist input to the EIA process, and identifies the main triggers and and key issues requiring specialist input on biodiversity. These issues may emerge from the stakeholder engagement process, be evident from the nature of the receiving environment, or from the nature of the project.

The guideline covers the range of possible inputs by the biodiversity specialist. Specialist input can be given in the form of professional advice or judgement with minimal documentation, usually in the early stages of the EIA process; or can be given in the form of a detailed specialist assessment supported by often lengthy written reports in the latter stages of the EIA process.

The guideline looks at the role of the EIA practitioner in planning and coordinating specialist input, and the issues that need to be considered by that practitioner in finalising the biodiversity specialist's terms of reference. The establishment of appropriate time and space boundaries, development alternatives, environmental and operating scenarios, a suitable approach to providing specialist input, stakeholder involvement, confidentiality issues, as well as the timing, sequencing and integration of the input need to be considered.

The guideline addresses the role of the biodiversity specialist in providing the right information in the best way to inform the EIA: from predicting through assessing and evaluating the potential significance of impacts, to recommending management actions (including mitigation, enhancement) and monitoring programmes, and reporting. The establishment of impact assessment criteria and thresholds of significance are important steps in the assessment and evaluation process. Risks and uncertainties, gaps in information and/or limitations to the study, as well as confidence levels in the specialist input should be clearly stated. Affected parties who stand to benefit or 'lose' from impacts on biodiversity should be identified.

Finally, the guideline gives advice on reviewing the biodiversity specialist's input. A list of useful resources that may assist the reader in better understanding best practice consideration of biodiversity in EIA is provided.

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BIODIVERSITY SPECIALIST GUIDELINE

PART A : BACKGROUND

This part of the guideline introduces the field of biodiversity, gives principles and concepts underpinning specialist input on biodiversity issues, impact assessment and management, contextualizes specialist input and looks at the role and timing of specialist input in the EIA process.

1. INTRODUCTION

Biodiversity is the variability among living organisms from all sources including, amongst others, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. It covers the composition, structure and function of living organisms, and includes diversity within species at a genetic level, between species and of ecosystems, as defined by the Convention on Biological Diversity (1992) and the recently promulgated National Environmental Management Biodiversity Act (Act No. 10 of 2004) (hereinafter referred to as 'the Biodiversity Act').

South Africa has ratified the Convention on Biological Diversity (CBD), which means that it has an international obligation to work towards conservation of its biodiversity. In terms of this Convention, conservation entails:

- The protection of species and ecosystems that warrant national protection;
- Sustainable use of indigenous biological resources; and
- The fair and equitable sharing of its benefits.

The Western Cape has a number of globally important ecosystems which provided an irreplaceable source of goods and services for the residents and economy of this province. Development pressure in the Western Cape is growing and, in many cases, affects threatened ecosystems or species.

Environmental impact assessment (EIA) in South Africa has shown a number of shortcomings with regard to the incorporation of biodiversity in the past; amongst others, consideration of only selective components of biodiversity, inadequate scoping of biodiversity issues, little consideration of cumulative impacts, problems defining significance of biodiversity impacts, and scant attention to ecosystem services[1].

For these reasons, the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) embarked on the process of developing guidelines for the involvement of biodiversity specialists in EIA processes.

[1] Brownlie and Wynberg 2001.

2. PRINCIPLES AND CONCEPTS UNDERPINNING BIODIVERSITY SPECIALIST INVOLVEMENT IN EIA PROCESSES

This section looks at:

- The context of biodiversity in society and its role in sustainable development;
- Principles underpinning consideration of biodiversity in EIA;
- Common biodiversity terminology; and
- The meaning of 'biodiversity specialist'.
- Generic principles for involving specialists in EIA processes;
- Common EIA terms and concepts

2.1 CONTEXT OF BIODIVERSITY IN SOCIETY, AND ITS ROLE IN SUSTAINABLE DEVELOPMENT

Biodiversity is the living component of that natural environment which underpins **ecosystem processes** and the provision of **ecosystem services** (Box 1 and Figure 1). Human wellbeing is inextricably linked to these services, and biodiversity is the basis for them[2]. Biodiversity is the basis for evolution and adaptation to changing environments, and can be seen as 'life insurance for life itself'. If we allow that biodiversity, and the capacity of ecosystems to deliver services, to deteriorate, people's wellbeing will suffer sooner or later[3].

Biodiversity depends on its '**pattern**' and on '**process**' (Box 1). To conserve biodiversity, it is important to represent the full variety of pattern of living organisms, and to ensure their persistence by maintaining ecological processes.

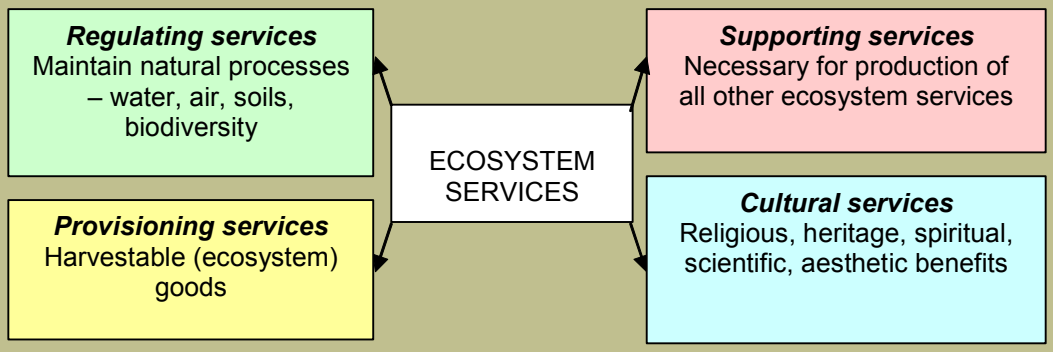
[2] Millenium Ecosystem Assessment, 2003, Scholes and Biggs, 2004.
[3] Scholes and Biggs, 2004.

Box 1 : Biodiversity pattern and process, and ecosystem services and goods

- '**Pattern'**, encompasses biodiversity *structure* and *composition*. It refers to genetic variability, and the number and distribution in space and time of populations and species, communities, ecosystems and landscapes.
- '**Process'**, also known as *function*, refers to the interactions and roles of living organisms, populations, species and communities, which allows the biodiversity pattern to persist. There are *spatially fixed* processes (e.g. linked to physical features such as soil or geological interfaces) and *spatially flexible* processes (e.g. where there are several options to link mountains and the coast) [4].

  Conserving processes requires a significantly larger proportion of the landscape than is needed to represent biodiversity pattern.[5] So, the sound management of land use in the vicinity of areas set aside for conserving pattern (e.g. protected areas) is essential.

  Pattern and process underpin **ecosystem services**, including **ecosystem goods**.
- Many '**ecosystem services'**[6] have indirect use value in terms of providing, regulating and supporting services such as freshwater yield, purification of air and water, breakdown of wastes, flood moderation, storm and coastal protection, soil formation and conservation, sedimentation processes, nutrient cycling, carbon storage and climatic regulation, pollination of commercially valuable crops and biological pest control. Biodiversity has social value in terms of aesthetics, providing a sense of place, culture, heritage[7] and spirituality, amongst others. The conservation of biodiversity itself is regarded as an ecosystem service, in that it provides options for future potential use (e.g. medicine, food, etc.) and insurance against such things as climate change.



- '**Ecosystem goods'** are a subset of ecosystem services (provisioning services) having direct use value. They include, for example, firewood, food, medicines, raw materials, and pest control agents.

[4] Rouget *et al.*, 2003.
[5] Pressey *et al.,* 2003.
[6] Millenium Ecosystem Assessment , 2003.
[7] The National Heritage Resources Act (Act No. 25 of 1999) interprets 'heritage' broadly, to include natural and living landscapes and objects deemed to be of heritage or cultural significance.

2.2 BIODIVERSITY PRINCIPLES

Key principles for sustainable development in general, and ecologically sustainable development in particular, are given below. These principles underpin the consideration of biodiversity in EIA, and indicate desired outcomes. They are dictated by international conventions which South Africa has ratified or signed, and reflected in accepted best practice world-wide[8]:

- A long-term perspective of biodiversity should be adopted to promote intergenerational equity;
- Biodiversity should be protected, and natural capital maintained at or near current levels, with best efforts made to replace or offset loss ("**no net loss**" principle);
- Prevention of impacts on biodiversity is better than cure in terms of risk and investment of resources;
- Biodiversity issues should be integrated into decision-making;
- An ecosystems approach to evaluating effects and impacts should be taken, recognizing that humans are a component of ecosystems on which they depend;
- The rights to an environment (including biodiversity) not detrimental to health or well-being must be respected;
- The requirements of international laws and conventions relating to biodiversity, as well as national and provincial legislation, should be met;
- Thorough and early consideration of alternatives is the optimum way to determine the best practicable environmental option to meet proposal objectives whilst preventing or avoiding loss of biodiversity;
- Resource use should operate within the regenerative capacities, whilst pollution/waste outputs operate within assimilative capacities of the natural environment;
- Both biodiversity pattern and process should be conserved;
- Ecosystem services should be safeguarded, giving due consideration to the costs of replacing these services should they fail;
- A risk-averse and cautious approach should be taken where either information and/or the level of understanding is inadequate, where impacts are unprecedented or where there is inherent uncertainty as to the significance of impacts, or there is an element of substantial risk of irreversible impacts which could lead to irreplaceable loss of natural capital;
- Traditional rights and uses of, and access to, biodiversity should be recognised, and any benefits of commercial use of biodiversity should be shared fairly.

[8] "Biodiversity in Impact Assessment" - IAIA's principles and Practices Series, CBD's and Ramsar principles for incorporation of biodiversity in EIA (see reference list).

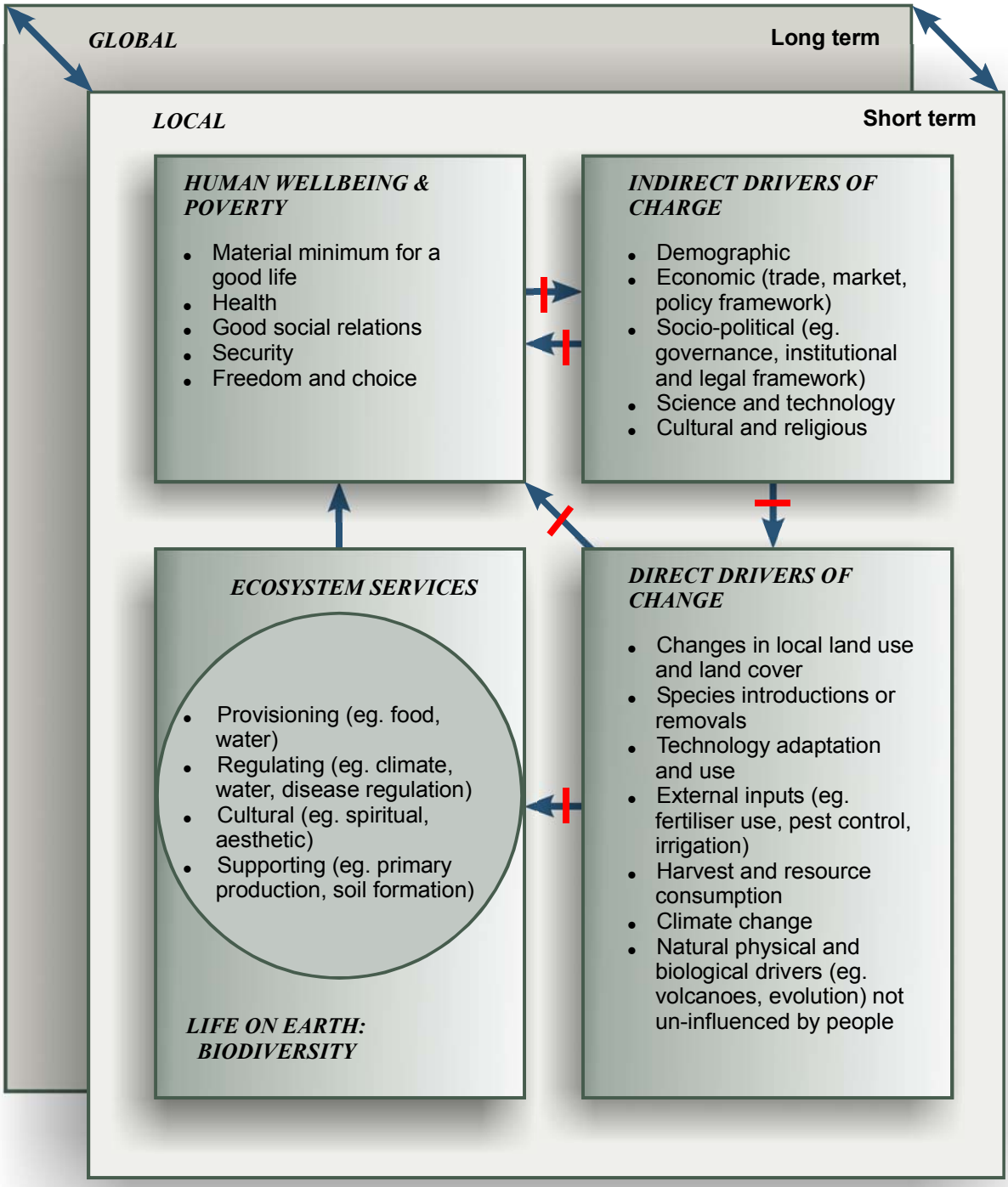


Figure 1: Biodiversity-socioeconomic- human wellbeing links[9]

Human wellbeing is partly dependent on ecosystem services. The drivers of change are affected by human wellbeing. Feedback [black arrows] occurs at all scales, from individuals to the entire globe. The red lines across the arrows represent points of intervention to influence feedback in beneficial ways.

[9] Source : The Millennium Ecosystem Assessment (2003) conceptual framework

2.3 COMMON BIODIVERSITY TERMINOLOGY

Common terminology used in biodiversity studies is given in Box 2.

Box 2 : Common biodiversity terminology

The following terms are frequently used when discussing biodiversity:

- ***Ecology***: The study of ecosystems and the interaction of living and non-living components within those systems;
- A ***gene*** contains genetic information which determines the characteristics of an organism. That information may vary from individual to individual, and between groups of individuals. Gene flow occurs between individuals of a species;
- A ***population***: A group of individuals of the same species;
- A ***species*** comprises populations that inter-breed and produce fertile offspring;
- A ***community***: A collection of interacting species in the same geographic area;
- An ***ecosystem***: A system embracing living and non-living components, which can be defined in terms of distinguishing characteristics (e.g. a wetland ecosystem, a freshwater ecosystem, a terrestrial ecosystem, a forest ecosystem, etc.). The boundaries between communities or ecosystems are often indistinct;
- ***Extinction***: End of an evolutionary line, measured in terms of species or subspecies;
- ***Red Data Book*** or ***Red List*** provides information on threatened species: endangered species are most at risk of extinction, followed by rare and vulnerable species;
- Ecosystems are said to be ***sensitive*** where relatively minor disturbances may result in substantial and significant changes;
- ***Dynamic*** ecosystems are those which are highly mobile (e.g. driftsands, dunefields) or prone to change (e.g. mouth of an estuary, floodplains, areas of subsidence).

2.4 WHAT IS A 'BIODIVERSITY SPECIALIST'?

There is no one 'biodiversity specialist'. Rather, the term is used to cover a range of specialists in the field of biodiversity, from broad areas of expertise (e.g. plant or terrestrial ecologist, marine ecologist or freshwater ecologist) to narrow areas of expertise (e.g. mammalogist, herpetologist, avian specialist, ichthyologist, wetland specialist, specialist in marine algae, fungi or bacteria, etc.). The term also covers specialists with expertise in the functional attributes of ecosystems (e.g. nutrient cycling, carbon cycling).

2.5 GENERIC PRINCIPLES FOR INVOLVING SPECIALISTS IN EIA PROCESSES

The following generic principles apply to the involvement of specialists in EIA processes and underpin this series of guidelines:

- Eliminate unnecessary specialist involvement through proactive project planning and design to avoid or sufficiently reduce negative impacts that may otherwise require specialist assessment;
- Maximise use of existing relevant information prior to involving a specialist;
- Where appropriate and necessary, involve specialists early in the EIA process to increase

efficiency and effectiveness of their involvement;

- Maintain continuity of specialist involvement throughout the EIA process (specialist involvement should add value to project planning and design);
- Support flexible, focused and appropriate involvement of specialists to provide adequate, relevant information to make informed decisions (i.e. the correct level of information should be supplied at the right time in the EIA process);
- Allow for greater involvement of specialists in the identification of key issues, over and above those identified through stakeholder engagement processes;
- Allow for efficient and effective interaction between specialists and the EIA practitioner, the project proponent, the authorities, other specialists on the EIA team and other interested and affected parties (I&APs) to improve the quality of the EIA process and outcomes and ensure that findings are informed by local and indigenous knowledge and experience.

2.6 COMMON EIA TERMS AND CONCEPTS

Common EIA terms and concepts used throughout this series of guidelines are summarised in Box 3.

Box 3: Common EIA terms and concepts

The following definitions aim to clarify common EIA terms and concepts:

- ***Environmental impact assessment:*** A process that is used to identify, predict and assess the potential positive and negative impacts of a proposed project (including reasonable alternatives) on the biophysical, social and economic environment and to propose appropriate management actions and monitoring programmes. The EIA process is used to inform decision-making by the project proponent, relevant authorities and financial institutions. The process includes some or all of the following components: pre-application planning, screening, scoping, impact assessment (including the identification of management actions and monitoring requirements), integration and decision-making. Suitably qualified and experienced specialists may be required to provide input at various stages of the EIA process.
- ***Pre-application planning:*** The process of identifying and incorporating environmental opportunities and constraints into the early stages of project planning and design, prior to the submission of an application for statutory approval. This includes the identification of potential fatal flaws and negative impacts of potentially high significance, as well as the identification of alternatives and management actions that could prevent, avoid or reduce significant impacts or enhance and secure benefits. This process is sometimes referred to as “pre-application screening”, “positive planning” or “fatal flaw assessment”.
- ***Screening:*** A decision-making process to determine whether or not a development proposal requires environmental assessment, and if so, what level of assessment is appropriate. Screening is usually administered by an environmental authority or financial institution. The outcome of the screening process is typically a Screening Report/Checklist.
- ***Scoping:*** The process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an impact assessment. The main purpose is to focus the impact assessment on a manageable number of important questions on which decision-making is expected to focus and to ensure that only key issues and reasonable alternatives are examined. The outcome of the scoping process is a Scoping Report that includes issues raised during the scoping process, appropriate responses and, where required, terms of reference for specialist involvement.
- ***Impact assessment:*** Issues that cannot be resolved during scoping and that require further investigation are taken forward into the impact assessment. Depending on the amount of available information, specialists may be required to assess the nature, extent, duration, intensity or magnitude, probability and significance of the potential impacts; define the level of confidence in the assessment; and propose management actions and monitoring programmes. Specialist studies/reports form the

basis of the integrated Environmental Impact Report which is compiled by the EIA practitioner.

- ***Trigger:*** A particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an *issue* and/or potentially significant *impact* associated with that proposed development that may require specialist input. Legal requirements of existing and future legislation may also trigger the need for specialist involvement but are not discussed in this guideline.
- ***Issue:*** A context-specific question that asks "what will the impact of some activity*/aspect of the development* be on some *element of the biophysical, social or economic environment?*" (e.g. what is the impact of atmospheric emissions on the health of surrounding communities?).
- ***Impact:*** A description of the effect of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space (e.g. an increased risk of respiratory disease amongst people living within a 10km radius from the industry, for the duration of the life of the project, due to sulphur dioxide emissions from the industry).
- ***Root cause/source of impact:*** A description of the aspect of the development that will result in an impact on the biophysical, social or economic environment (e.g. atmospheric emissions from industrial stacks).
- ***Risk situation:*** A description of the environmental or operating circumstances that could influence the probability of a significant impact occurring.
- ***Scenarios:*** A description of plausible future environmental or operating conditions that could influence the nature, extent, duration, magnitude/intensity, probability and significance of the impact occurring (e.g. concentration of sulphur dioxide emissions during normal operations vs during upset conditions; dispersion of atmospheric pollutants during normal wind conditions vs during presence of an inversion layer).
- ***Alternatives:*** A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The "no-go" alternative constitutes the 'without project' option and provide a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.
- ***Best practicable environmental option:*** This is the alternative/option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term.
- ***Impact significance:*** A term used to evaluate how severe an impact would be, taking into account objective or scientific data as well as human values. A specific significance rating should not be confused with the acceptability of the impact (i.e. an impact of low significance is not automatically "acceptable").
- ***Thresholds of significance:*** The level or limit at which point an impact changes from low to medium significance, or medium to high significance.
- ***Management actions:*** Actions – including planning and design changes - that enhance benefits associated with a proposed development, or that avoid, mitigate, restore, rehabilitate or compensate for the negative impacts.
- ***Monitoring programmes:*** Programmes established to observe, take samples or measure specific variables in order to track changes, measure performance of compliance, and/or detect problems.
- ***Review:*** The process of determining whether specialist input meets minimum requirements, is reasonable, objective and professionally sound.

3. CONTEXTUALISING THE SPECIALIST INPUT

This section provides a brief overview of the legal, policy and planning context for involving a biodiversity specialist, and gives the specific Western Cape context within which that specialist would be working. Readers need to be aware that legislation, policies and plans are reviewed periodically. The guideline does not, therefore, remove the need to consult the currently applicable legislation, policies and plans.

3.1 LEGAL, POLICY AND PLANNING CONTEXT FOR INVOLVING A BIODIVERSITY SPECIALIST

Laws, policies and plans are important with regard to biodiversity since they reflect current scientific thinking as well as societal value. That is, they reflect significant issues for biodiversity. All laws at international, national and provincial level which have direct application to the proposed project and its potential impact on biodiversity must be taken into account by the biodiversity specialist in giving input to an EIA. The most important laws are given in Box 4. Detail of key national laws is given in Appendix B.

The national Department of Environmental Affairs and Tourism (DEAT) is responsible for biodiversity conservation in South Africa; the South African National Biodiversity Institute is tasked to support this mandate. The Department of Environmental Affairs and Development Planning (DEA&DP) in the Western Cape is responsible for promoting human well-being and environmental integrity for sustainable development in the Western Cape. CapeNature, a parastatal Board, is responsible for conserving biodiversity in the province.

Box 4 : Legislation of relevance to the biodiversity specialist[10]

The particular context of the EIA, nature of the proposed project and of the receiving environment will determine which – if any – of the following are relevant.

At an international level:

- *Convention on Biological Diversity;*
- *The Ramsar Convention (on wetlands of international importance especially as waterfowl habitat);*
- *The Bonn Convention (on conservation of migratory species of wild animals);*
- *The World Heritage Convention;*
- *The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).*

At a regional level, the Action Plan of the Environmental Initiative of NEPAD (the New Partnership for Africa's Development), 2003, advocates sustainable development and associated conservation and wise use of biodiversity.

[10] Updated on 13 April 2005.

At a national level:

- *The National Environmental Management (NEMA) (Act No. 107 of 1998);*
- *The National Environmental Management Protected Areas (Act No. 57 of 2003);*
- *The National Environmental Management Biodiversity (Act No. 10 of 2004);*
- *Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations [to be replaced by regulations i.t.o. NEMA];*
- *Sea Birds and Seals Protection Act (Act No. 46 of 1973);*
- *Marine Living Resources Act (Act No. 18 of 1998);*
- *Mountain Catchment Areas Act (Act No. 63 of 1970);*
- *National Heritage Resources Act (Act No. 25 of 1999), and provincial regulations;*
- *National Water Act (Act No. 36 of 1998);*
- *Conservation of Agricultural Resources Act (Act No. 43 of 1983);*
- *National Forests Act (Act No. 84 of 1998);*
- *Lake Areas Development Act (Act No. 39 of 1975);*
- *Sea Shore Act (Act No. 21 of 1935);*
- *Atmospheric Pollution Prevention Act (Act No. 45 of 1965).*

At provincial level:

- *Western Cape Nature Conservation Laws Amendment Act (Act No. 3 of 2000);*
- *The Provincial Spatial Development Framework (PSDF) in terms of the Municipal Systems Act (Act No. 32 of 2000);*

Spatial Development Frameworks (SDFs) at municipal level, in terms of the Municipal Systems Act 32 of 2000. The preparation of an SDF draws on bioregional planning principles.

With regard to planning and biodiversity in the province:

- Provincial planning must be aligned with South Africa's National Biodiversity Strategy and Action Plan or NBSAP (due 2005) and with the National Spatial Biodiversity Assessment (NSBA). Targets for biodiversity conservation have been derived through the NSBA[11]; and systematic conservation planning (Box 12);
- DEA&DP promote a bioregional planning approach, to achieve continuity in the landscape and maintain important natural areas and ecological processes. This approach provides a spatial and theoretical framework for the integration of social, environmental and economic criteria in local planning initiatives (e.g. SDF); priority areas for biodiversity conservation are accommodated in 'core' areas within the municipal fabric, supported by 'buffer' and 'transition' areas;
- There are numerous protected natural areas managed by SANParks or by CapeNature, as well as UNESCO Biosphere Reserves in the Western Cape. There are also mega-corridor initiatives (e.g. Gouritz, Greater Cederberg);
- A number of SDFs have been completed in the province that specifically accommodate biodiversity, taking into account their ecosystem status and the need to conserve ecological and evolutionary processes ('ecological corridors').
- Provincial government is party to a national Memorandum of Understanding for the implementation of the Cape Action for People and the Environment (CAPE) strategy for the conservation of biodiversity within the Cape Floristic Region (Box 5);

[11] Driver *et al.,* 2005.

- There are a number of local initiatives that include biodiversity conservation as an objective (e.g. Garden Route Initiative).

Key non-government organizations (NGOs) with an interest in the natural environment of the Western Cape include the Wildlife and Environment Society of SA (WESSA), the Botanical Society of SA, CAPE, Birdlife SA, Earthlife Africa, Biosphere organizations and local conservation groups, residents/ratepayer groups, and community-based organizations.

3.2 ENVIRONMENTAL CONTEXT FOR SPECIALIST INPUT

Specialist inputs need to take into account the specific nature of the environment within which they are undertaken. Box 5 provides a brief description of the environmental context for biodiversity considerations in the Western Cape.

Box 5 : The context for biodiversity considerations in the Western Cape

The Western Cape is home to the Cape Floristic Region (CFR). The CFR is the smallest of six plant kingdoms in the world, the only one to exist entirely within one country, and almost entirely within one province of that country (Western Cape). It is internationally recognized as one of the world's 'hottest biodiversity hotspots'[12], a Centre for Plant Diversity, an Endemic Bird Area, a Global 2000 Ecoregion and a global priority for conservation action. The CFR is rich in endemic amphibian, reptile, fish and invertebrate species. In June 2004, a series of eight natural properties in the CFR were registered as a World Heritage Site[13]. The Succulent Karoo biome, another global biodiversity hotspot, also falls partially within the Western Cape. The CFR and the Succulent Karoo biomes are national biodiversity priority areas[14].

The ecosystems of the Western Cape provide irreplaceable goods and services for the residents and economy of this province. Catchment areas safeguard our water supply systems, wetlands help attenuate floods and regulate water yield and quality, and natural landscapes attract domestic and international tourism. Harvest of marine resources and fynbos products are valued at over R1300 million and R78 million p.a respectively; the total value of the CFR is estimated to be at least R10000 million p.a, equivalent to over 10% of South Africa's Gross Geographic Product[15].

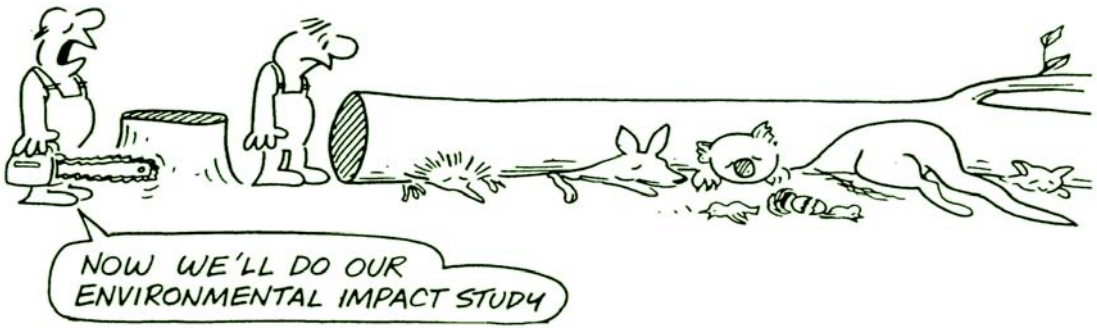
Of the 21 Critically Endangered vegetation types in South Africa, 15 are found in the CFR. In addition, 97% of the Western Cape's mainstem rivers are either Critically Endangered or Endangered. Many Western Cape species are considered to be threatened (e.g. 14 of the 19 freshwater fish species, of which 16 are endemic). The biozones (e.g. intertidal zone) of the west coast are considered threatened. The Western Cape has a known concentration of 'species of special concern'[16].

The major causes of habitat loss and fragmentation in the Western Cape are agriculture, forestry, urban development and invasion by alien plants.

[12] Myers, 1990, in Turpie *et al.,* 2003.
[13] DEAT, 2003.
[14] Driver *et al.,* 2005.
[15] Turpie *et al.,* 2003.
[16] Driver *et al.,* 2005.

4. THE ROLE AND TIMING OF SPECIALIST INPUT WITHIN THE EIA PROCESS

This section looks at the stages of the EIA process during which a biodiversity specialist could be involved, the role of the biodiversity specialist in each stage, and the type of input appropriate. Refer also to the *Guideline for determining the scope of specialist involvement in EIA processes.* The *Guideline for determining the scope of specialist involvement in EIA processes* provides more detailed guidance on the role and timing of specialist input and provides a generic approach that can be used to determine the need for specialist involvement. Clarification of responsibilities amongst the different roleplayers, as well as prerequisites for specialists to provide effective, efficient and quality input, is included.



An approach to be avoided when looking at biodiversity in an EIA[17]

[17] Source: Presentation by Dr Asha Rajvanshi on the status of biodiversity and impact assessment in India at the Capacity Building for Biodiversity in Impact Assessment pre-meeting, IAIA 2004, Vancouver

The role and timing of specialist input within the broader EIA process involves a number of aspects that need to be considered, i.e.:

- Whether, when and why specialist input is required – see Sections 5 and 6 and the *Guideline for determining the scope of specialist involvement in EIA processes;*
- What the scope of specialist input should be - see Section 8, 10 and 11;
- What level/intensity of specialist input is required – see Section 8.

Input of biodiversity expertise to the EIA process, be it at broad level or with regard to a specific issue, can take place at different times and in different ways (Box 6).

Box 6 : *When to involve a biodiversity specialist*

- In the ***pre-application planning*** phase of a proposed project (before starting the formal process of applying for statutory approval), where ***conceptual planning*** is done. Biodiversity specialists would contribute in a proactive and advisory way, and give specialist input (Section 4.1);
- In the ***formal application*** phase for statutory approval, during the ***screening stage*** of the EIA process. Biodiversity specialists would contribute in a proactive and advisory way, and give specialist input (Section 4.1);
- In the ***formal application*** phase for statutory approval, during the ***scoping stage*** of the EIA process. Biodiversity specialists would contribute in a reflective and advisory way, and give specialist input (Section 4.2);
- In the ***formal application*** phase for statutory approval, during the ***impact assessment stage*** of the EIA process. Biodiversity specialists would contribute in an investigative, analytical and advisory way, and carry out a specialist assessment (Section 4.3).

Figure 2 outlines the process used to identify triggers and/or biodiversity issues which could indicate the need to involve a biodiversity specialist.

Involvement of biodiversity expertise from the pre-application planning phase of a proposed project, where effects of the proposed project on biodiversity could be significant, is regarded as best practice. The use of triggers, described in Section 5, gives an early indication of probable biodiversity issues (discussed in Section 6) which would benefit from early input from a biodiversity specialist.

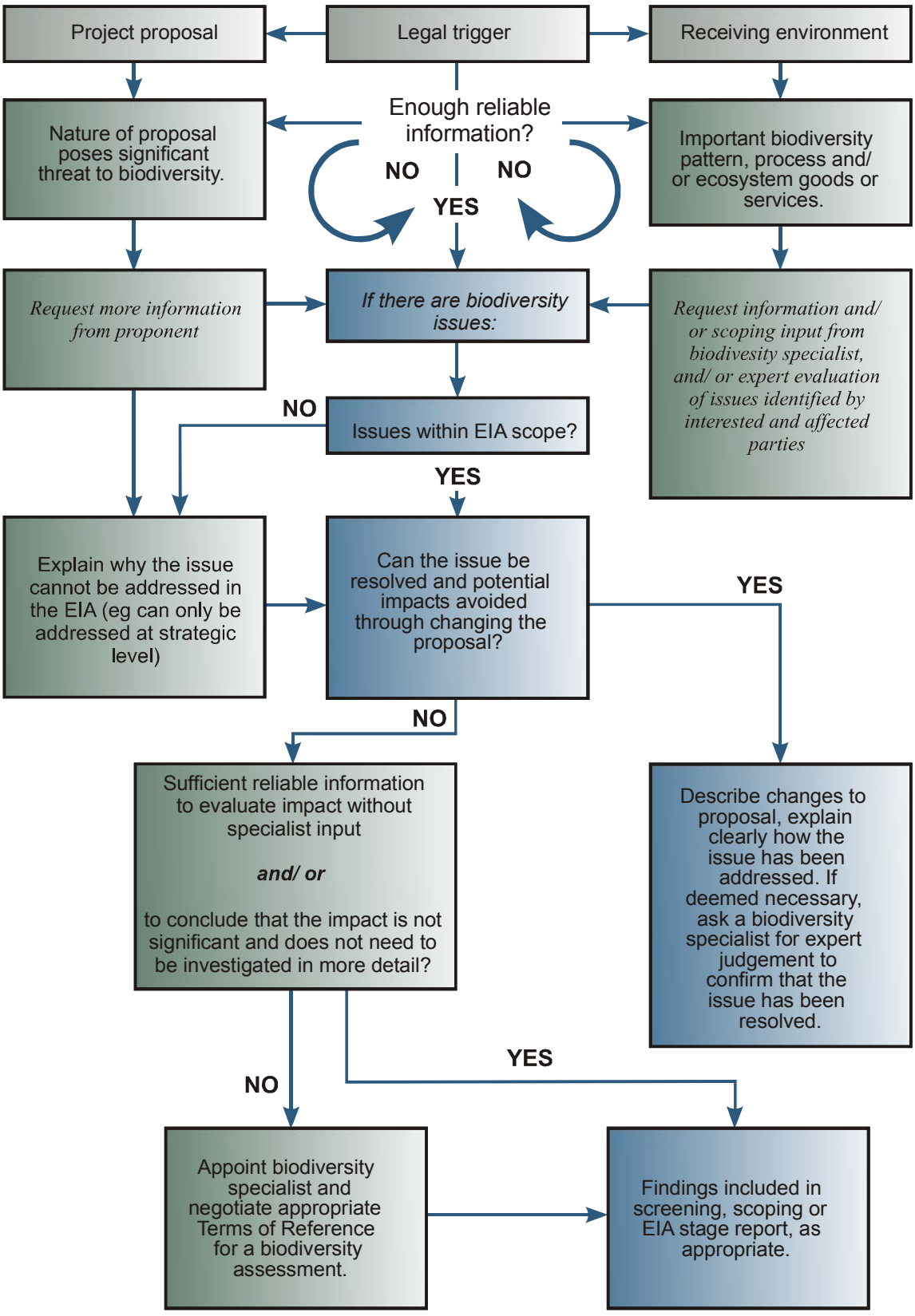


Figure 2 : When to involve a biodiversity specialist

A ***'positive planning' approach*** (Figure 3) to considering biodiversity in EIA is advocated internationally[18]. It helps to manage the proponent's expectations by giving sound guidance early on in the planning process and, in many cases, can fast-track the statutory approval process, avoid the need for an impact assessment, and result in major cost and time savings. This approach promotes:

1) The early identification of possible 'fatal flaws' or potentially significant issues from a biodiversity perspective;
2) The early identification and evaluation of conceptual alternatives (e.g. location, scale, design, siting, layout and management) which could prevent, avoid or reduce significant impacts on biodiversity, or enhance or secure opportunities for biodiversity conservation; and
3) The use of mitigation and offsets to ensure no net loss of biodiversity.

The involvement of a biodiversity specialist during the pre-application planning phase is at the discretion of the project proponent. After an EIA practitioner has been appointed, either in the pre-application planning phase or to take the proposed project through the formal statutory approval process, the need to involve a biodiversity specialist would be decided by that EIA practitioner.

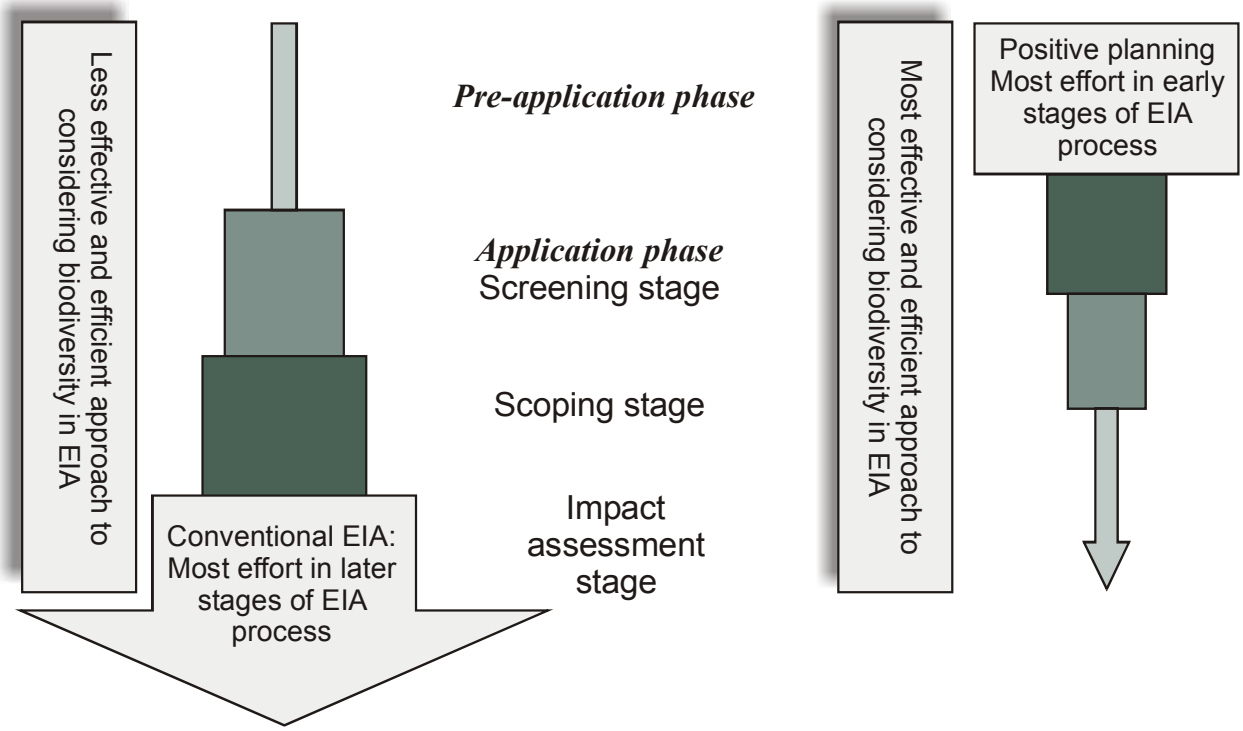


Figure 3: Positive planning approach to involving a biodiversity specialist

[18] IAIA December, 2004.

Depending on the nature of the project, the stage of project planning and the EIA process, the environmental context and the amount of available information, specialist involvement will vary in intensity (i.e. level of detail) and may include any or all of the following approaches:

- Provision of a specialist opinion or comment;
- Archival research and literature review;
- Detailed baseline survey (including site visit/s);
- Consultation and interviews;
- Mapping and simulation modelling;
- Assessment of impacts and their significance.

A specialist's role in the EIA process could be to assist with any or all of the following:

- Describing the affected environment
- Describing the legal, policy and planning context
- Identifying and responding to issues
- Identifying alternatives
- Identifying opportunities and constraints
- Developing specialist terms of reference (TOR)
- Predicting, assessing and evaluating the potential significance of impacts
- Recommending management actions and monitoring programmes
- Undertaking an independent peer review of specialist input.

Terms of reference for specialist involvement should, therefore, be appropriate to the purpose and intensity/scale of involvement and should be discussed and agreed between the EIA practitioner and the specialist, and the authority (when relevant).

4.1 BIODIVERSITY SPECIALIST INPUT DURING THE PRE-APPLICATION PLANNING OR SCREENING PHASE OF EIA

The project leader or EIA practitioner should be able to determine the national and regional conservation context of the proposed project, and identify anything which would trigger the need to involve a biodiversity specialist (Section 5 and Box 8), drawing on the sources of information described in Section 9 and Box 13. If the EIA practitioner or project leader lacks the ability or confidence to interpret information on biodiversity, the advice of an ecologist (terrestrial, plant, marine and/or freshwater, as appropriate in the receiving environment) should be sought. The ecologist should have experience in, and be familiar with, the affected area.

The role of the biodiversity specialist at this stage of the process is proactive and advisory. Input from the ecologist would focus on the objectives of 'positive planning'. The ecologist should help to identify opportunities and constraints from a biodiversity perspective. S/he should identify potential 'fatal flaws', 'no go' areas and potentially significant negative impacts from a biodiversity perspective. Where these impacts on biodiversity are unavoidable, and/or where the available information is insufficient to predict impacts reliably, the ecologist

should advise on the need for further investigation and/or the need to involve specialists in particular fields of biodiversity where appropriate[19].

Where there is known to be important biodiversity in the receiving environment, and a more detailed survey could better inform the scale, location or siting, and/or design of the proposed project, a baseline (or sensitivity) study is recommended to inform the project proposal, in line with 'positive planning'. Such a study could 'fast track' scoping and the EIA process through avoiding these impacts. However, *it would not substitute for a scoping exercise, or a biodiversity assessment during the impact assessment stage should other potentially significant impacts be identified during scoping*.

4.2 SPECIALIST BIODIVERSITY INPUT DURING THE SCOPING STAGE OF EIA

The EIA practitioner should involve a biodiversity specialist in scoping when:

- One of the triggers in Box 8 of Section 5 is pertinent;
- Specific concerns or issues in relation to the natural environment or biodiversity have been raised by key interested and affected parties (I&APs, Box 7), during scoping.
- A biodiversity specialist has been involved in the pre-application planning phase and has indicated that there could be potentially significant impacts on biodiversity.

Box 7 : Parties interested in, or affected by, impacts on biodiversity

Key stakeholders who should be involved in scoping from a biodiversity perspective include government departments responsible for biodiversity conservation, Non-Government Organizations and Community-Based Organizations with an interest in biodiversity, local authorities in whose area of jurisdiction the affected area lies, as well as those parties who use, have rights to, are dependent on, and/or value biodiversity and/or ecosystem services.

During scoping, the specialist's role is reflective and advisory. Whilst the specialist may be asked to provide a written professional opinion, it would not be appropriate to commission detailed specialist studies as part of scoping. The specialist could be asked to:

- Identify key issues for biodiversity;
- Identify alternatives that could avoid or minimize impacts on biodiversity;
- Respond to and evaluate biodiversity-related issues raised by I&APs (Section 8.1);
- Identify measures to reduce these impacts, and/or measures to optimise or enhance possible benefits to biodiversity;
- Advise on whether or not there is sufficient information to determine reliably the likelihood of unavoidable significant impacts at this stage, and/or the need for additional specialist studies;
- Advise on the need for additional specialists to investigate specific ecosystem components

[19] It should be noted that, where a biodiversity specialist is involved in the pre-application phase of a project, and helps formulate terms of reference for work that would go out to tender, that specialist may

and the scope and extent of the information required from such studies;

- Assist in drawing up the TOR for involvement of biodiversity specialists should these be required.

4.3 SPECIALIST BIODIVERSITY INPUT IN THE IMPACT ASSESSMENT STAGE OF THE EIA

During the impact assessment stage, the specialist's role is investigative, analytical and advisory.

The need for specialist input during this phase would be triggered during scoping. The scope of specialist involvement would be determined by taking into account the components given in Section 8 of the guideline.

disqualify him/herself from performing that work given an unfair competitive advantage.

PART B : TRIGGERS AND KEY ISSUES POTENTIALLY REQUIRING SPECIALIST INPUT

This part of the guideline looks at the triggers and key issues potentially requiring biodiversity specialist input to the EIA process.

5. TRIGGERS FOR SPECIALIST INPUT

A 'trigger' means a characteristic of either the receiving environment or the proposed project which indicates that biodiversity is likely to be a 'key issue' and may require the involvement of an appropriately qualified and experienced specialist.

In many cases, particularly where a project leader or EIA practitioner has little ecological expertise, a relatively undisturbed or 'natural' site, with indigenous vegetation, or a wetland, river, dune system or other natural feature, would be sufficient to trigger the need to ask a biodiversity specialist about its significance.

Indicators of potentially significant impacts on biodiversity which should trigger specialist biodiversity input in the EIA process are given in Box 8.

Box 8 : Triggers for involving a biodiversity specialist

1) Legal triggers, including legal requirements of existing and future legislation;
2) Lack of information about the receiving environment;
3) The presence of important biodiversity pattern;
4) The presence of important ecological processes;
5) The presence of important ecosystem goods and services;
6) The potential of the specific project to pose a threat to biodiversity;
7) The potential of biodiversity and/or ecosystems to pose a threat to the proposed project; and
8) The potential for making a significant contribution to biodiversity conservation objectives, given the particular context of the proposed project of ecosystems and the interaction of living and non-living components within those systems.

1) ***Legal triggers***, such as permit requirements (e.g. for removing or trading in protected or endangered species) and existing legislation (e.g the NEMA and Biodiversity Act may require an EIA for activities to be undertaken within threatened ecosystems or involving threatened species) and future legislation, may trigger the need for specialist involvement. These legal requirements are not addressed in this guideline. Where the legal trigger for EIA is biodiversity-related, it is advisable for the EIA practitioner to involve a biodiversity specialist as early as possible, either to confirm that biodiversity is indeed a potentially

significant issue and to advise accordingly, or to 'sign off', with sound justification, that there would not be significant impacts on biodiversity.

2) ***Lack of information*** about the receiving environment to determine reliably whether impacts on biodiversity could be significant.

3) ***The presence of important biodiversity pattern,*** such as:
   - A protected or threatened ecosystem, or an area recognized as important from a biodiversity perspective (e.g. centre of endemicity, core or buffer area of a Biosphere Reserve, area zoned or demarcated for protection in a Conservation Plan, Spatial Development Framework, Environmental Management Framework, Biodiversity Network or similar plans); or
   - A protected or threatened species (e.g. Red Data Book or IUCN Red List species, or species listed in terms of the Biodiversity Act);
   - Ecosystems or organisms known to have high levels of endemicity (e.g. freshwater systems in the Western Cape have extremely high levels of threatened and endemic fish species).

4) ***Important ecological processes***, such as:
   - A local or regional ecological corridor or buffer for ecological or evolutionary processes (e.g. a component of an ecological gradient or important link to other areas or ecosystems, possibly comprising a sand movement corridor, river corridor, upland lowland gradient, coastal corridor, migration corridor, etc.;
   - Tracts of indigenous habitat connecting remnants of a particular ecosystem or vegetation type, on which the viability of that ecosystem may depend;
   - Important habitat for breeding, feeding, refuge, a particular stage of a life cycle, or migration for a threatened, protected, commercially valuable or declining species (e.g. habitat on which a key insect pollinator of threatened plant species is dependent for breeding);
   - A highly dynamic, unstable or mobile ecosystem (e.g. sand dunes or floodplain);
   - Key processes which drive and ensure persistence of ecosystems (e.g. fire in fire-dependent ecosystems), and which must be maintained.

5) ***Important ecosystem goods or services in the area***, which support lives or livelihoods, such as:
   - Reserves for harvest of natural products, wetlands, flood moderation areas, groundwater recharge areas, coral reefs which buffer coastal areas, etc.;
   - A landscape, area, site, species or individual of a species (e.g. tree) prized for its heritage, recreational, tourism, aesthetic, religious or other cultural value;
   - Unique or significant opportunities which could enhance or influence the proposed development (e.g. ecotourism, important and harvestable species, etc.).

6) ***Potential of the proposed project***, because of its nature, to pose a significant threat either directly or indirectly to biodiversity (e.g. hazardous installation, high potential for air, soil or water pollution, disturbance of contaminated sediments, etc.). Where pollution is identified as an issue, a biodiversity specialist is invariably needed to address effects on valued or important receiving ecosystems and species.

7) ***Potential of a component of biodiversity or receiving ecosystems*** to pose a threat to the proposed project (e.g. disease vectors, flooding, waterlogging).

8) ***Potential for significant contribution to the biodiversity estate***, given the particular context of the proposed project, such as:
   - Proposal to set aside part of the affected site for biodiversity conservation purposes (e.g. nature reserve);
   - Proposal to enter into a stewardship agreement with the conservation authority/ies.

6. KEY ISSUES REQUIRING SPECIALIST INPUT

In order to focus the EIA process and avoid the generation of excessive amounts of irrelevant information, "issues-focused scoping" is commonly used in South Africa to determine the scope of the EIA and focus the assessment on a manageable number of important issues and alternatives[20]. Scoping relies heavily on I&APs to raise issues and alternatives. In many areas, stakeholders may not have an interest in, or may be poorly informed about biodiversity. Biodiversity issues can thus easily be overlooked. The involvement of a biodiversity specialist in scoping, where there are triggers indicating that biodiversity may be significant, is thus important.

Key issues typically requiring involvement of a biodiversity specialist[21] include:

At a genetic level: Increased risk of extinction or reduced viability of species, loss of valuable cultivars or varieties, and/or other ecosystem goods, through:
- Reduced genetic diversity (small populations are at greater risk than larger ones),
- Reduced opportunities for populations to interact (e.g. habitat fragmentation, physical barriers, reduced connectivity, isolation of populations, destruction of habitat for pollinators);
- Increased pressure on localised endemic populations (where populations are widespread geographically, the risks of extinction are smaller);
- Increased susceptibility to disease or pollutants;
- Genetic contamination (e.g. through introduction of genetically modified organisms)
- Destruction of habitats on which the species is dependent at different times of the year or for completion of its life cycle.

[20] Le Maitre *et al.,* 1997.
[21] Beanlands and Duinker, 1984 ; IAIA, 2004; Treweek, 2001.

At a species, community and habitat level: Increased risk of biodiversity loss, including valued ecosystem goods and/or services, through:

- Altered species composition of habitats (e.g. loss of species, removal of keystone species);
- Altered species composition of communities (e.g. loss of species, removal of keystone species, etc.);
- Loss of species from the area (e.g. through loss of habitat, increased fragmentation of habitat, reduction in and/or isolation of populations, and/or alien invasive or genetically modified species).

At an ecosystem level: Increased risk of biodiversity loss, including valued ecosystem services, through:

- Changes to ecosystem processes within and between different systems, and at landscape scale[22] (e.g. through removal of keystone species, transformation of important ecotones, interruption of source-sink relationships, and/or major changes to the ecological process 'drivers' (e.g. exclusion of fire in fire-driven system));
- Changes in the amount, quality or spatial organisation of habitat (e.g. transformation of natural habitat surrounding protected or conserved areas which meets process needs of 'focal'[23] species for persistence;
- Inconsistency or incompatibility with plans to conserve or set aside areas of important biodiversity;
- Changes to ecological linkages and corridors between habitats and ecosystems which could halt or hinder evolutionary processes (e.g. isolation and fragmentation of ecosystems, barrier in ecological corridor between mountains and coast, etc.).

These key issues become crucial where the proposed project is likely to be one of a number of activities in the affected area causing similar impacts, i.e. where impacts on biodiversity would be cumulative.

There is no clear relationship between project scale and biodiversity impact (Box 9).

Box 9 : Relationship between project scale and impact on biodiversity

There is no easy or direct relationship between the scale of development and its impact on biodiversity, although in general terms scale does influence the impact (e.g. the bigger the open-cast mine, the bigger the impact).

For example, the impact of small-scale development (e.g. small housing project, or ploughing of a field) could be significant and/or lead to irreplaceable loss of biodiversity where that development were to affect small patches of critically endangered habitat, habitat for an endangered species, critical corridors linking patches of a threatened ecosystem, or an ecosystem which provided a vital ecosystem service (e.g. wetland). Conversely, a large project (e.g. major housing estate) in a well-represented ecosystem, where there were no threatened species or ecological corridors, and which did not deliver important ecosystem services, would have relatively minor impacts on biodiversity.

[22] Rouget *et al.,* 2003.
[23] 'focal' species comprise keystone species such as carnivores, Red Data Book / threatened species, local endemics, species of commercial value, and/or charismatic species. e.g. Desmet, 2004.

PART C : PLANNING AND COORDINATION OF SPECIALIST INPUTS (DRAWING UP TERMS OF REFERENCE)

Once the need for biodiversity specialist input has been determined, the scope of specialist input needs to be clarified through discussions between the EIA practitioner, the specialist, the proponent and the decision-making authority. This part of the guideline covers the choice of an appropriate specialist, and the negotiation process leading to sound Terms of Reference (TOR) for that specialist. Appendix C gives generic TOR for specialist input.

7. QUALIFICATIONS, SKILLS AND EXPERIENCE REQUIRED

This section covers what attributes to look for when appointing a biodiversity specialist. It answers the following questions:

- Which biodiversity specialist/s to involve in the EIA, and
- What qualifications, skills and experience would be needed.

7.1 WHICH BIODIVERSITY SPECIALIST?

An ecologist is best involved in the pre-application planning phase, or screening and scoping stage of an EIA, given their broad, holistic perspective on ecosystems and biodiversity. Where specific components of biodiversity may need to be addressed in greater detail in the later impact assessment stage, specialists in relatively narrow fields of biodiversity pattern (e.g. particular threatened species) or process (e.g. heavy metal contamination in aquatic ecosystems) should be appointed (Section 4).

Biodiversity specialist/s involved in the impact assessment stage should have the necessary expertise to answer questions about particular issues raised during scoping (e.g. issues relating to frogs or reptiles would require a herpetologist, to plants or vegetation a botanist, to wetlands or freshwater systems a freshwater ecologist, to invertebrates an entomologist, etc.[24]).

[24] The expertise of organizations such as CapeNature's scientific services could be drawn on in several of these instances; such expertise may obviate the need to appoint a taxa-specific specialist.

It is useful to remember that every specialist looks at the environment through discipline-specific lenses. So, the way a hydrologist analyses a river system is very different from the way a freshwater ecologist views that same system. It would, therefore be inappropriate to appoint a hydrologist if you were trying to determine the value of the river ecosystem and, conversely, inappropriate to appoint a freshwater ecologist if you were trying to determine the risk of bank erosion as a result of increased flow and hydraulic changes in that system

Specialist studies are often commissioned with regard to vegetation, vertebrates (mammals, reptiles, birds and amphibians), wetlands and/or freshwater systems, and marine systems. Specialist studies on invertebrates seldom form part of the EIA process, although studies on butterflies are occasionally commissioned. Given that invertebrates play a key role in ecosystem function, that different stages of invertebrate life-cycles may rely on different habitats, and that invertebrate-driven interactions (e.g. pollination) are particularly sensitive to fragmentation and transformation of natural areas, they warrant special consideration. Due consideration should therefore be given to invertebrates across and within landscapes to enable persistence of our invertebrate fauna, and associated ecosystem processes.

Invertebrate pollinators: Many orchid species in South Africa are pollinated by different moth and butterfly species, and the larval stage of the moth often has a different habitat and feeds on a non-orchid species. If, through an EIA, a patch of land is set aside to conserve plant species, such as a rare orchid, it is very possible that the pollinator's habitat would not be included in the patch. The orchid population would then become extinct over time because there would be no replacement of the existing plants. Recent research has shown that specialized pollination systems, often involving just one pollinator species, are prevalent in South Africa.

It may be appropriate to use a natural resource economist[25] in complex and controversial EIAs, so that the monetary value of ecosystem services, and to whom these values might accrue, can be determined. However, the translation of the value of biodiversity pattern and process, and ecosystem services, into hard currency has many limitations[26], and should be used with caution.

In projects which could be controversial and/or elicit much public interest, it is a good idea to give key stakeholders an opportunity to participate in, or comment on, the choice of specialist/s, to ensure that they are respected and trusted and, by implication, their findings would be credible.

7.2 QUALIFICATIONS, SKILLS AND EXPERIENCE

The biodiversity specialist should:

- Be competent at interpreting and evaluating information and answering the "so what" and "to whom" questions, not simply providing descriptive information (e.g. species lists);
- Have appropriate formal training in his/her field of expertise;
- Have sufficient practical experience working in the specific ecosystems of the affected region, and preferably local area, to make him/her respected by peers;

[25] This specialist field spans economics and biodiversity.
[26] Biodiversity has direct and indirect values; the latter are seldom adequately covered.

- Be able to think beyond his/her immediate discipline, able to trace impact pathways and identify indirect or cumulative impacts, and think of biodiversity/human wellbeing interfaces (ecosystem goods and services);
- Have good knowledge relating to assessment techniques and to relevant legislation, policies and guidelines;
- Be independent i.e. the specialist should not benefit financially from the outcome of the project decision-making; and
- Be registered with South African Council for Natural Scientific Professions (SACNASP), and could also be certified by a professional body registering biodiversity and/or ecological specialists.

In terms of the Natural Scientific Professions Act 27 of 2003, all natural scientists should be registered with SACNASP. The proponent carries a risk of legal liability in the event that specialists are not professionally registered. In addition, the findings of an EIA based on studies conducted by non-registered specialists could be overturned if legally challenged. The Southern African Institute of Ecologists and Environmental Scientists (SAIE&ES) maintains a voluntary register of professional, certified ecologists and biodiversity specialists in different areas. The criteria for certification in both systems take into account the academic qualifications and specific professional experience of candidates.

8. DETERMINING THE SCOPE OF SPECIALIST INPUTS

Reference should be made to the *Guideline for determining the scope of specialist involvement in EIA processes* with regard to generic scoping issues and prerequisites for the effective and efficient involvement of specialists. This section focuses on the scope of specialist input on biodiversity.

This section is primarily aimed at the EIA practitioner and addresses the key components that should be considered when involving a biodiversity specialist and drawing up appropriate Terms of Reference[27]. These components are:

- Identifying or responding to issues during scoping;
- Establishing appropriate time and space boundaries;
- Selecting appropriate development alternatives;
- Establishing environmental and operating scenarios;
- Dealing with direct, indirect and cumulative impacts;
- Selecting the appropriate approach;
- Timing, sequencing and integration of specialist input;
- Stakeholder engagement; and
- Confidentiality issues.

[27] Recommended reading: DEAT, 2002

The biodiversity specialist/s should be given the opportunity to review their draft TOR and, where relevant and in discussion with the client and EIA practitioner, to amend these TOR where they are deemed inadequate for the purposes of reliable EIA.

In complex and/or controversial projects, the draft TOR for specialists should preferably be seen by key stakeholders before they are finalized. Alternatively, the TOR for specialists should be evaluated by an independent reviewer.

8.1 IDENTIFYING AND RESPONDING TO ISSUES

The biodiversity specialist could be asked *either* to identify issues during scoping, *and/or* to respond to, *and/or* to investigate issues raised through the scoping process. The Scoping Report should be consulted by the specialist in order to ensure that any biodiversity issues raised are considered appropriately. The biodiversity specialist should determine:

- Whether the issues raised through the scooping process are valid in the context of the proposed project, and/or need to be addressed further in the EIA (e.g. I&APs claimed that there was a rare snake in the area; herpetologists stated that the snake was, in fact, a common resident). The specialist is not necessarily required to assess each issue raised during scoping; a response or a comment on why the issue is not relevant or is not assessed further may suffice in some cases. The specialist must give sound reasons to support his/her conclusion.
- Whether there is enough information to predict reliably the likely significance of key issues and associated impacts. If not, additional information should be gathered.
- Whether or not additional issues need to be considered (i.e. issues that were not raised by I&APs during scoping, but are well understood by the biodiversity specialist) and how these additional issues may relate to, or influence, the overall impact assessment process. Again, the specialist must be able to provide clear reasons for including any additional issues.
- Where there is sufficient reliable information, the biodiversity specialist must determine:
    (a) Whether or not it can be reliably concluded that negative impacts could be avoided either by amending the project proposal, pursuing alternatives, and/or by appropriate management actions. *In this instance, the specialist should provide sound motivation and justification for his/her conclusions. There would then be no need to assess these issues further in the impact assessment phase and the need for further involvement of the biodiversity specialist would be unnecessary.*
    (b) Whether or not the issue is potentially significant, and/or the issue and associated impacts cannot be avoided. *In this instance, the specialist should indicate the field of biodiversity expertise needed to address the issue, and help to draw up sound terms of reference for specialist inputs during the impact assessment stage.*

If appointed to provide specialist input during the impact assessment phase, s/he should respond to, and/or address all those biodiversity issues raised during scoping which were deemed to lead to potentially significant impacts, unavoidable, and/or about which there was insufficient information to reach conclusions at the scoping stage about potential impact significance.

The specialist may also evaluate the adequacy of I&AP scoping from a biodiversity perspective, particularly where local communities in rural or remote areas who could depend on ecosystem goods and services have not been given an opportunity to raise issues. Such circumstances may warrant additional scoping of biodiversity issues.

8.2 ESTABLISHING APPROPRIATE TIME AND SPACE BOUNDARIES

With regard to space boundaries:

- The broad context of the proposed project (i.e. beyond the boundaries of the specific site) and the role of the site within that context, particularly from an ecosystem process and services perspective, must be considered. Are there opportunities to link the site with nearby protected or threatened areas? Does the site form part of an ecological corridor linking inland mountains to the coast? Is the site important for water storage, or flood regulation? Are local communities dependent on access to water or resources on the site?
- Where a proposed project is likely to have off-site impacts, the space boundary of the study needs to be adjusted to include potentially significant off-site impacts on biodiversity. For example, the emission of pollutants could impact on downwind habitats. Or the discharge of effluent in a river could impact on downstream ecosystems. These impacts should be included in the specialist study.
- The full spectrum of contexts with regard to impacts on biodiversity must be considered: impacts may be at a local scale (i.e. on local communities or ecosystems), a regional scale (i.e. on landscapes, ecosystems), a national or even a global scale (i.e. where there is loss of a species, unique habitat or ecosystem).
- The value of the site to migratory species (e.g. birds), invertebrates (to complete a stage of their life cycle), fauna (known water source for the surrounding areas) should be taken into account.

With regard to time boundaries:

- The time needed to provide specialist input or to gather reliable baseline information will vary, depending on the available existing information and levels of knowledge about the affected area. Where there is a high risk of potentially significant impacts on biodiversity, and a paucity of information, it may be necessary to conduct seasonal surveys and/or surveys at particular times of the year, to determine reliably the biodiversity pattern and process. In some instances, a biodiversity assessment without such information may severely compromise its credibility, given the low level of confidence in predicting impacts.
- Where little is known about the affected ecosystem, and it is not possible to assign a significance rating to potential impacts *with high levels of confidence* from initial site visits and synthesis of available information, field surveys and/or seasonal studies may be needed. Where these seasonal studies cannot be carried out, due to time constraints, and the confidence in evaluating significance is low, this limitation must be clearly stated in the specialist report, to highlight uncertainty and possible under-valuation of biodiversity.

In many cases, specialist studies are undertaken with short time frames and a one-off visit to site. In fire-prone and species rich communities, many plants only appear, flower and/or are identifiable for short periods of the year. Also, many plants only appear immediately after fire, or mature and are identifiable a few years after fire. A one-off visit to site in these communities may have potentially severe limitations. This limitation is highlighted by a 3-month survey at Grootbos Nature Reserve in the Western Cape, which identified 301 indigenous, and 16 Red Data Book species. A subsequent 7-year survey, from 1997 to 2005, brought the total species list to 659 of which 53 are Red Data Book species and 2 species are new to science[28]. Clearly, it would not be reasonable to expect a project proponent to set aside a number of years to determine biodiversity pattern with such accuracy! However, this example illustrates that a compromise needs to be found between 'good enough' and 'perfect' to enable the potential importance of the area to be gauged with confidence.

- The specialist must consider short- to long-term implications of impacts on biodiversity, highlighting irreversible impacts (i.e. permanent) and irreplaceable loss of natural capital.
- The specialist must consider any expected or predictable trends or changes over time *without* the proposed project, in order to evaluate the potential significance of the project against those changes (Section 8.4).
- Uses of the receiving environment by, or habitat for, species during the year (e.g. seasonal migration, or during times of drought) should be taken into account.
- Optimum times of the year should be considered for construction activities, to avoid, prevent or minimize adverse impacts on biodiversity.

8.3 CLARIFYING APPROPRIATE DEVELOPMENT ALTERNATIVES

The early consideration of alternatives offers the best possibility to prevent or avoid adverse impacts on biodiversity[29]. Alternatives considered in the EIA process can include *location* and/or *routing* alternatives, *scale of development* alternatives, *layout* and *siting* alternatives, *process* and/or *design* alternatives, *scheduling* alternatives, *input* and/or *management* alternatives[30]. Any development proposal may include a range of possible alternatives from some or all of these various categories of alternatives. The *"no-go*" alternative in EIA provides a benchmark against which to evaluate potential impacts of the proposed project alternatives.

The broad location and specific siting of a proposed project have a major influence on its impact, since they determine its ecological 'footprint' and, to a large extent, its indirect and cumulative impacts. Where proposed projects are on state-owned land, or where the state is the proponent, consideration of alternative project locations is thus essential. For privately owned land and/or private proponents, consideration of alternative routing, siting and layouts are critical. Alternative design, process, and/or use of different technology can help to avoid or minimize non-footprint impacts on biodiversity (e.g. by minimizing emissions or effluent).

[28] *Sean Privett, pers comm, Conservation Director: Grootbos Nature Reserve*
[29] The World Bank Group, 2000.
[30] Recommended reading: DEAT, 2004a.

Alternatives are best considered in the pre-application planning, and early screening and scoping phase of the EIA, where the proposal has most flexibility, and opportunities to avoid or prevent significant impacts on biodiversity are greatest (Section 4).

The biodiversity specialist should help identify new alternatives which would best meet the objectives of the proponent, whilst preventing, avoiding or minimizing impacts on biodiversity and ecosystem services, and/or optimizing possible benefits. For example, by developing a small number of luxury units on a site, rather than a large number of high-income units, the proponent could better meet his objectives and avoid significant impacts on a threatened ecosystem.

It is important for the biodiversity specialist to consider the restoration potential of threatened ecosystems (or habitat for threatened species) that are degraded or invaded by alien species in assessing sites and considering alternatives, including the 'no go' alternative. Important areas with high restoration potential should be accommodated in the project proposal and managed to that end (Section 10.8.4).

8.4 ESTABLISHING ENVIRONMENTAL AND OPERATING SCENARIOS

The biodiversity specialist should, where relevant and possible, take into account expected global trends in terms of climate change and global warming, as well as, for example, associated changes in flood patterns, sea level rise and fire incidence. Typically, a cautious approach is required, based on reasonable scenarios of climate change.

At a localized level, the specialist should take into consideration any anticipated changes which could aggravate or ameliorate potential impacts of the proposed project on biodiversity, including:

- Development trends or strategies, reflected in policy or planning for the area;
- Rates of informal settlement or in-migration to the area;
- Any substantial shifts in reliance on ecosystem goods and/or services in the area;
- Any threats or risks posed by alien invasive or genetically modified organisms;
- Any initiatives to remove or manage alien invasive organisms (e.g. Working for Water);
- Any planned conservation areas for the area (e.g. Greater Cederberg Biodiversity Corridor, Gouritz Initiative).

With regard to scenarios within the scope of the proposed project, and where the nature of the project plays a principal role in determining the significance of impacts on biodiversity, the specialist should evaluate the significance of impacts during:

- Normal operating conditions;
- Routine upset conditions (e.g. closure during, and start-up after, routine maintenance);
- Extreme upset or emergency conditions.

The biodiversity specialist needs to take into account the status of the receiving species and ecosystems, and their likely resilience to the above conditions in evaluating potential

significance, and evaluate the effectiveness of proposed mitigation measures in minimizing impacts (e.g. contained in the environmental management plan/programme (EMP), and/or environmental management systems (EMS)). For extreme upset or emergency conditions, an ecological risk assessment may be needed.

8.5 ADDRESSING DIRECT, INDIRECT AND CUMULATIVE IMPACTS

In addition to predicting direct impacts (Section 10.1), the specialist must consider potentially significant **indirect** impacts, as well as **cumulative** impacts (Box 10)[31]. S/he needs:

- To picture the cause-effect-impact pathways resulting from the proposed project;
- To understand what other plans, projects and activities are likely to, or already, take place in the same ecosystem/s;
- To be aware of other threats, trends or scenarios which could affect the ecosystem/s or species to be affected by the proposed project (Section 8.4);
- To know the likely resilience and status of affected ecosystem/s and/or species.
- To take into account, and make explicit reference to, the broader strategic goals or targets for biodiversity conservation in the affected ecosystem/s.

Box 10 provides definitions of these different effects and provides examples to illustrate them in the context of biodiversity.

Box 10 : Direct, indirect and cumulative effects

Direct effects, or primary effects, occur at the same time and in the same space as the project, For example: a) loss of habitat through mining; b) reclamation of wetland.

Indirect effects, also known as secondary effects, occur later in time or at a different place from the causal activity, or as a result of a complex pathway. For example, abstraction of groundwater leading to changes in the water table and affecting a distant groundwater-dependent wetland.

Cumulative effects on biodiversity result from in-combination effects on biodiversity acting with a host of processes that are, or may be, insignificant when seen in isolation, but which collectively have a significant effect. Cumulative effects can be:

1) **Additive**: the simple sum of all the effects (e.g. fertilizer inputs to a river from farms in the catchment);
2) **Synergistic**: effects interact to produce a total effect greater than the sum of individual effects. These effects often happen as habitats or resources approach a 'persistence threshold' (e.g. fragmentation of habitat for a species can have limited effect until additional fragmentation makes areas too small to support that species at all);
3) **Time crowding**: frequent, repetitive impacts on a particular resource at the same time (e.g. small-scale mining within a particular ecosystem);
4) **Neutralizing**: where effects may counteract each other to reduce the overall effect (e.g. infilling of a wetland for road construction, and creation of new wetlands for water treatment, or cadmium plus zinc in industrial effluent);
5) **Space crowding**: high spatial density of impacts on an ecosystem (e.g. settlement).

Source: Adapted from Cooper, 2004.

[31] Recommended reading: DEAT, 2004b.

In many instances, project-level EIA is an inappropriate tool to consider cumulative impacts on biodiversity; strategic level assessments are often better suited to this purpose[32]. For instance, since 1989, about 45 550 ha of 'virgin land'[33] has been approved for cultivation in the Western Cape; 20% of this area was approved in 2003 alone. Almost 80% of this land lies in the west coast 'sandveld'; the component vegetation types all having a 'threatened' ecosystem status in terms of the National Spatial Biodiversity Assessment'[34]. The failure of the EIA system to address the cumulative effects has given impetus to strategic planning initiatives in the area to rectify the deficiency, namely through the Greater Cederberg Biodiversity Corridor, and through the Department of Agriculture's LandCare Area-Wide Planning programme.

Where potentially significant cumulative effects on biodiversity are likely and cannot be effectively addressed in the EIA, the biodiversity specialist should alert the EIA practitioner and decision-maker/s to these effects, and make explicit recommendations as to ways of addressing them (e.g. through strategic planning initiatives and/or systems-based approaches).

8.6 SELECTING THE APPROPRIATE APPROACH

The approach in all instances should be to use the most reliable and efficient way of determining whether or not significant impacts on biodiversity are likely, and/or responding to the issue/s raised. Clearly, the approach would differ if there was no information on the receiving environment or if available information indicated that impacts related to pattern, process or ecosystem goods and services issue/s.

Box 11 outlines a range of possible approaches, and when they would be most appropriate to use.

Box 11 : Selecting the appropriate approach

Approach	**When used**
Desk top study. Gather and synthesize best available information: legal, policy, planning context, permits or authorizations needed; information on project and receiving environment	**Always**, at the start of the specialist's involvement
Site visit	**Always**, preferably with other specialists involved in the EIA process
Determine **cause-effect-impact pathways**, to focus on potentially significant issues	**Always**, at an appropriate level of detail to the proposed project.
Determine **information needs from other specialists**	When other specialists are involved and where their input overlaps, is needed by, or is dependent on, the biodiversity specialist.
Determine the **best methodology to address the particular project-related issue/s**. For example:	**Always**. Methods and techniques used should be standard to, and recognized by the professional discipline. The methodology should take into account the quality and quantity of available information.

[32] Gelderblom *et al.,* 2000, and Van der Walt *et al.,* 2004.
[33] Pristine indigenous vegetation, or vegetation which has not been cultivated for at least 10 years.
[34] Verna Bowie, CapeNature, *pers comm*.

Baseline survey, from a rapid scan to a more comprehensive survey	Where information is insufficient to determine potentially significant impacts and/or risks to biodiversity. Usually carried out in pre-application planning phase or impact assessment stage of EIA processes.
Sensitivity study, and/or analysis of opportunities and constraints of the natural environment, using a range of approaches, from a rapid scan to a more comprehensive survey	Where the natural environment is known to be potentially sensitive or important from a biodiversity or ecosystem services perspective. Carried out to inform the proposal and alternatives, using a positive planning approach and identifying 'no go', sensitive areas (etc.), usually in the pre-application planning, screening or scoping phase of an EIA.
Professional judgment or opinion	When information is sufficient to enable opinion or judgment to be given with high level of confidence.
Interviews	Where there has been insufficient opportunity for biodiversity stakeholders to give input, and/or to gather local, traditional, or indigenous knowledge.
Detailed studies and/or surveys, laboratory processing, analysis and/or mapping	Where effects on, and/or risks to biodiversity are potentially significant; where there is inadequate information to assess and evaluate reliably and with confidence the potential significance of impacts, look at mitigation measures and identify additional alternatives; and/or where statistically robust surveys would be needed for monitoring purposes. Usually carried out in the impact assessment stage of EIA processes.
Modelling	Can be used *qualitatively* early on in EIA process to illustrate cause-effect-impact relationships of alternatives (e.g. using cartoons). Or, can be used *quantitatively* where impact pathways are not clear and modelling would help to test or confirm the relevance and/or significance of a path that has been 'built into' the model.

8.7 CLARIFYING THE TIMING, SEQUENCING AND INTEGRATION OF SPECIALIST INPUT

The timing of the biodiversity specialist involvement in relation to the other specialists is central to effective and efficient EIA. Optimum scheduling of different specialists' inputs would depend on the particular proposal. For example, the results of pollution studies often need to inform the biodiversity assessment, whilst the biodiversity specialist can inform social and economic studies (e.g. coastal pollution could affect marine shellfish; decline in marine shellfish populations would impact on local mariculture, livelihoods, and the local economy).

The scheduling of different specialist studies should be carefully determined by the EIA practitioner to ensure that they integrate effectively and efficiently. Good co-operation and communication between specialists and the EIA practitioner is critical. The relative timing of different specialist inputs should seek to maximize potential benefits to one another, in terms of efficient information gathering, identification of alternatives, and the prediction and assessment of impacts and practicable options.

In scheduling specialist studies, it is useful to note that:

- Biodiversity studies may have constraints with regard to timing. Where impacts cannot be evaluated reliably and there is high potential for additional sampling at particular times of the year, or to coincide with specific events (e.g. flooding, emergence of butterflies, etc.), that

result in substantial changes to the significance rating of impacts on biodiversity, then provision must be made for such sampling.

- The alternatives and/or mitigation measures proposed by one specialist may themselves present as impacts in another field, which then need to be addressed.

The specific information requirements and inter-dependencies, and timing constraints of the various specialists should be clearly articulated and discussed in an interdisciplinary workshop, preferably following a joint site visit. The workshop would enable the scheduling and focus of the different studies to be optimized.

8.8 ENSURING APPROPRIATE STAKEHOLDER ENGAGEMENT

The biodiversity specialist may need to obtain input from, or engage, key stakeholders over and above those involved in the main EIA process. Typically, the specialist would need to involve CapeNature's Conservation Planning Unit, Land Use Advisory Unit, scientific services and/or regional ecologists (Section 9.2, Box 13). In addition, where potentially significant impacts on ecosystem services are likely, it may be appropriate to involve key affected parties, in co-operation with other specialists (e.g. social or economic specialists). Additional involvement of these stakeholders should be done in line with the principles established for such engagement in the EIA process, ideally working with the practitioner appointed to carry out stakeholder engagement.

8.9 CLARIFYING CONFIDENTIALITY REQUIREMENTS

Issues of confidentiality need to be discussed by the proponent, EIA practitioner and biodiversity specialist, and specified in the Terms of Reference where relevant. They may relate to the proponent's need to keep commercial information about the proposed project confidential, or information about the location of highly sought after, protected, critically endangered or endangered species which would best be kept confidential in order to safeguard these species. The need for confidentiality may apply to a particular phase of the project only; e.g. in the pre-application planning phase, to avoid raising undue expectations or pre-empting activities which could have a major effect on the proposed project.

PART D : PROVIDING SPECIALIST INPUT

This part of the guideline provides guidance for providing specialist input, as well as identifying the information required by specialists.

9. INFORMATION REQUIRED TO PROVIDE SPECIALIST INPUT

This section addresses the information required by the biodiversity specialist, namely:

- Relevant project information;
- Information describing the affected environment;
- The legal, policy and planning context;
- Information generated by other specialists in the EIA process.

9.1 RELEVANT PROJECT INFORMATION

The EIA practitioner, proponent or project leader should give the biodiversity specialist:

- The objectives and description of the project proposal, including the scale and nature of development, location and siting of project components, inputs (e.g. water sources - fresh water or groundwater, and materials), outputs (emissions, effluent, solid waste) and activities during different phases (e.g. clearing land, dredging, etc.);
- Maps (or map references) of the affected area;
- Parameters within which alternatives should be considered throughout the specialist study (to meet the proposal's objectives, taking into account opportunities and constraints of the affected environment), and/or a range of reasonable alternatives already identified by the proponent;
- Issues raised by I&APs during scoping that are relevant to the specialist;
- A list of the I&APs who participated in scoping should be given to the specialist, to ensure that key parties with responsibility for, and/or a stake in biodiversity, have been given the opportunity to participate. Guidance on the approach to be used by the specialist in involving additional stakeholders should also be given, if appropriate;
- Terminology to be used by specialists in the EIA (Box 3), including assessment criteria (Box 15);
- Instructions about liaising with other specialists undertaking related studies that are either dependent on the findings of, or will provide essential information for, this study. Contact details of these specialists should be provided;
- Instructions regarding the format, structure and timing of input or reporting;
- Timeframes for input, assessment and reporting;
- Contractual issues and confidentiality issues.

9.2 INFORMATION DESCRIBING THE AFFECTED ENVIRONMENT

The biodiversity specialist needs to be given a broad description of the affected environment as the point of departure for his/her input. This description should include a list of sources, documents or other information which the project leader or EIA practitioner has used to determine the need for specialist involvement.

The specialist must decide what issues are important in the affected environment, taking into account the status and any trends in biodiversity, pressures on, uses and values of biodiversity, and the main factors that 'drive' those ecosystems and ensure their persistence. To this end, s/he must synthesize appropriate information on the affected environment, using techniques and methods standard to the discipline, drawing on local authority, and traditional knowledge, relevant and available published information, as well as input from I&APs. S/he must also collect new information where this is deemed to be necessary for the purposes of reliable assessment. Information should be presented as simply and concisely as possible, and ***only that information which has potential to influence decisions should be presented and/or gathered***.

Please note*: The involvement of specialists should be based on the need to supply information about the potential impacts of a proposed development. Gaps in scientific information for geographical areas / ecosystems should not be used to motivate for specialist involvement to provide information on these areas or ecosystems, where they would not be affected by the proposed development or where potential impacts on these ecosystems could easily be avoided or prevented by sound planning.*

The desired outcome of information gathering by the biodiversity specialist is to be able to describe the affected biodiversity in terms of the criteria given in Box 12:

Box 12 : Describing the affected environment from a biodiversity perspective

- Its broad, 'bigger picture' status (e.g. global status, centre of endemicity, biodiversity 'hotspot');
- The extent of habitat type in the affected area in relation to that present in a wider context (i.e. its contribution to conservation of that habitat);
- Its condition (e.g. extent of degradation or transformation);
- Defining characteristics[35]:
- Main ecosystems and their threatened and/or protected status in terms of, e.g. the National Spatial Biodiversity Assessment, biodiversity legislation;
- Unique or special habitats or features (e.g. quartzitic patches);
- Presence of protected or threatened species, 'keystone' species to an ecosystem (e.g. large predators), species on which ecosystem services rely (e.g. pollinators), and/or use of the site by threatened species at certain times;
- Harvestable goods, important for lives and/or livelihoods (e.g. source of materials like thatching grass, food source such as fish species, etc.);

[35] The Botanical Society's Conservation Unit's Terms of Reference, 2004, are useful in this regard.

- Key ecosystem services (e.g. important water yield area, coastal protection);
- Elements sensitive to change (e.g. species with narrow tolerance limits), dynamic elements (e.g. dunefields) or unstable elements (e.g. seismic fault);
- Resilience, or ability to recover from disturbance (e.g. forest has low resilience, whereas pioneer weedy plants are adapted to disturbance).
- Its importance to surrounding areas, with regard to fixed or flexible processes (e.g. situated on a fixed vegetation transition, or within a flexible ecological corridor, provides links to fragments of the same ecosystem, or isolated);
- The main 'drivers' of ecosystem processes (e.g. fire, large herbivores);
- Trends or anticipated changes (Section 8.4);
- The main uses and users of the area and its ecosystem goods and services.

There are a number of key sources of information at the specialist's disposal. These sources can be drawn on to determine the current status and trends in biodiversity, as well as pressures on and uses of biodiversity. The sources are presented in a hierarchy, from a national to a local biodiversity perspective in Box 13. Where these sources indicate that potentially significant impacts are likely, the specialist should make use of additional sources of information.

Box 13 : Key sources of biodiversity information

- The National Spatial Biodiversity Assessment [36] (NSBA) should be a 'first stop' reference for any biodiversity assessment, as should the NBSAP which prioritises areas for action. The NSBA gives the national ecosystem status (i.e. critically endangered, endangered, vulnerable or not currently threatened) for terrestrial, river, marine and estuarine ecosystems; wetlands are to be included in future.
- The new South African vegetation map (South African National Biodiversity Institute[37]). The NSBA gives the national ecosystem status of vegetation types in this map.
- The Conservation Planning Unit of CapeNature (http://cpu.uwc.ac.za/home), which gives information on:
  - Systematic biodiversity planning outputs, at broad and/or fine-scale spatial scales (Cape Floristic Region: CAPE, Succulent Karoo: SKEP, Subtropical Thicket: STEP, Cape Lowlands Renosterveld Project), plus guides for users[38]. These plans provide information on both important pattern and process corridors. Depending on their scale, they can be used as a trigger of potential biodiversity significance or, at fine-scale, to inform an EIA.
  - Regional biodiversity corridor initiatives (e.g. Greater Cederberg Biodiversity Corridor initiative, Gouritz Initiative). These corridors 'capture' both pattern and process.
- CapeNature's State of Biodiversity : 2000 report [www.capenature.org.za/know_how/html/sobintro.html] describes critical habitats for reptiles and amphibians, birds and mammals in the Western Cape.
- Fynbos Forum's Ecosystem-specific Guidelines (Box 14).
- Information on threatened ecosystems and species held by CapeNature's Land Use Advisory Unit and regional ecologists.

[36] Driver *et al.,* 2005.
[37] Formerly the National Botanical Institute.
[38] Guides for using the outputs of systematic conservation planning are available on CapeNature's Conservation Planning Unit's website. The STEP Handbook provides a guide for integrating the natural environment into land use decisions at local authority level (Pierce, 2003)

- The biodiversity expertise within the Scientific Services section of CapeNature for information on specific taxa, as relevant (e.g. invertebrates, frogs, fishes, mammals, birds).
- Additional information (e.g. Protea Atlas, Frog Atlas and Bird Atlas) held by research institutions who carry out work on biodiversity, such as universities, technikons and the National Biodiversity Institute, the South African Natural History Museum in Cape Town (various specialists), the Plant Protection Research Institute in Pretoria (arthropod and fungi specialists).
- South African Red Data Books, provided that these are current (e.g. Red Data Book for Mammals, produced by the Endangered Wildlife Trust 2004), IUCN's Red List, and other protected or threatened species lists (e,g. in terms of the Biodiversity Act).
- The River Health Programme gives information on the ecological state of certain river systems [www.csir.co.za/rivercons/related.html].
- Provincial or local State of Environment Report.

Box 14 : Fynbos Forum's ecosystem-specific guidelines

The Fynbos Forum, together with the Conservation Unit of the Botanical Society of South Africa, is preparing Ecosystem-Specific Guidelines. These Guidelines give information on the main drivers, issues, threats to, and vulnerabilities of threatened ecosystems in the Western Cape.

Guidance is also given on the 'bottom lines' or non-negotiables regarding the acceptability of impacts on these systems, and their likely reversibility. The spatial components of ecosystem processes, and recommended approaches to planning development within these ecosystems and habitats are also given. Critical issues for managing these ecosystems to ensure persistence are provided, and mitigation, compensation and/or offsets for impacts are discussed. The use of indicators is also covered.

9.3 LEGAL, POLICY AND PLANNING CONTEXT

The biodiversity specialist needs to obtain a broad description of the legal, policy and planning context of the project.

- Relevant international conventions, treaties, or protocols that have been ratified, or to which South Africa is signatory, need to be taken into account. Laws, policies, plans and strategies at national[39] and provincial level which are of direct relevance from a biodiversity perspective to the proposed project should be addressed by the specialist (Section 3.1). Associated permitting or licensing requirements must be determined (e.g. for removal of protected trees in terms of nature conservation or forestry legislation).
- The vision, objectives, targets and/or trends for biodiversity conservation contained in district or local municipality plans, policies and strategies should be taken into consideration (e.g. IDPs, SDFs, biodiversity networks, metropolitan open space systems and Environmental Management Frameworks). This information indicates the desired future state for the area within which development is proposed, and provides a benchmark against which to evaluate whether or not the proposed development would contribute to, or conflict with, this desired future state.
- Areas contributing to global biodiversity conservation in terms of specific provisions in international conventions or treaties (e.g. World Heritage Sites, Biosphere Reserves),

[39] Good websites for laws and policies are given in the references section: Southern/South Africa.

protected areas, and areas identified by planning and/or conservation authorities (e.g. SANParks, CapeNature), and/or by local authorities for protection, should be considered where appropriate. Specific reference should be made to systematic conservation plans and conservation targets for the affected area (Section 9.2).

- Any national or provincial standards for water quality or flow, as they relate to ecosystem health, processes or services (e.g. ecological reserve determination for rivers, Department of Water Affairs and Forestry's water quality guidelines) should be taken into account.
- The specialist must indicate clearly whether or not the proposed project would be consistent with, comply with, and/or contribute to the objectives or requirements of, the various applicable conventions, treaties, protocols, laws, policies, plans and strategies with regard to biodiversity.

9.4 INFORMATION GENERATED BY OTHER SPECIALISTS IN THE EIA PROCESS

Evaluation of impacts on biodiversity should include consideration of all ecosystem services and goods (Box 1). For this reason, the biodiversity specialist must communicate with social, economic, heritage, pollution or other specialists, as appropriate, during the EIA process, to ensure that the various specialist inputs can be effectively integrated (Section 8.7).

Where a proposed project is complex, and/or a number of specialists are involved in the EIA process, interdisciplinary workshops should be held at the start of speicalist involvement and again before finalizing their findings and recommendations. This approach optimizes the exchange of information, allows any points of conflict or inconsistency to be identified, and enables mitigation measures to be aligned.

If several biodiversity specialists are involved in an EIA process (e.g. a freshwater ecologist, a botanist and an entomologist) their findings should be integrated by someone with appropriate broad biodiversity expertise. If the EIA practitioner lacks this expertise, it may be necessary to engage a competent ecologist to undertake this task.

10. SPECIALIST INPUT FOR IMPACT ASSESSMENT AND RECOMMENDING MANAGEMENT ACTIONS

A biodiversity specialist could provide input at different stages of the EIA process (Box 6, Section 4). This input could be minor, in the form of a brief professional opinion, or a detailed biodiversity assessment with associated written report, depending on the nature of the proposed project and the sensitivity and complexity of the receiving environment. In most instances, regardless of the final product and its level of detail the conceptual thinking followed by the biodiversity specialist would be similar.

As a general guide, the specialist should:

- Consider the **full project cycle**;
- Answer the "**so what**" and "**to whom**" questions of probable impacts on biodiversity; i.e. what are the likely consequences of impacts, how severe would they be, and who would be affected by these impacts;

- Predict, assess and evaluate potentially significant **direct, indirect and cumulative** impacts (Box 10, Section 8.5) on **biodiversity pattern and process, and on ecosystem services**, without and with practicable management actions. The evaluation of significance should be linked to the thresholds of significance (Section 10.3);
- Assess and evaluate impacts for the different alternatives, and for different environmental and operating scenarios, where appropriate (Sections 8.3-8.4);
- Consider not only impacts **on the affected site**, but also impacts **beyond the site boundaries** (Section 8.2);
- Assess and evaluate any impacts of **biodiversity and ecosystems on the proposed development** (e.g. natural hazard, flooding, disease, nuisance organisms).

This section addresses:

- Predicting potential impacts;
- Defining impact assessment criteria;
- Establishing thresholds of significance;
- Identifying potential fatal flaws from a biodiversity perspective;
- Describing the distribution of impacts, and identifying those who would benefit or lose from the proposed project;
- Identifying key uncertainties and risks;
- Justifying underlying assumptions;
- Defining confidence levels and constraints;
- Recommending management actions;
- Helping to identify the Best Practicable Environmental Option; and
- Communicating the findings of the biodiversity input.

10.1 PREDICTING POTENTIAL IMPACTS

Specialists need to trace likely cause-effect pathways[40] to determine all potentially significant direct, indirect and cumulative impacts. The impact/s will depend on the nature of the project (e.g. establishing infrastructure, providing inputs, and/or generating outputs), as well as on the properties of the receiving environment, both human and natural, and on their probable response and linkages.

For example, the discharge of effluent into the sea would result in a change in water quality. Change in water quality could impact on marine algae and shellfish, the quality of recreation, etc. These impacts may interact with each other to result in additional impacts (e.g. shellfish, that feed on algae, could be doubly affected), which in turn could impact on local economies and employment (e.g. decline in mariculture, with subsequent job losses and fewer future employment opportunities).

[40] Münster and Davies, 2005.

The term '**fatal flaw**' is used in the pre-application planning and screening phases of a project to evaluate whether or not an impact would have a 'no-go' implication for the project (Box 15). In the scoping and impact assessment stages, this term is not used; rather, impacts are described in terms of their potential **significance** (Section 10.2).

Box 15: Potential fatal flaws from a biodiversity perspective

A potential fatal flaw is an impact that could have a "no-go" implication for the project. A 'no-go' situation could arise if residual negative impacts (i.e. those impacts that still remain after implementation of all practical mitigatory procedures/actions) associated with the proposed project were to:

a) Conflict with international conventions, treaties or protocols (e.g. irreversible impact on a World Heritage Site or Ramsar Site);
b) Conflict with relevant laws (e.g. clearly inconsistent with NEMA principles, or regulations in terms of the Biodiversity Act);
c) Make it impossible to meet national or regional biodiversity conservation objectives or targets in terms of the NBSAP or other relevant plans or strategies (e.g. transformation of a 'critically endangered' ecosystem);
d) Lead to loss of areas protected for biodiversity conservation;
e) Lead to the loss of fixed, or the sole option for flexible, national or regional corridors for persistence of ecological or evolutionary processes;
f) Result in loss of ecosystem services that would have a significant negative effect on lives (e.g. loss of wetland on which local communities rely for water);
g) Exceed legislated standards (e.g. water quality), resulting in the necessary licences/approvals not being issued by the authorities;
h) Be considered by the majority of key stakeholders to be unacceptable in terms of biodiversity value or cultural ecosystem services (Box 1).

10.2 INTERPRETING IMPACT ASSESSMENT CRITERIA

- Impacts are often assessed by looking at their nature, intensity (severity or magnitude), extent (spatial influence) and duration (Box 16). This assessment is largely an objective and scientific / technical exercise. The level of confidence in the assessment is critical in biodiversity, given the complexity of many ecosystems and, in some cases, an inherent uncertainty as to their response to impacts.
- Evaluating the potential significance of impacts (e.g. 'low', 'moderate' or 'high' significance), takes into account both the scientific/technical assessment and the social context and values of affected resources.
- To evaluate the significance of impacts on biodiversity, therefore, these impacts need to be interpreted within the context of international conventions, and national, provincial and local laws, policies, plans and strategies, which reflect the values of broader society. The evaluation of impact significance should thus take into account not only the current biodiversity and known trends in the affected area that are likely to affect biodiversity, but also any vision, objectives or targets for that area.
- Local stakeholders and communities may attach specific direct or indirect use values to biodiversity (Box 1) which could be affected by a proposed project. These values may be different from the values of society as a whole. In determining the significance of impacts on biodiversity, therefore, it is important that the biodiversity specialist works closely with social and economic specialists, to ensure that these values are incorporated in the EIA[41].

[41] These local biodiversity values can be expressed in terms of heritage or socioeconomic value, and impacts of a proposed project on these values are principally incorporated by social, economic or heritage

Box 16: Criteria used for the assessment of impacts

Nature of the impact – A description of positive or negative effect of the project on the affected environment, or *vice versa*. This description should include who or what would be affected, and how.

Extent - the impact could:
- be site – specific;
- be limited to the site and its immediate surroundings;
- have an impact on the *region* (e.g. if communities rely on biodiversity);
- have an impact on a *national* scale (e.g. national biodiversity conservation targets);
- have an impact across *international* borders (e.g. where catchments cross international border, international conventions are concerned, or migratory species).

Duration – It is important to indicate whether or not the lifetime of the impact will be:
- *short term* (e.g. during the construction phase);
- *medium term* (e.g. during part or all of the operational phase);
- *long term* (e.g. beyond the operational phase, but not permanently);
- *permanent (*where the impact is for all intents and purposes irreversible. An irreversible negative impact may also result in irreplaceable loss of natural capital or biodiversity, if it were to result in extinction or loss of a species or ecosystem); or
- *discontinuous or intermittent* (where the impact may only occur during specific climatic conditions or during a particular season of the year).

Intensity or magnitude – The size of the impact (if positive) or its severity (if negative):
- *low,* where biodiversity is negligibly affected or where the impact is so low that remedial action is not required;
- *medium,* where biodiversity pattern, process and/or ecosystem services are altered, but not severely affected, and the impact can be remedied successfully; and
- *high,* where pattern, process and/or ecosystem services would be substantially (i.e. to a very large degree) affected. If a negative impact, could lead to irreplaceable loss of biodiversity and/or unacceptable consequences for human wellbeing.

Probability – Should describe the likelihood of the impact actually occurring indicated as:
- *improbable,* where the possibility of the impact is very low either because of design or historic experience;
- *probable,* where there is a distinct possibility that the impact will occur;
- *highly probable,* where it is most likely that the impact will occur; or
- *definite,* where the impact will occur regardless of any prevention measures.

Significance – The significance of impacts can be determined through a synthesis of the assessment criteria. Significance can be described as:
- *low,* where it would have negligible effect on biodiversity, and on the decision;
- *medium,* where it would have a moderate effect on biodiversity, and should influence the decision;
- *high,* where it would have, or there would be a high risk of, a large effect on biodiversity. These impacts should have a major influence on the decision;
- *very high,* where it would have, or there would be a high risk of, an irreversible negative impact on biodiversity and irreplaceable loss of natural capital or a major positive effect. Impacts of very high significance should be a central factor in decision-making.

Confidence – The level of confidence in predicting the impact can be described as:
- *low,* where there is little confidence in the prediction, due to inherent uncertainty about the likely

specialists. However, co-operation between these specialists and the biodiversity specialist is recommended, as biodiversity values are often overlooked by specialists in these other disciplines.

response of the receiving ecosystem, or inadequate information;
- *medium,* where there is a moderate level of confidence in the prediction; or
- *high,* where the impact can be predicted with a high level of confidence.

Source: Adapted from criteria used by the Department of Environmental Affairs and Tourism, 1998.

10.3 ESTABLISHING THRESHOLDS OF SIGNIFICANCE

The biodiversity specialist should use the criteria given in Box 17 to determine *thresholds of significance*, or changes in effects on biodiversity which would change a significance rating, e.g. from low to medium, or medium to high[42]. These thresholds are often linked to current societal values which determine what would be acceptable or unacceptable to society and may be expressed in the form of legislated standards, guidelines or objectives.

Box 17 : Determining significance thresholds

The establishment of significance thresholds should take into account the following:
- The generic biodiversity principles given in Section 2 of the guideline;
- International conventions, protocols or treaties which South Africa has ratified or signed (Section 3.1);
- The legal, policy and planning context for biodiversity conservation at national and provincial level (Section 3.1);
- Objectives and targets for biodiversity conservation, and ecosystem status, derived from the NBSAP, systematic conservation planning products, as well as the threatened status of species from Red Data Books, IUCN Red List and other sources (Section 9.2);
- The vision, objectives and targets for biodiversity conservation contained in local plans, policies and strategies;
- Levels of public concern about, dependence on, or interest in, biodiversity, through scoping, which reflects societal values.[43]

Thresholds of significance should be linked to the criteria in Box 17. The biodiversity specialist should justify, and give explicit reasons with regard to how s/he arrived at particular significance thresholds for impacts.

The significance thresholds for biodiversity impacts defined by national, provincial or local government may be different from those articulated by local communities or landowners adjacent to the proposed development. Clearly, it would be optimal to achieve a shared set of common values expressed in Box 17; however, in many instances trade-offs between these values are unavoidable (Section 10.9).

[42] "Thresholds of potential concern"(TPC) is another term used, in particular by managers of river systems. The TPC belongs to the concept of having a hierarchy of targets for managing biodiversity, rather than just defining the desired final outcome or endpoint. Targets derived through systematic conservation planning effectively define the desired endpoints of management; ecosystem status acts as a TPC of adverse trends or changes.

[43] These local values reflect heritage, social and/or economic value of biodiversity. It is the responsibility of the biodiversity specialist to assess and evaluate impacts on valued biodiversity and to provide input to the social, economic and/or heritage specialist, to ensure that biodiversity-related impacts and values are adequately dressed and integrated in the EIA.

When deciding on significance thresholds, it is important to take into account:

- Any environmental and operating scenarios or trends (Section 8.4);
- The status of ecosystems and/or species, and their resilience to the proposed project (Section 9.2);
- Mitigation potential (Section 10.8); and
- The required risk-averse and cautious approach in terms of NEMA (Section 3.1).

Where the impacts of the proposed project would support or contribute to the criteria given in Box 17, they would be of 'medium' to 'high' ***positive*** significance, depending on the scale and duration of contribution (Box 16). Box 18 gives significance thresholds for ***negative*** impacts on biodiversity.

Box 18 : Significance thresholds for negative impacts on biodiversity

Threshold	Significance rating
'Exclusionary'[44] threshold. e.g. *irreversible loss of critically endangered ecosystem; impact on international scale or high impact on national biodiversity or ecosystem services*	Very high
Threshold of major potential concern[45]. e.g. *irreversible impact, leading to change in ecosystem status from endangered to critically endangered; medium impact on national, or high impact on provincial biodiversity or ecosystem services*	High
Threshold of potential concern. e.g. *irreversible impact leading to change in ecosystem status from vulnerable to endangered; medium impact on provincial or high impact on local biodiversity or ecosystem services*	Medium - High
Threshold of potential concern. e.g. *irreversible impact leading to change in ecosystem status from not threatened to vulnerable; impacts with low impact on provincial but medium impact on local biodiversity or ecosystem services*	Medium
Negligible or no concern. e.g. *low impact on local biodiversity or ecosystem services*	Low

10.4 DESCRIBING THE DISTRIBUTION OF IMPACTS – BENEFICIARIES AND LOSERS

The biodiversity specialist should help, where relevant, to identify parties who would benefit or lose from a proposed project, based on their dependence on ecosystem services (Box 19), focusing on risk-prone or vulnerable communities.

Box 19 : Some examples of beneficiaries and losers from biodiversity impacts

- The wellbeing of society as a whole could be adversely affected where impacts result in the loss of biodiversity (Section 2.1);
- Communities who rely on water from a catchment would benefit if actions resulted in more reliable water yield from that catchment (e.g. by clearing alien vegetation);
- Communities living on the coast would lose protection from rough sea conditions should an offshore reef be destroyed.

[44] Lawrence Environmental, for Canadian Environmental Assessment Agency, 2000.
[45] "Threshold of potential concern"(TPC) is a term used as an early warning sign of adverse or unacceptable changes or trends which could prevent final objectives or target/s from being met.

Vulnerable or risk-prone communities can be described as:

- Communities who rely heavily on those ecosystem goods and/or services likely to be negatively affected; e.g. subsistence communities, communities where livelihoods are based on the harvest of natural resources;
- Communities in dynamic, sensitive or harsh ecosystems, where extreme conditions (e.g. drought, floods, earthquakes, landslides) make them particularly vulnerable to additional negative impacts.

10.5 IDENTIFYING KEY UNCERTAINTIES AND RISKS

The biodiversity specialist needs to take a risk-averse and cautious approach under conditions of uncertainty; that is, where outcomes cannot be predicted with high confidence (Section 2). The implications of this approach are given in Box 20.

Box 20: The precautionary principle in practice with regard to biodiversity

The following considerations should be applied:

For a critically endangered or endangered ecosystem or species, ***or for a previously un-recorded species or species about which little is known*** where impacts could be of high significance, irreversible, lead to irreplaceable loss of natural capital, and/or there is little prior experience or scientific confidence about the outcome:	***Follow the strict precautionary principle***. Impacts should be confined within the realm of complete reversibility, and only activities which have been shown to pose negligible risks to biodiversity should be permitted. Mitigation, including offsets should totally and reliably compensate for impacts on biodiversity to ensure no change in conservation status, providing for a margin of error where there may be uncertainty as to the effectiveness of mitigation.
For a vulnerable ecosystem and/or species, where impacts could be long term and significant:	Only those human-induced activities which pose low risk to biodiversity should be permitted. Impacts should be mitigated in full and, in a 'worst case' scenario, residual impacts should be offset to ensure that there would not be a change in status to 'endangered'. Where there is uncertainty as to the likely effectiveness of mitigation, a margin of error should be provided.
For an ecosystem and/or species which is ***currently not threatened***:	Human-induced activities which pose some risk to biodiversity should be permitted. However, impacts must be mitigated and offset as far as practicable.

The biodiversity specialist must take into account:

- Particular hazards posed by the nature of the proposed project on biodiversity, and associated risks.
- Any hazard posed by the receiving environment on the proposed project and associated risks.

The specialist must inform the EIA practitioner about any major risks and uncertainties associated with the assessment of biodiversity-related impacts (Box 21).

Box 21: Risks and uncertainties, particularly in data-poor circumstances

The biodiversity specialist must be explicit about:

- Any assumptions made in the assessment methodology;
- Any gaps in information that may affect the accuracy or reliability of predictions and/or confidence levels;
- Any inherent uncertainties with regard to the behaviour or resilience of the receiving environment, including the influence of environmental trends and/or operating conditions (Section 8.4);
- The risk implications associated with any of the above; and
- The associated consequences, highlighting significant or irreversible impacts on biodiversity pattern, process or ecosystem goods and services, and/or or irreplaceable loss of natural capital.

10.6 JUSTIFYING UNDERLYING ASSUMPTIONS

Any assumptions made by the biodiversity specialist should be reasonable, realistic and justified.

10.7 DEFINING CONFIDENCE LEVELS AND CONSTRAINTS TO INPUT

Levels of confidence in predicting, assessing and evaluating impacts on biodiversity are pivotal to the reliability of specialist input to an EIA, and must be clearly stated (Box 16). Where the biodiversity specialist has low levels of confidence in his/her input, that input is of little value to the decision-maker and typically indicates the need for additional information. In some instances, however, low confidence levels may be associated with inherent uncertainty as to the likely response of ecosystems to a particular aspect of the project (i.e. reflecting unprecedented projects and/or lack of scientific knowledge); in these cases the precautionary principle should be applied.

Any constraints or limitations on the specialist input should be given, and the implications for the reliability and repeatability of that input should be explicitly stated.

10.8 RECOMMENDING MANAGEMENT ACTIONS

There is a hierarchy of possible management actions, given in order of priority:

- *Avoiding or preventing the impact* (Section 10.8.1);
- *Mitigating* (reducing or minimizing) negative impacts and enhancing (maximising) benefits, by considering alternatives (Section 10.8.2, and Sections 10.8.3-10.8.5);
- *Rectifying* negative impact by restoring the affected environment to its previous condition, or rehabilitating it for a different land use (Section 10.8.4);
- Providing an *offset* to compensate for the residual negative impact, to ensure that there is 'no net loss' of biodiversity (Figure 4, Section 10.8.5).

Assurance or guarantees from the proponent should be provided that management actions would, in fact, be implemented. Should the capacity or commitment to implement management actions be lacking, the 'without management' significance ratings would present a more reliable scenario for decision-makers to consider.

10.8.1 Avoidance

Avoiding potentially significant impacts should be the 'first prize' of planning. The consideration of alternatives throughout the EIA process, beginning in the pre-application planning phase, is the most effective tool to use to achieve this end.

10.8.2 Mitigation

The approach to mitigation of impacts on biodiversity should move beyond conventional 'end of pipe' approaches such as rehabilitation of disturbed areas, and rescue and relocation of Red Data Book species, towards a focus on *in situ* conservation. Provision should be made for management to replicate or mimic the key drivers of the receiving ecosystems (e.g. fire in fire-dependent ecosystems).

Mitigation measures proposed by the biodiversity specialist should be specific to the project[46], practicable, and aligned with measures proposed by other specialists.

The following should be addressed in mitigation:

- Due consideration of alternatives to minimize negative impacts (Section 8.3);
- Clearly defined measures for mitigating, managing and monitoring (if appropriate) impacts on biodiversity during the different phases of the proposed project (construction, operation and decommissioning) should be prepared for incorporation in an EMP or EMS for the proposed development, and in a Record of Decision (where relevant). The likely effectiveness of these measures in reducing potential significance should take into consideration the capacity of the proponent, authorities and/or communities (as relevant) to implement them.
- The EMP and/or EMS should give clear targets for managing biodiversity, specify the actions to be taken, and when, where, how often and by whom the actions should be taken.
- Provision should be made in an EMP and/or EMS for emergency response measures and/or contingency plans where upset or accident conditions could threaten biodiversity. A risk-averse and cautious approach should be adopted in making recommendations.
- Monitoring often plays a crucial role in managing and minimising adverse impacts on biodiversity, particularly where there is some uncertainty and risk regarding the exact scale or nature of possible impacts (Section 10).

10.8.3 Enhancement

The biodiversity specialist should strive to enhance potential benefits for biodiversity arising directly from the proposed project (e.g. re-introduction of locally indigenous wildlife, or securing

[46] A broad statement that 'impacts on biodiversity will be addressed in the EMP' is not acceptable.

public open space for biodiversity conservation through a stewardship agreement and change to the title deed of the property).

S/he should also look for additional ways in which a project could benefit those affected, aside from those related to the immediate purpose of that project (e.g. the creation of an artificial wetland to polish sewage effluent, in which local communities could grow arum lilies for harvest as a source of income.)

10.8.4 Rehabilitation and restoration

Restoration (reinstating the pre-project pattern and process, allowing the ecosystem to become self-regulating) rather than rehabilitation (to another habitat and/or for different use) of impacted ecosystems is the preferred option for biodiversity. Opportunities to re-create threatened habitat, and/or habitat for threatened species or communities, should be borne in mind during rehabilitation. Locally-occurring indigenous, rather than exotic, species should be used. Restoration or rehabilitation objectives must be technically feasible and the performance thereof should be monitored to allow adaptive management where appropriate to meet objectives.

10.8.5 Compensation and offsets

Compensation or offsets should only be considered once those management actions in Sections 10.8.1 – 10.8.4 have been adequately addressed. Offsets work by replacing or providing 'like for like or better' substitutes for residual negative impacts on biodiversity. Such offsets could include formal commitment to managing substitute areas of comparable or greater biodiversity value for conservation, entering into a secure and permanent conservation agreement with the conservation authority, setting aside protected natural areas, establishing a trust fund for biodiversity conservation, thereby enabling land acquisition or management, etc. Offsets should focus on areas of recognised value to biodiversity conservation, and on ensuring the persistence of landscape-scale processes.

Offsets in mitigation of significant biodiversity loss should ***only be considered*** when:

- There is flexibility with regard to securing areas needed to meet targets for biodiversity conservation (i.e. where an ecosystem is 'critically endangered', and every last remnant of that ecosystem is irreplaceable if conservation targets are to be met, then there is no flexibility to consider offsets. However, offsets could be considered for other categories of threatened ecosystem);
- Offsets won't have an unacceptable 'domino effect' (i.e. sacrificing one area in view of a promise to conserve another has cumulative effects which, if not carefully monitored, could result in elimination of options to achieve biodiversity conservation targets); and
- Offsets and/or compensation represent a secure (i.e. over time, by way of, for example, entering into a stewardship agreement) and significant commitment to biodiversity conservation (i.e. of value in terms of meeting conservation targets and/or financing acquisition or management of critical areas).

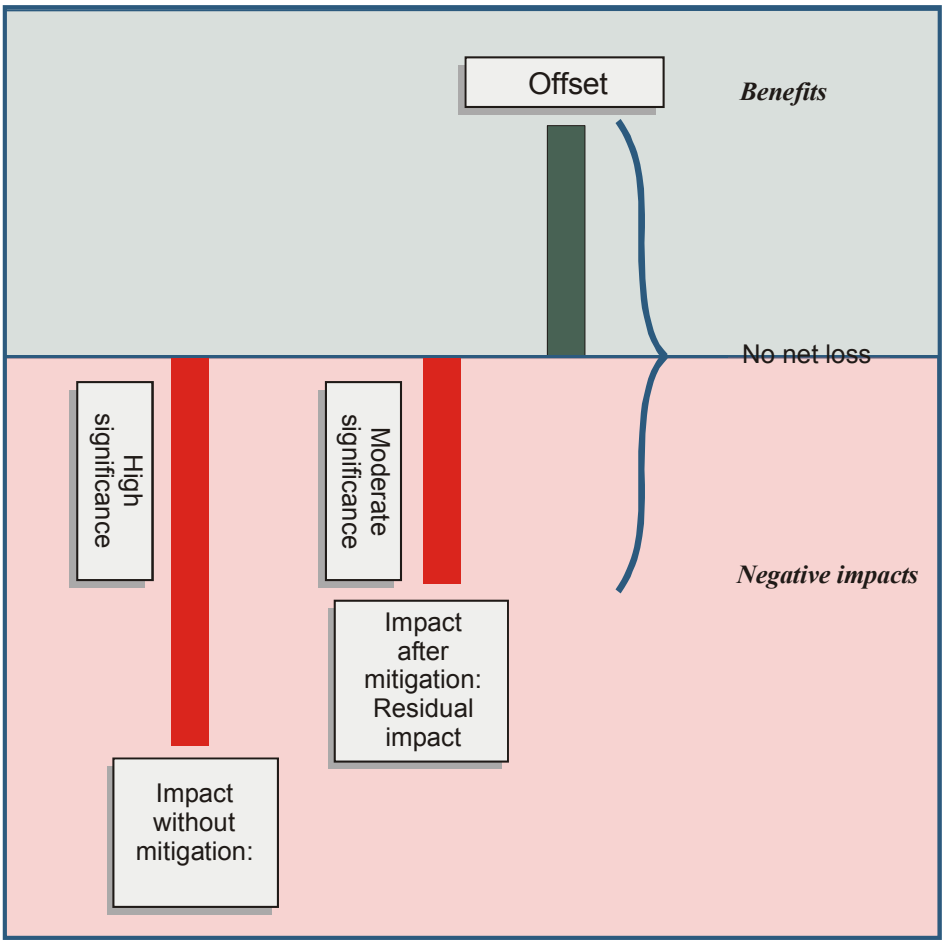


Figure 4 : Significance, mitigation, residual impacts and offsets

10.9 IDENTIFYING THE BEST PRACTICABLE ENVIRONMENTAL OPTION

The biodiversity specialist should clearly indicate the implications for biodiversity pattern, process, and any ecosystem goods and services of each alternative, and indicate which alternative would be optimum from a biodiversity perspective. The EIA practitioner would have to integrate the findings of different specialist studies. Should there be a number of different specialist assessments with different optimum alternatives, it would be useful to workshop the alternatives with all specialists and the proponent, to negotiate trade-offs which would be acceptable to all specialists, the outcome of which would be a BPEO.

10.10 COMMUNICATING THE FINDINGS OF THE SPECIALIST INPUT

Specialist input should be concise, accessible and intelligible to a non-specialist. It should:

- Be focused on the key biodiversity issues, and present sufficient, reliable and relevant information;
- Be scientifically and technically sound, explaining the methodology used and processes followed, and giving all sources of data, both existing and new. The criteria used to evaluate

the potential significance of impacts on biodiversity, as well as the likely effectiveness of proposed mitigation, enhancement or compensation, should be described;

- Present the findings in a clearly organised way which facilitates understanding.

Input should be at a level of detail appropriate to the specific project and stage of the EIA process. Box 22 specifies the information to be provided in a specialist assessment (i.e. during the impact assessment stage of an EIA). Input to the pre-application planning phase, or to screening and/or scoping, would depend on the particular trigger/s for involving a biodiversity specialist and associated information required.

Box 22 : Information to be provided in biodiversity specialist report

- The specialist's Terms of Reference and scope of input;
- A summary table of positive and negative impacts associated with different alternatives and their significance before and after mitigation or enhancement, using the defined impact assessment and significance rating criteria;
- A statement as to which impacts would be irreversible, or result in an irreplaceable loss of biodiversity or ecosystem services to the ecosystem and/or society;
- A statement as to whether or not the proposed project would comply or be consistent with international conventions, treaties or protocols, and with national, provincial and local legislation, policy and plans as they apply to biodiversity;
- The need (where relevant) for higher order assessment to address potentially significant cumulative effects on biodiversity;
- A concise description of the importance of the affected area to biodiversity in terms of pattern and process, ecosystem goods and services, as appropriate;
- The significance of impacts for each issue and alternative, before and after management, specifying whether significance thresholds have been exceeded;
- The main beneficiaries and losers from the proposed development where there are clear dependencies on ecosystem goods and/or services, highlighting vulnerable and risk-prone parties;
- The specialist's assumptions, and confidence levels in the assessment predictions;
- Key risks and uncertainties that may influence the assessment. Associated with these risks and uncertainties, a clear statement of limitations and/or gaps in knowledge or information;
- A summary of key mitigation and enhancement measures that would fundamentally affect the significance of impacts on biodiversity if implemented;
- The most appropriate alternative from the specialist's perspective;
- Alternatives not previously considered in the EIA;
- References for all sources of information and/or data used.

The specialist should be given the opportunity to review the draft EIA Report prior to making it available to the public, to ensure that findings and recommendations contained in the specialist study are accurately reflected in this report.

11. SPECIALIST INPUT TO MONITORING PROGRAMMES

Monitoring means to observe, take samples or measure specific environmental variables, in order to track changes, measure performance or compliance, and/or detect problems.

Monitoring is generally only considered appropriate where changes are probable or likely, and where these changes could be significant and would require remedial or specific management measures.

Monitoring may be carried out to[47]:

- Ensure that mitigation or enhancement measures are implemented;
- Evaluate whether mitigation or enhancement is having the expected and desired effect;
- Improve available data or information;
- Determine whether or not predicted impacts are occurring and/or whether or not the models or other tools used to predict impacts are appropriate and useful;
- Check compliance with legal and/or other requirements with regard to environmental quality (compliance monitoring);
- Determine the intensity of impacts and allow for timeous and effective remedial action where necessary, particularly where prediction of such impacts was uncertain because of lack of prior experience and/or scientific knowledge.
- Detect warning signs that significance thresholds or environmental targets are being exceeded or will be exceeded, to allow for prompt remedial action and/or adaptive management through the life of the project to minimise negative effects.
- Evaluate the accuracy of the EIA in predicting impacts, and allow for changes to an EMP or EMS accordingly.

Monitoring can be carried out ***prior to the construction phase*** (to establish a reliable benchmark), or during the ***construction***, ***operational*** and/or ***decommissioning*** phases of a project, depending on the particular risks of significant impacts during these phases and/or the need to monitor compliance with requirements.

Monitoring programmes should include:

- The specific questions to be answered by monitoring;
- The frequency, season and/or time of monitoring;
- Responsibility for carrying out monitoring;
- Indicators to use in monitoring. Organisms most sensitive to probable impacts should be chosen as reliable indicators for monitoring purposes, to provide the earliest possible indication of undesirable change. The choice of indicators would depend on the particular impacts predicted, and the receiving environment (e.g. if changes in salinity are predicted in an aquatic ecosystem, an organism most sensitive to salinity changes should be used as an indicator). Since monitoring often has to consider natural fluxes as well as human-induced effects, complementary indicators may be appropriate in monitoring. Indicators should be specific, measurable, achievable, relevant and timely. Where possible, the choice of indicators should be aligned with key national and provincial indicators;
- Significance thresholds or thresholds of probable concern (Section 10.3), which would trigger remedial action or other intervention;

[47] e.g. IAIA, December 2004.

- Responsibility for analysing and evaluating the results of monitoring, and for implementing adaptive management in response;
- Reporting requirements.

Monitoring must be tied in to an effective decision-support system which triggers appropriate management changes depending on the results of monitoring, and clearly identifies who would be responsible for implementing that management.

For monitoring to be meaningful, a reliable benchmark picture of the biodiversity to be affected must be captured prior to the start of the project. Monitored changes can then be evaluated against this baseline picture and anticipated natural trends. Such ***baseline data collection*** is especially important in ecosystems where there are likely to be substantial fluctuations: it may be necessary to gather data from different seasons, during different climatic and/or atmospheric conditions, to enable the range of 'without project' measurements to be accurately captured.

PART E : REVIEW OF SPECIALIST INPUT

This part of the guideline identifies specific review criteria that can be used as a quality check.

12. SPECIFIC EVALUATION CRITERIA

Reference should be made to the *Guideline for the review of specialist input in EIA processes* for the generic review criteria that can be applied to any specialist input. This section only provides specific guidance on reviewing biodiversity input.

Review of the specialist biodiversity report is undertaken 'in-house' by the EIA practitioner and the proponent, before the report is made available to a wider audience for review. This wider audience consists of I&APs, including the relevant authority/ies. Where deemed appropriate, and generally before the draft EIA report is made available for I&AP comment, a biodiversity specialist is asked to carry out peer review. An EIA reviewer may also be asked to review the adequacy of the EIA report in terms of, amongst others, the integration of different specialist studies.

This section looks at criteria used in evaluating specialist biodiversity input to the EIA, namely:

- Adequate biodiversity scoping;
- Involvement of the right biodiversity specialist/s;
- Adequate Terms of Reference;
- Clarity and adequacy of the specialist report;
- Sound integration with other specialist studies;
- Faithful representation of the specialist/s' findings in the final EIA documentation.

If the answer to one or more of the following questions is 'no', then the findings of the EIA report are not reliable, and would not provide a sound basis for decision-making.

12.1 ADEQUATE BIODIVERSITY SCOPING

The reviewer should be guided by the following questions:

- Have the key issues from a biodiversity perspective been reliably identified (Section 6)? There should be clear evidence that essential sources of information (Box 13) have been used, that adequate opportunity was made for key I&APs (particularly users of, or dependants on, biodiversity) to participate in scoping, and/or that a biodiversity specialist was involved in scoping.
- Have issues raised about biodiversity been soundly answered or, where questions and issues remain, have biodiversity specialists been appointed to investigate potentially significant impacts (Section 5)?

12.2 APPROPRIATE SPECIALIST/S INVOLVEMENT

The reviewer should be guided by the following questions:

- Where there are clear triggers for the involvement of a biodiversity specialist (Section 5), have specialists in the field of biodiversity, who are best suited to answering the specific issues raised during scoping, been involved in the EIA (Section 7.1)?
- Where biodiversity specialists have been involved, have specialists with suitable qualifications, skills and experience been used (Section 7.2)?

If potentially significant biodiversity issues have been addressed by an EIA practitioner without the relevant qualifications, skills or experience to do so, and/or if specialists in inappropriate disciplines have been appointed (e.g. a hydrologist rather than a freshwater ecologist, or a fish specialist where the expertise of a broad ecologist is needed), and/or if specialists with inadequate experience in the affected environment have been appointed, then the EIA is inadequate.

12.3 ADEQUATE TERMS OF REFERENCE FOR SPECIALISTS

The reviewer should be guided by the following questions:

- Are the TOR for specialist/s explicit and adequate (Section 8)?
- Do the TOR link explicitly to the issues identified during scoping?

12.4 CLARITY AND ADEQUACY OF BIODIVERSITY SPECIALIST REPORT

The reviewer should be guided by the following questions:

- Are the findings of the specialist presented clearly and logically, with minimal use of technical jargon?
- Has the specialist satisfied his/her Terms of Reference?
- Has the information required in Box 22 been provided?
- Have potential direct, indirect and cumulative impacts on important pattern, important ecological processes and associated areas (e.g. corridors), and on ecosystem goods and services (as relevant to the proposed project) on and beyond the site, been identified, assessed and evaluated (Sections 5-10)?
- Has sufficient attention been paid to the identification and due consideration of alternatives (Section 8.3 and Section 10.8) to avoid or minimise negative impacts?
- Are recommendations explicit with regard to alternatives, mitigation and / or enhancement of impacts, and monitoring and associated evaluation (Section 10.8 and Section 11)?
- Has a defensible approach been used to evaluate the potential significance of impacts (Sections 10.2-10.3)?
- Is the significance of impacts clearly presented, highlighting irreversible impacts, impacts likely to result in irreplaceable loss of natural capital, and/or a high risk thereof?
- Has a risk-averse and cautious approach been adopted in assessing and evaluating impacts, and in determining appropriate mitigation?

- Are both the information base and the methodology used sound? (Where they have been challenged by key stakeholders, and not peer reviewed, then indications are that the answer would be 'no').

12.5 ADEQUATE INTEGRATION OF BIODIVERSITY WITH OTHER SPECIALIST STUDIES

The reviewer should be guided by the following question:

- Has the biodiversity specialist worked closely with others, as appropriate to the particular context, in order to ensure that interdependencies – particularly between human wellbeing and biodiversity, as indicated by ecosystem goods and services - have been adequately addressed (Section 8.7)?

12.6 FAITHFUL REPRESENTATION OF SPECIALIST/S' FINDINGS IN THE EIA REPORT

The reviewer should be guided by the following question:

- Are the principal findings of the biodiversity specialist (Section 10.10) soundly reflected in the EIA report?

PART F : REFERENCES

13. REFERENCES

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- ICB: www.eapsa.co.za/.
- Laws and policy: www.info.gov.za/documents/index.html or www.polity.org.za/pol/home/.
- NEPAD 2002. Summary of NEPAD action plans. www.nepad.org.
- River Health Programme – www.csir.co.za/rhp/. Includes information on past and future state-of-rivers (SoR) reports, provincial implementation agencies, technical reports
- SACNASP : www.sacnasp.org.za.
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- The Water Page (2001) – www.thewaterpage.com/aq_eco_july_01.htm [including a short review of water for ecosystems, plus useful references and web-based documents]

USEFUL WEBSITES : WESTERN CAPE

- CapeNature's Conservation Planning Unit: http://cpu.uwc.ac.za.
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- Guidelines for broad-scale systematic conservation plans, information sheets for Cape Lowlands Renosterveld Project, and other fine-scale plans. CPU: http://cpu.uwc.ac.za.
- State of Biodiversity Report: www.capenature.org.za/know_how/html/sobintro.html.

APPENDIX A: DEFINITIONS AND ACRONYMS

DEFINITIONS

Alternatives	A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The "no-go" alternative constitutes the 'without project' option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.
Biodiversity	The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems", as defined by the Convention on Biological Diversity.
Bioregional planning approach	The bioregional planning approach supported in the Western Cape supplements the statutory planning process by providing a spatial and theoretical framework for the integration of social, environmental and economic criteria in local planning initiatives such as SDF preparation. The approach draws on UNESCO's Man and the Biosphere programme.
Environmental Management Framework	Provision is made in NEMA draft regulations for Environmental Management Frameworks that must identify conservation and environmental priorities, and provide associated guidance for planning, land use and environmental management.
Exclusionary threshold	Significance threshold which would lead to the automatic rejection of a proposal.
Fatal flaw	A fatal flaw is defined as an impact that could have a "no-go" implication for the project.
Hazard	Anything that has the potential to cause damage to life, property and/or the environment. The hazard of a particular material or installation is constant; that is, it would present the same hazard wherever it was present.
Irreplaceable	Impact which results in the loss of a resource without substitute, which cannot be replaced. Loss of natural capital is inconsistent with 'strong sustainability' within the 'sustainable development' paradigm, and inconsistent with the Convention on Biological Diversity's 'no net loss' goal. An impact leading to irreplaceable loss of natural capital is, by definition, irreversible. However, that impact may be acceptable to current stakeholders when seen in the light of trade-offs which must be made to meet their needs.
Irreversible impact	An impact which cannot be reversed in time, incapable of changing back, permanent. [An irreversible impact is not synonymous with one that is irreplaceable or unacceptable: it may or may not lead to irreplaceable loss of natural capital, and may or may not be acceptable to society or stakeholders in terms of their current values.]
Key issue	An issue raised during the scoping process that has not received an adequate response and which requires further investigation before it can be resolved.

Rehabilition	To repair disturbed ecosystem, but not necessarily to its pre-disturbance biodiversity.
Restoration	To re-instate the pre-disturbance biodiversity pattern and process.
Spatial Development Framework	In terms of the Municipal Systems Act 32 of 2000, all municipalities have to prepare an Integrated Development Plan (IDP) for the area under their control. The spatial component of the IDP is known as an SDF.
Stakeholders	A subgroup of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term includes the proponent, authorities and all interested and affected parties.
Threshold of potential concern	The level of environmental quality which indicates unacceptable deterioration, degradation or loss, and which triggers remedial intervention to halt or reverse the cause-effect pathways.

ACRONYMS

BPEO	Best Practicable Environmental Option
CBD	Convention on Biological Diversity
CFR	Cape Floristic Region
DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
EIA	Environmental Impact Assessment
EMP	Environmental management plan or programme
EMS	Environmental management system
I&AP	Interested and affected party
IDP	Integrated Development Plan
NBSAP	National Biodiversity Strategy and Action Plan
NSBA	National Spatial Biodiversity Assessment
SA	South Africa
SAIE&ES	Southern African Institute for Ecologists and Environmental Scientists
SACNASP	South African Council for Natural Scientific Professions
SDF	Spatial Development Framework
TOR	Terms of Reference

APPENDIX B: NATIONAL LAWS

[Updated: 15 April 2005.]

The following national laws in South Africa have direct application to biodiversity:

- The environmental clause in the Bill or Rights of the Constitution of the Republic of South Africa Act (Act No. 108 of 1996), which states that "everyone has the right (b) to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".
- The National Environmental Management Act (Act No. 107 of 1998)[48], Section 2 of which contains national environmental management principles. The text box below gives those principles which have a direct bearing on biodiversity conservation:

NEMA principles relevant to biodiversity

S2(3) Development must be socially, environmentally and economically sustainable;

S2(4) Sustainable development requires consideration of all relevant factors (a), including:

- *Avoid* or, where it's not possible to altogether avoid, *minimize and remedy* disturbance of ecosystems and loss of biological diversity (i);
- Avoid or, where it's not possible to altogether avoid, minimize and remedy pollution and degradation of the environment (ii);
- Development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardized (vi);
- *A risk-averse and cautious* approach is applied, taking into account the limits of current knowledge about the consequences of decisions and actions (vii);
- Avoid negative impacts on people's environmental rights (viii):

(a) Pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure well-being. Special measures may be taken to ensure access by categories of persons disadvantaged by unfair discrimination;

(b) Decisions must take into account the interests, needs and values of all I&APs, recognising all forms of knowledge including traditional and local knowledge;

(k) The environment is held in public trust for the people, the beneficial use of resources must serve the public interest and the environment must be protected as the people's common heritage;

(l) The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment;

[48] The Department of Environmental Affairs and Tourism is currently undertaking a law reform process, including promulgation of revised EIA Regulations in terms of NEMA.

(m) Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands and similar systems require specific attention in management and planning procedures, especially where they area subject to significant human resource usage and development pressure.

- The Development Facilitation Act (Act No. 67 of 1995), which calls for 'sustained protection of the environment' and optimum use of natural resources.
- The NEMA and the Biodiversity Act provide EIA triggers for activities in threatened ecosystems, and/or where threatened species could be adversely affected. DEAT and DEA&DP would be the responsible departments for implementing EIA-related regulations.
- The National Spatial Biodiversity Assessment, undertaken as part of the National Biodiversity Strategy and Action Plan (NBSAP), will probably provide the basis for listing of threatened ecosystems. Ecosystem status is defined in terms of categories defined by the Biodiversity Act, namely Protected, Vulnerable, Endangered or Critically Endangered[49].
- The NBSAP will provide priorities for action with regard to biodiversity conservation in South Africa.

Other national legislation may also be relevant to biodiversity in the EIA process. DEAT and DEA&DP would be the responsible departments for implementing EIA-related regulations. The particular context of the EIA, nature of the proposed project and of the receiving environment will determine which – if any – of the following are relevant:

- National Environmental Management Protected Areas Act (Act No. 57 of 2003);
- Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations. (These Regulations are to be replaced by regulations promulgated in terms of the NEMA);
- Sea Birds and Seals Protection Act (Act No. 46 of 1973);
- Marine Living Resources Act (Act No. 18 of 1998), which aims to conserve marine living resources and biodiversity, protect the marine ecosystem, and minimize pollution;
- Mountain Catchment Areas Act (Act No. 63 of 1970);
- National Heritage Resources Act (Act No. 25 of 1999), and provincial regulations;
- National Water Act (Act No. 36 of 1998); particularly the ecological reserve determination;
- Conservation of Agricultural Resources Act (Act No. 43 of 1983) [currently being revised];
- National Forests Act (Act No. 84 of 1998) and regulations on protected species;
- Lake Areas Development Act (Act No. 39 of 1975);
- Sea Shore Act (Act No. 21 of 1935);
- Atmospheric Pollution Prevention Act (Act No. 45 of 1965) [updated by draft legislation];
- National Environmental Management Draft Coastal Zone and Estuarine Bill [in preparation].

[49] s 52(2)

APPENDIX C: MODEL TERMS OF REFERENCE FOR SPECIALIST INPUT

Terms of reference for specialist input should include the following elements:

1) Project description
2) Overview of EIA process and timeframes
3) Specific issues and information requirements to be addressed by the specialist
4) Key sources of information
5) Assumptions, limitations and uncertainties
6) Approach to be used
7) Requirements to attend meetings and workshops
8) Requirements to liaise and exchange information with other specialists
9) Protocol for stakeholder engagement
10) Report template providing structure of contents, formatting styles and standard terminology (including impact assessment criteria if applicable)
11) Clarification of review and integration process
12) Requirements for specialist sign off on the specialist report and inputs to integrated reports
13) Summary of tasks, deliverables and due dates
14) Budget and payment schedule, including penalty clause for late delivery
15) Confidentiality agreement
16) Protocols for communication with outside parties during the project