

The Integration of Biodiversity into National Environmental Assessment Procedures

National Case Studies

South Africa

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Introduction

South Africa – A Biodiverse Country

South Africa is a country well endowed with both natural resources and a rich cultural heritage. Its economy and society are often characterised as dichotomous, comprising a mix of both developing and industrialised economies and as a result the country's environmental problems represent a microcosm of the world's environmental concerns. For example, South Africa shares with many developing countries the challenges of a growing population, natural resource depletion, increasing urbanisation, and high levels of poverty and unemployment. Yet concerns typically associated with industrialised countries are also extremely prevalent. These include severe air and water pollution, over-consumption by the affluent, and problems associated with waste disposal. These issues have a profound effect on South Africa's extraordinarily rich and unique biodiversity.

South Africa unequivocally classifies as a biodiverse country. The country is ranked as the third most biologically diverse in the world, containing between 250 000 and 1 000 000 species, many of which occur nowhere else. For plants alone, some 18 000 vascular plant species occur in the country, of which 80% are endemic (Goldblatt 1978).

Animal life is equally varied, both in terms of numbers and variety (see Box 1). South Africa hosts an estimated 5.8% of the world's total of mammal species; 8% of bird species; 4.6% of the global diversity of reptile species; 16% of marine fish species; and 5.5% of the world's described insect species. In terms of the number of endemic mammal, bird, reptile and amphibian species, South Africa is the 24th richest country in the world, and the 5th richest in Africa (World Conservation Monitoring Centre 1992).

South Africa is also the only country on Earth to have within its borders an entire plant kingdom – the Cape Floral Kingdom – which is one of just six in the world. This area has the highest recorded species diversity for any similar sized temperate or tropical region in the world and is the world's "hottest hotspot", or the area where high levels of species richness, endemism, as well as threat coincide. Other biomes – or habitat types - are also of global conservation significance: one third of the world's succulent plant species are found in South Africa, and the succulent karoo is recognised as a major centre of endemism.

Seven major terrestrial biomes, or habitat types, exist in South Africa: forest, fynbos, grassland, Nama karoo, succulent karoo, savanna and thicket. These biomes can in turn be divided into 70 vegetation types, which are communities that share common species, have similar vegetation structures, and share the same set of ecological processes (Low and Rebelo 1996).

South Africa's marine life is also diverse, partly as a result of the extreme contrast between the water masses on the East and West Coast. Three water masses – the cold Benguela current, the warm Agulhas current, and oceanic water – make the region one of the most oceanographically heterogeneous in the world. For animals, over 11 000 species have been described from the marine environment around South Africa, and some 17-30% of these are endemic to the area (Gibbons 2000). South African seaweeds are also extremely diverse: about 800 species have been recorded, demonstrating high levels of endemism (Bolton & Anderson 1997).

A well developed system of marine and terrestrial protected areas exists in the country, and it is in such areas that efforts to conserve biodiversity have been focused. The 422 formally protected areas constitute some 6% of the land surface area. The extent to which viable populations are conserved in such areas is not known but 74% of plant, 92% of amphibian and reptile, 97% of

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bird, and 93% of mammal species of South Africa are estimated to be represented in the present protected area system (Siegfried 1989).

Table 1 Species richness of South African Taxa

Taxa	Number of described species in South Africa	% of the Earth's total
Mammals	227	5.8
Birds	718	8
Amphibians	84	2.1
Reptiles	286	4.6
Freshwater fish	112	1.3
Marine fish	2 150	16
Invertebrates	77 500	5.5
Vascular plants	18 625	7.5

Threats and development pressures

Biodiversity is under considerable threat in South Africa and a substantial proportion of natural habitat has already been transformed. Comprehensive estimates are not available as to the extent of modification, although a conservative assessment is that at least 25% of land has been transformed for purposes of cultivation or afforestation, for urban or industrial development, or to enable roads, railways and dams to be built. Overgrazing, alien plant and animal infestations, the overexploitation of certain species, and the pollution or toxification of the soil, water and atmosphere have also had major effects on South Africa's biodiversity.

Threatened species (as listed in the Red Data Books) include 3 435 (15%) of South Africa's plant species; 102 (14%) of bird species, 72 (24%) of reptile species, 17 (18%) of amphibian species, 90 (37%) of mammal species, and 142 (22%) of butterfly species.

The degree to which the different terrestrial biomes is threatened varies, depending upon the fertility of the soil, human population pressures, the economic value derived from the area, and the extent to which the biome is conserved in protected areas. Noteworthy is that the existing reserve system in southern Africa is estimated to protect 74% of all vascular plants (Siegfried 1989). Three of the seven described biomes (desert, fynbos and savanna) have more than 10% of their area conserved, with the forest biome approaching 9%, and 14 of the 70 vegetation types have more than 10% of their area conserved (Rebello 1997). However, the Nama-karoo, grassland and succulent karoo biomes have less than 3% of their area conserved.

Adverse impacts on freshwater systems are of particular concern, especially in light of the scarcity of water in the region, and the loss of wetlands has been high, especially in the coastal and inland margin zones of the country. Catchment changes through afforestation, alien plant invasion, irrigation and over-abstraction have reduced natural run-off and groundwater levels substantially, and water quality has been reduced considerably through salinisation, eutrophication, and pollution by heavy metals, mine dump effluents, pesticides, insecticides and herbicides.

Estuarine areas count as some of the most threatened ecosystems in South Africa, and have been affected by excessive upstream water abstraction, resulting in a reduction of freshwater to estuaries; agricultural practices that lead to increased soil erosion and thus silt deposition in estuaries; urban or industrial development adjacent to estuaries; modifications to river and tidal flows through floodplain development and infrastructure construction; and pollution resulting from activities in catchments. Of South Africa's 250 estuaries, only 23 are protected in some way and of those that are protected, most are considered small and insignificant (Attwood *et al* 2000).

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Threats to marine and coastal biodiversity in South Africa are similar in many respects to those facing terrestrial biodiversity, with most threats originating from land-based activities. These include marine pollution, from domestic sewage, industrial waste, stormwater drains and oil spills; coastal zone degradation, from rapid urbanisation, tourism, recreation, infrastructural development, and mining; the overexploitation and poaching of marine resources; and the introduction of alien species.

Of South Africa's three marine biogeographic zones, one (the cool temperate west coast) has no marine protected area in which representative habitats are protected. Inadequate protection has also been given to the southern part of the subtropical east coast. Collectively, marine protected areas cover 17% of the South African coastline, but only 4.9% of the coastline has all forms of exploitation prohibited (Attwood *et al* 2000).

National biodiversity policy and strategy

South Africa is a party to the Convention on Biological Diversity (CBD), having ratified the agreement in 1995. Political changes in the country, combined with anticipated ratification of the CBD, led to the government initiating a policy process in 1995 to develop a national biodiversity policy and strategy that reflected the interests and aspirations of the South African population³.

Prior to democracy in South Africa, civil society had enjoyed little influence in the manner in which decisions were made about biodiversity, and had no status on any of the formal structures set up to consider its conservation and use. A chasm also existed between those from the "old guard" – who were typically "expert-driven" natural scientists who were disinterested in or antagonistic towards the broader social and political context of biodiversity; and those from civil society organisations who were "process driven" and committed to principles of social and environmental justice, but often lacking formal scientific training and knowledge about biodiversity.

Such differences demanded the need for a fairly exhaustive participatory process and a strategy was designed to incorporate both the political process necessary to facilitate ownership and acceptance of the policy, as well as the technical component required to articulate substantive issues. Three key structures were established to meet these objectives:

- ❑ A four-person Steering Committee responsible for day-to-day management, through partnership with the national Department of Environmental Affairs and Tourism (DEAT) and a non-governmental organisation, the Land and Agriculture Policy Centre;
- ❑ A 28 person multi-stakeholder Reference Group, representing the primary decision-making body for the process; and
- ❑ An Editorial Committee, responsible for drafting the various policy documents and incorporating diverse views and interests into such drafts.

There were three phases in the process:

- ❑ An initial preparatory phase, focused on gathering information and drafting a Discussion Document based on information obtained;
- ❑ An intensive consultation phase, including a national conference, stakeholder briefings and numerous workshops; and
- ❑ A policy drafting stage, which consolidated comments received, and resulted in the preparation firstly of a Green Paper (or draft policy) for public comment; and then a White Paper (or final policy) for submission to Parliament.

³ See Wynberg & Swiderska 2001 for a comprehensive review of this process.

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In July 1997 the *White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity* was gazetted (DEAT 1997) and, following minor modifications by Cabinet, was adopted by Parliament as formal policy. Shortly thereafter the management and support structures for the process concluded their work and the DEAT assumed responsibility for further implementation.

The end result is a comprehensive policy that breaks markedly from past approaches to biodiversity conservation in South Africa. This it does through the identification of six goals, and within a broad vision for the conservation and use of biodiversity in South Africa. This vision is articulated as:

“A prosperous, environmentally conscious nation, whose people are in harmonious coexistence with the natural environment, and which derives lasting benefits from the conservation and sustainable use of its rich biological diversity.”

The six goals of the White Paper are:

- ❑ To conserve the diversity of landscapes, ecosystems, habitats, communities, populations, species and genes in South Africa;
- ❑ To use biological resources sustainably and to minimise adverse impacts on biodiversity;
- ❑ To ensure that benefits derived from the use and development of South Africa's genetic resources serve national interests
- ❑ To expand the human capacity to conserve biodiversity, to manage its use, and to address factors threatening it
- ❑ To create conditions and incentives that support the conservation and sustainable use of biodiversity;
- ❑ To promote the conservation and sustainable use of biodiversity at the international level.

Each of these goals in turn comprises a number of objectives, which detail strategies through which to meet the objectives. The Biodiversity White Paper thus represents a combined attempt to develop both a policy and a strategy for implementation, but does not go so far as to describe a detailed action plan. In this regard South Africa's biodiversity strategy does not fit neatly within the conventional Global Environmental Facility (GEF) description for a National Biodiversity Strategy and Action Plan (NBSAP). It does however go some way towards fulfilling national obligations towards Article 6 of the CBD, which requires Parties to develop or adapt national strategies, plans or programmes for the conservation of biodiversity.

A specific policy objective referring to land-use planning and environmental assessment is included within Goal 2 of the White Paper, concerning the sustainable use of biodiversity. This objective (Policy objective 2.3) states the intent of government to integrate biodiversity considerations into land-use planning procedures and environmental assessments. The content of this policy objective 2.3⁴ is as follows:

Integrate biodiversity considerations into land-use planning procedures and environmental assessments.

In addition to the White Paper, the need to conserve biological diversity is increasingly reflected in policies and laws after 1997 (eg the Marine Living Resources Act 18 of 1998; the National Forests Act 84 of 1998; the 2000 White Paper for Sustainable Coastal Development).

⁴ Extracted from the White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (DEAT 1997).

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Policy and Strategy

Government is well aware of the need to review land-use planning and environmental assessment procedures in South Africa. The Department of Environmental Affairs and Tourism has recently published draft regulations concerning the control of activities which may have a detrimental effect on the environment, as well as guidelines for producing comprehensive environmental impact reports. The effectiveness of existing planning controls and the Integrated Environmental Management (IEM) process is also being investigated by the national process to determine a general environmental policy for South Africa.

These initiatives will continue to be supported by Government which, in collaboration with relevant interested and affected parties will:

- ❑ Strongly support the adoption of a bioregional approach to planning for terrestrial, aquatic, and marine and coastal areas, whereby natural boundaries (*e.g.* catchment areas) are used to facilitate the integration of conservation and development needs, and conservation is proactively incorporated into land-use plans.
- ❑ Support the incorporation of IEM principles and appropriate environmental procedures into all planning controls and legislation.
- ❑ Ensure that potential impacts of projects, programmes, plans and policies on biodiversity are assessed and reflected in planning processes (*e.g.* town planning and zoning schemes) and environmental assessments, and that decision-making seeks to avoid impacts, to minimise risks, and to mitigate adverse impacts wherever possible.
- ❑ Investigate, formulate and implement integrated land-use planning approaches that include multiple natural resource activities which are compatible with and which complement the conservation and sustainable use of biodiversity.
- ❑ Integrate consideration of the cumulative and secondary impacts on biological diversity of development proposals, and the reversibility of proposed actions over time, into regional planning processes and environmental impact assessment procedures.
- ❑ Ensure that potential impacts of projects, programmes, plans and policies on biodiversity are assessed in an integrated manner and by competent professionals.

Progress with Implementation of the Biodiversity Policy and Strategy

Progress with implementation of the White Paper has been frustratingly slow. The White Paper identifies eight priority actions requiring urgent attention (see Box 3), but virtually none of these has been realised.

No action plan: Four years on from the publication of the White Paper, there is still no concrete action plan to implement the policy. Capacity constraints and inadequate funding have been key obstacles. Lack of transformation within the national Department of Environmental Affairs and Tourism has also been a major contributing factor. Poor political support is a perennial problem and there is little recognition that biodiversity is absolutely fundamental to the present and future survival of humankind.

No legal control over bioprospecting: Legal and administrative mechanisms to control bioprospecting are still not in place. This is extremely problematic and has resulted in a good deal of frustration and anxiety on the part of potential investors and collaborators, a free-for-all among bioprospecting opportunists, and weak benefit-sharing arrangements for South Africa. Complicating matters is the fact that there are several departments affected by the issue, including: Environmental Affairs and Tourism; Agriculture; Water Affairs and Forestry; Arts, Culture, Science and Technology; and Health; each of which is taking up the issue in a different manner and with little coordination.

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Reduced capacity among nature conservation agencies: Despite recognition in the White Paper of the importance of strengthening and rationalising South Africa's protected area system, and of reducing fragmentation amongst nature conservation agencies, resources allocated to such activities have progressively dwindled. The appointment of a Board of Investigation into the management of nature conservation, headed by Judge Kumleben, did little to address these concerns. Frustration and disillusionment has resulted in a mass exodus of highly trained managers and scientists from conservation agencies, to the detriment of protected area management in the country.

Lack of consultation as to the risks of biotechnology: While South Africa has participated actively in the development of a Biosafety Protocol, and has promulgated (inadequate) legislation to regulate genetic engineering, these processes have not involved adequate consultation with civil society. A process is urgently needed to demystify the debate, which has tended to be dominated in South Africa by scientists and industry, and to open up the issues for public scrutiny. This is especially pressing in light of the mounting evidence questioning the impacts of biotechnology on the livelihoods of small-scale farmers, and on biodiversity and human health.

Current Initiatives

There are encouraging signs that this disheartening situation is recognised by government, and that steps are being taken to bring biodiversity to the fore. The Department of Environmental Affairs and Tourism has been restructured, allowing for a realignment of the functions of biodiversity management and the deployment of additional personnel. New legislation for environmental management (the National Environmental Management Act) has also been enacted, providing a powerful new framework for environmental and biodiversity management in South Africa (see later discussion).

A new Biodiversity Act is presently being drafted, including measures for:

- ❑ Biodiversity planning;
- ❑ Species and ecosystem conservation;
- ❑ Protected areas;
- ❑ Community-based natural resource management;
- ❑ Controlling and eradicating alien species;
- ❑ Biosafety;
- ❑ CITES;
- ❑ Bioprospecting; and
- ❑ Institutional arrangements required to give effect to the new legislation.

A proposal to develop a comprehensive National Biodiversity Strategy and Action Plan was submitted by DEAT to the GEF in February 2001. There has as yet been no formal response to this proposal. The project is envisaged to span a period of 18 months.

The stated rationale for developing a NBSAP is to:

- ❑ set medium- to long-term strategies with respect to biodiversity management;
- ❑ translate policy objectives into actions with timeframes and address gaps in the White Paper;
- ❑ enable DEAT and other government departments to develop a coherent portfolio of biodiversity programmes and projects;
- ❑ provide a tool for DEAT to coordinate, monitor and evaluate biodiversity-related actions in the country;
- ❑ provide a tool for DEAT to mobilise and deploy resources for biodiversity management;
- ❑ inform capacity development needs with respect to biodiversity management; and
- ❑ clarify roles of stakeholders in biodiversity management (DEAT 2001).

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Strategies and actions in the NBSAP are envisaged to be synergistic with mechanisms being developed in the new Biodiversity Act.

The suggested approach to develop a NBSAP is first, to do a stocktaking and inventorying exercise; second to undertake an analysis of available options; and third, to develop draft strategies and actions. While it is envisaged that the NBSAP will address biodiversity management comprehensively, it is likely that some themes will command greater emphasis than others. The following are themes suggested by DEAT:

- ❑ Conservation of biodiversity;
- ❑ Sustainable use of biodiversity and its components;
- ❑ Access to genetic resources and equitable sharing of benefits arising from the use of such resources;
- ❑ Control and eradication of alien invasive species;
- ❑ Biosafety;
- ❑ Various cross-cutting issues including: incentives; funding mechanisms; institutional arrangements; partnerships, intergovernmental cooperation and cross-sectoral coordination; regional cooperation; capacity building and awareness raising; information management.

Once funding is secured it is likely that the NBSAP will proceed apace. The ongoing development of a Biodiversity Act has given added impetus to the initiative, joined with regular meetings and consultations between national and provincial government departments. A Working Group on Conservation and Biodiversity has been established as part of MinTech – a technical group that advises affected Ministers – and this is likely to be the structure which will oversee implementation of the NBSAP. Political support for the initiative will however be crucial. Biodiversity is still very much the “Cinderella of the Ball” within government.

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Box 1 Priority actions of the biodiversity white paper

- The development of a biodiversity action plan through which detailed implementation strategies can be developed.
- Obtaining a political commitment from all relevant ministers and provincial Members of the Executive Committee (MECs) towards achieving the objectives of the policy (eg through approved sectoral plans and budgets for relevant central and provincial departments and institutions).
- Addressing concerns relating to the present degree of fragmentation amongst nature conservation agencies and establishing necessary institutional arrangements to accommodate such concerns.
- Securing necessary funding for implementation.
- Strengthening and rationalising South Africa's protected area system.
- Establishing legal and administrative mechanisms to control access to South Africa's genetic resources;
- Instituting a national biodiversity education and awareness plan; and
- Participating in the development of an international Biosafety Protocol and instituting appropriate measures for biosafety.

The EIA system

History of Environmental Assessment in South Africa

Environmental assessment (EA) has been practised extensively in South Africa since the 1970s, particularly for large projects, in circumstances where there was no legal obligation to do so. In 1983, an Environmental Impact Assessment (EIA) Committee was set up by the Council for the Environment to initiate research on and consultation about EIA in South Africa. (This Council started as a non-statutory committee established in 1975 and later became a statutory body in terms of the Environment Conservation Act 100 of 1982. Its function was to advise the Minister on all actions likely to affect use or conservation of the environment.)

In 1989, the Council for the Environment developed and publicised a so-called Integrated Environmental Management (IEM) procedure, designed to ensure that the environmental consequences of development were understood and adequately considered in the planning process. Principles underpinning IEM provide for a democratic, participatory, holistic, sustainable, equitable and accountable approach to environmental management.

Legal provisions for EA were incorporated in the **Environment Conservation Act 73 of 1989 (ECA)**.

Part I of the ECA includes reference to biodiversity in noting that the statutory policy is to be applied for "the protection of ecological processes, natural systems and the natural beauty as well as the preservation of biotic diversity in the natural environment" (S2(1)).

Part V of the ECA relates to the control of activities which may have a detrimental effect on the environment, although the term EA is not used.

Part VI provides for regulations, including those for environmental impact reports. Provision is made for the relevant Minister to declare either Activities or Limited Development Areas, where

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EAs would be required. With regard to Activities, the Minister may prescribe that these apply in general or in respect of certain designated areas.

Notwithstanding a few attempts to declare Limited Development Areas, nothing of significance was done until 1997 to enact Regulations on EA.

In 1992, a series of six Guideline Documents was published by the then Department of Environment Affairs, serving to spread the IEM philosophy across a broad spectrum of sectors in South Africa. These Guidelines, covering scoping, reporting and review, formed the basis of several hundred voluntary EIAs in South Africa in which the linkage between EIA and ongoing environmental management of the implemented project was a key feature (Avis, 1994; Preston *et al* in Fuggle and Rabie, 1996).

The Bill of Rights in the Constitution of the Republic of South Africa Act 108 of 1996

contains an environmental clause which states that “everyone has the right... to an environment that is not harmful to their health or well-being”, and 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”.

There is a distinction between legislative and executive function in South Africa, which makes it possible for one sphere of government to legislate and impose duty to implement laws on a different sphere of government. The various national, provincial and local government spheres are given different competencies in the Constitution: National government has exclusive legislative competence for water and minerals; Schedule 4 lists functional areas of concurrent national and provincial legislative competence, including “environment”, “administration of indigenous forest”, “agriculture” and “nature conservation excluding national parks, botanical gardens and marine resources); Schedule 5 lists functional areas of exclusive provincial competence, including beaches and solid waste disposal; Chapter 7 describes the role and responsibilities of Local Government, which include the objectives in Section 152, namely to promote social and economic development, and a safe and healthy environment.

The Constitution of South Africa makes the environment a concurrent competency between national and provincial government. Provincial government, usually the provincial department concerned with environmental matters, is thus generally the relevant authority for managing the EIA process, unless the proposed activity has implications at a national or international level. The so-called **EIA Regulations** were promulgated in terms of Section 21 and 26 of the ECA, on the 5 September 1997 (see Box 4 for details).

The EIA Regulations were promulgated on the 5 September 1997. They apply to nine scheduled activities which are identified as having the potential to cause “substantial detrimental effects” on the environment. These activities comprise:

1. Construction or upgrading of:
 - ❑ Facilities for commercial electricity generation and supply.
 - ❑ Nuclear reactors and installations for production, enrichment, reprocessing and disposal of nuclear fuels and wastes.
 - ❑ Transportation routes and structures, and manufacturing, storage, handling or processing facilities for any substance which is dangerous or hazardous and is controlled by national legislation.

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- ❑ Roads, railways, airfields and associated structures outside the borders of town planning schemes.
 - ❑ Marinas, harbours and all structures below the high-water mark of the sea.
 - ❑ Cableways and associated structures.
 - ❑ Structures associated with communication networks, other than telecommunication lines and cables, as well as access roads leading to these structures.
 - ❑ Racing tracks for motor-powered vehicles and horse racing, excluding indoor tracks.
 - ❑ Canals and channels including diversion of the normal flow of water in a river bed and water transfer schemes between water catchment and impoundments.
 - ❑ Dams, levees and weirs affecting the flow of a river.
 - ❑ Reservoirs for public water supply.
 - ❑ Schemes for the abstraction or utilisation of ground or surface water for bulk supply purposes.
 - ❑ Public and private resorts and associated infrastructure.
 - ❑ Sewage treatment plants and associated infrastructure.
 - ❑ Buildings and structures for industrial and military manufacturing and storage of explosives or ammunition or for testing disposal of such explosives or ammunition.
2. Change of land use from
- ❑ Agricultural or undetermined use to any other use.
 - ❑ Use for grazing to any other form of agricultural use.
 - ❑ Use for nature conservation or zoned open space to any other use.
3. Concentration of livestock in a confined structure for mass commercial production.
4. Intensive husbandry or, or importation of, any plant or animal that has been declared a weed or invasive alien species.
5. Release of any organism outside its natural area of distribution that is to be used for biological pest control.
6. Genetic modification of any organism with the purpose of fundamentally changing the inherent characteristics of that organism.
7. Reclamation of land below the high-water mark of the sea and in inland water including wetlands.
8. Disposal of waste in terms of s20 of the Environment Conservation Act, 1989.
9. Scheduled processes listed in the second schedule to the Atmospheric Pollution Prevention Act 45 of 1965.

The EIA Regulations essentially provide for two key decision points in the EA procedure, namely at the end of Scoping and, where deemed necessary, after carrying out an EIA. The EIA Regulations prescribe certain procedures to be followed and documentation to be submitted in conducting scoping and the EIA.

The relevant authority may, at its discretion, ask for a Plan of Study for Scoping to be submitted prior to scoping, giving a description of the proposed activity, tasks to be undertaken and a schedule of scoping, the proposed method of identifying the issues and alternatives, and the stages at which there is to be consultation with the relevant authority. A Scoping Report must contain a brief description of the project, how the environment may be affected, the environmental issues identified and all identified alternatives. A description of the public participation process and a list of interested and affected parties (IAPs) and their comments, must also be submitted to the relevant authority.

Where an EIA is deemed necessary by the relevant authority, a Plan of Study for the EIA is required, giving a description of the main issues identified during scoping which require further

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investigation and assessment, a description of feasible alternatives to be investigated, and proposed methods of identifying and assessing the significance of the main issues and impacts. An Environmental Impact Report must contain a description of each alternative, including particulars on the extent and significance of impacts, the possibility for mitigation of impacts, and a comparative assessment of alternatives. Appendices describing the affected environment, the proposed activity, the public participation process followed, with list of IAPs and their comments, any media coverage given to the proposed activity, as well as any other information included in the accepted plan of study for the EIA, must be submitted to the relevant authority. All of the listed activities have the potential to affect biodiversity.

Current Initiatives with respect to Environmental Assessment in South Africa

At about the same time as the IEM Guideline Series was produced, or subsequently in parallel to the promulgation of the EIA Regulations, provisions for EA were included in the **National Environmental Management Act 107 of 1998 (NEMA)**, as well as in some **sectoral legislation** such as the Development Facilitation Act 67 of 1995, the National Water Act 36 of 1998, the Minerals Act 50 of 1991, and the Marine Living Resources Act 18 of 1998. Many of the **new provincial planning laws** also include provision for EA. In spite of the provisions, a number of these Acts have not exercised their EA powers (Wood, 1999).

Even if a proposed activity doesn't fall within the listed activities of the EIA Regulations it may be necessary and appropriate to conduct an EIA in terms of the NEMA (see Box 5 for details). The NEMA requirements are more explicit and wider than those imposed by the EIA Regulations, asking for – amongst others - an assessment of cumulative impacts, gaps in knowledge, underlying assumptions and uncertainties, as well as the effectiveness of arrangements for monitoring and management of impacts after implementation [S24(7)]. The precautionary principle also receives strong emphasis in NEMA.

In 1998, DEAT produced Guidelines for Implementing the EIA Regulations and these are closely modelled on the IEM Guideline Series. Biodiversity considerations are not mentioned in these guidelines.

The Biodiversity White Paper, adopted as policy by government in 1997, requires *inter alia* that biodiversity consideration be integrated into land-use planning procedures and environmental assessments and sets out a number of strategies to effect this.

More recently, reflecting international trends to include EA early on in the planning cycle, the Department of Environmental Affairs and Tourism (DEAT) produced a Guideline Document on Strategic Environmental Assessment in South Africa (February 2000). The need for SEA is widely acknowledged in South Africa, together with the need for a context-specific, integrative and sustainability-led approach which takes into account environmental opportunities and constraints. The NEMA requires that IEM be applied to policies, programmes, plans and projects, not only projects as currently the case in terms of the EIA Regulations.

DEAT is presently amending NEMA and the EIA Regulations, and it is intended that new or amended legislation be promulgated in 2001 or early 2002. New EIA Regulations are being prepared in terms of Section 24 of the NEMA, to replace the existing EIA Regulations which will then be repealed in terms of Section 50(2) of the NEMA.

The policy and legislative climate in South Africa is believed to be favourable for biodiversity conservation (Sandwith and Porter 1997). Recent legislation and policy are seen to provide clear directions for an improved framework for environmental decision-making.

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THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT 107 OF 1998 (NEMA):

- ❑ The NEMA provides in broad terms for the IEM philosophy to be applied to EAs.
- ❑ The NEMA emphasises sustainable development - namely the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations - and co-operative governance.
- ❑ The NEMA is based on a set of environmental management principles derived from the concept of sustainable development. It refers specifically to biodiversity in providing that “the disturbance of ecosystems and loss of biological diversity are avoided, and where they cannot be altogether avoided, are minimised and remedied” [S2(4)(a)(i)]. In addition, the NEMA states that “sensitive, vulnerable, highly dynamic or stressed ecosystems require specific attention in management and planning” [S2(4)(r)].
- ❑ The NEMA includes the precautionary principle, providing that "a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions" [S2(4)(a)(vii)].
- ❑ In terms of NEMA, decision-making must take into account the interests, needs and values of all IAPs, recognising all forms of knowledge including traditional and local knowledge.
- ❑ Chapter 5 of the NEMA provides the foundation for an important shift in the function of the Department of Environmental Affairs and Tourism (DEAT) from one that manages the environment, to one that facilitates, monitors, co-ordinates and streamlines the environmental functions in other departments. Key departments with functions that may significantly affect the environment, including those responsible for Land Affairs, Agriculture, Housing, Water Affairs and Forestry, Trade and Industry, Defence, amongst others, are required to prepare environmental implementation plans (EIPs) and environmental management plans (EMPs) to co-ordinate and harmonise environmental policies, plans, programmes and decisions so as to promote consistency in exercising functions that may affect the environment.

The EIPs must describe policies, plans and programmes that may significantly affect the environment, explain how these policies, plans and programmes will comply with the environmental management principles, and how the departments will ensure that their functions are exercised soundly.

The EMPs must describe the departmental functions, give environmental norms and standards, describe policies, plans and programmes and their relative priorities, state the extent of compliance by other organs of state and persons with such norms and standards, and specify arrangements for co-operation.

The focus thus far for EIPs and EMPs has been on cooperative governance, and attaining clarity on the environmental responsibilities of national, provincial and local government, rather than on the setting of standards. Although too early to assess, it would seem that EIPs and EMPs are useful tools to outline the functions of government and their respective scopes of responsibility. It is intended that the EIPs and EMPs be used as mechanisms to integrate biodiversity considerations into sectoral plans, policies and programmes, through dovetailing with biodiversity planning initiatives.

The NEMA is applicable to programmes, policies and plans as well as specific projects in terms of the definition of “activities” contained in Section 1 of the NEMA, and thus encapsulates use of Strategic Environmental Assessments. Provision has, however, still to be made for use of a range of tools for environmental management and not only EIA as provided for at present. In terms of Section 24 of the NEMA, which deals with implementation of Integrated Environmental Management, and of particular relevance to consideration of biodiversity in EA:

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The potential impact on the environment (including natural, socioeconomic and cultural aspects) of activities that require authorisation by law and which may significantly affect the environment must be considered, investigated and assessed prior to implementation.

The Minister may identify activities and/or geographical areas for or in which EAs would be mandatory, and prepare compilations of information or maps specifying important environmental attributes which need to be taken into account by organs of state in considering new activities and/or evaluating existing activities.

Procedures for investigation, assessment and communication of potential impacts of activities must satisfy the minimum requirements given in S24(7); these minimum requirements go beyond the requirements of the EIA Regulations.

Implementation of EA in South Africa

The principal weaknesses of EA in South Africa relate to poor EIA report review, impact monitoring, EIA system monitoring and to the lack of EA of policies, programmes and plans (Wood 1999).

With specific regard to *biodiversity in EA*, in a study which examined 22 EIAs, and 35 specialist studies from 7 EIAs, it was concluded that biodiversity is not adequately addressed in EIAs in South Africa (Le Maitre and Gelderblom 1998).

Institutional fragmentation is cited as one of the principal causes of reduced efficiency and effectiveness in biodiversity conservation and EA, at least in the Cape Floristic Region (as identified in the CAPE project) but likely to apply to other provinces. The lack of co-ordination of environmental laws at different levels of government is an old problem; while environmental management embraces a spectrum of concerns which by nature is cross-sectoral, government administration is divided into narrow functional areas (Glazewski 2000).

In some provinces in South Africa, memoranda of agreement have been drawn up between the relevant authority and other government departments with regard to administering the EIA Regulations where there is overlap between authorities and functions. In some instances, poor co-ordination and co-operation between signatories to such memoranda has led to inadequate integration of biodiversity considerations into environmental assessments of proposed developments.

The establishment of an inter-ministerial committee (MINMEC) for environment and nature conservation in recent years, comprising national ministers from key departments with responsibility for the environment, as well as their provincial MECs, is seen to be a positive step towards improving co-operative government in matters affecting the environment. The NEMA promotes integration, co-operation and co-ordination between government agencies with regard to environmental management, including EA. Implementation of this Act should benefit EA and biodiversity consideration in South Africa, although it is still too early to judge the effects thereof.

Before the EIA Regulations were promulgated in 1997, consideration of biodiversity in EA was erratic: where the IEM procedure was systematically applied, decisions generally took nature conservation objectives into account. Deficiencies in the voluntary implementation of the IEM procedure in KwaZulu-Natal province, from a nature conservation perspective, were identified as follows (Sandwith and Porter 1996):

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- ❑ Lack of clearly defined criteria or procedures for decision-making and evaluation of trade-offs among conflicting objectives;
- ❑ Poor scoping and assessment procedures;
- ❑ EA often undertaken after the activity had commenced, so didn't inform decision-making;
- ❑ Insufficient consideration of impacts at different spatial and temporal scales;
- ❑ Questionable effectiveness of mitigation measures, especially given the lack of formal monitoring and compliance auditing after approval granted for the activity;
- ❑ Lack of clearly defined criteria or procedures for decision-making and evaluation of alternatives and trade-offs among conflicting objectives;
- ❑ Development applications rarely refused outright for any nature conservation reason and development therefore usually resulted in a net loss of biodiversity.
- ❑ It was noted, amongst others, that there was a need for:
 - Mandatory adherence to EA procedures;
 - Independent review of assessments by acknowledged experts where necessary to validate findings;
 - Compliance with conditions of decisions made;
 - Land use planning and SEA to address biodiversity impacts adequately;
 - Greater effort to clarify impacts on components of biodiversity and thus contribute to a scientific basis for effective mitigation.
- ❑ The ***promulgation of the EIA Regulations in 1997*** made adherence to EA procedures for scheduled activities mandatory.
- ❑ The ***effects of the EIA Regulations*** have been to:
 - ❑ Slow down the development consent process, particularly given the increasingly complex requirements of relevant authorities in terms of both procedures to be followed and documentation to be submitted. Furthermore, shortage of capacity of these authorities to process applications in terms of the EIA Regulations has exacerbated delays.
 - ❑ Improve the quality of decision-making from a broad environmental viewpoint, including socioeconomic and biophysical considerations. In addition, EA is considered to have contributed to biodiversity conservation, in spite of the additional delays and costs, and shortcomings in EA in South Africa (detailed under Section 6).
- ❑ Increase awareness and appreciation of potential impacts of development on biodiversity.
- ❑ ***Deficiencies in the EIA Regulations***
 - ***Project specific.*** With the exception of changes in land use where plans are covered, the wording of the EIA Regulations is clearly project specific. There is no legal requirement for environmental assessment at programme, plan or policy level in South Africa.
 - ***Limited application.*** The EIA Regulations are limited in their application to activities. They don't take into account the impacts of those activities *per se*, or the nature, sensitivity or vulnerability of the receiving environment (in early drafts of the EIA Regulations, a list of sensitive environments was included. However, on legal advice, this list was later excluded.) There are also no thresholds to eliminate the need for EA on minor activities: the EIA Regulations either apply to an activity or don't; the scale of the activity is not addressed.
 - ***Exclusion of mining.*** The EIA Regulations do not apply to prospecting, mining and mining-related activities, a significant contributor to environmental degradation in South Africa, although the Department of Minerals and Energy has laid down specific environmental management programmes for such actions; "quasi EIA" powers (Wood 1999). The Environmental Management Programme (EMP) Reports focus on restoration or rehabilitation, pollution prevention and control, and health and safety aspects and do not specifically address biodiversity considerations.

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- Since EMP Reports are in effect only required ***once prospecting or mining has been approved***, and the discretionary power of the Department to require an EIA to be carried out can only be used pending the approval of an EMP, their effectiveness as decision-making tools is undermined. There are numerous problems associated with integration of decision-making processes around mining, instances where mining has commenced without approval or based on inadequate EA and/or where the principles set out in the NEMA seem not to be considered (Gerber, pers. comm.).
 - ***Exclusion of species use.*** The EIA Regulations do not apply to commercial exploitation, extraction, or harvest of naturally occurring indigenous species – including the fishing industry, which has the potential to have significant impacts on biodiversity (Acts such as the Marine Living Resources Act, 1998 and National Forests Act, 1998, as well as provincial nature conservation Ordinances make use of quotas, bag limits, protected areas and/or species, licensing of users – amongst others – to control such activities).
 - ***No coverage of GMO release.*** The EIA Regulations do not apply to release of genetically modified organisms into the environment.
 - ***No application to marine traffic.*** The EIA Regulations do not apply to marine traffic.
- ***Capacity constraints.*** Effective implementation of EIA Regulations at provincial level has been limited in a number of instances by a lack of formal EIA experience, combined with an unfunded mandate for this responsibility.
 - Most provincial authorities implementing the Regulations have insufficient experience to review EIAs adequately and this is believed to be a significant constraint. Many EA practitioners gain experience as fresh graduates in government departments responsible for implementing EA legislation, and then move into private practice or the private sector. This means that those tasked to review and make decisions on proposed policy, plans and projects are often less competent than the proponents; a situation which is problematic and could undermine soundness of decision-making.
 - ***Poor understanding of biodiversity issues.*** A lack of understanding of biodiversity issues by EA consultants on the one hand, and decision-makers on the other, hampers the effectiveness of integrating biodiversity considerations in EA in South Africa. Developers often regard biodiversity as academic and esoteric, not as something real or pertinent, and there is resistance to funding related studies as part of EA.
 - This situation is aggravated by lack of clarity on acceptable levels of disturbance of ecosystems and loss of biodiversity (interpretation of the NEMA principles arguably allows for a gradual erosion of natural capital given the statement that, *where loss of biodiversity and disturbance of ecosystems can't be avoided, they should be minimised and remedied*).
 - ***Limited time and budgets.*** Time and budgets for EAs are typically limited and this results in insufficient time being allocated for specialist studies. Money for biological expertise or studies is especially limited for small projects.
 - ***Lack of a certification system.*** The absence of a certification system for EA practitioners, namely those practitioners who evaluate the need for, co-ordinate and integrate the various studies constituting the EA, is problematic. To date, no certification system exists for EA practitioners, who come from diverse training backgrounds. The promulgation of the EIA Regulations created an attractive market niche for EA practitioners, with the result that many people with little experience and relevant training could undertake EA with little control on the quality of work. A voluntary system of certification is currently being initiated under the joint auspices of the International Association for Impact Assessment (SA Affiliate) and the Southern African Institute of Ecologists and Environmental Scientists.

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- ❑ **Mitigation.** Although measures to mitigate potential impacts are legally binding when stipulated as conditions of authorisation in terms of the EIA Regulations, lack of follow-up to ensure effective implementation is felt to undermine the effectiveness of EA.
 - ❑ **EA beyond the project level.** Integration of biodiversity in spatial planning considerations at a subregional to regional scale is increasingly common and has led to improved and more effective allocation of land for different uses, making provision for biodiversity patterns and processes.
 - The CAPE (Cape Action Plan for the Environment) is a key example of such provincial level planning in the Cape Floristic Region (Cowling *et al* 1999).
 - Bioregional planning is increasingly finding favour with planning authorities as the basis for both policy and plans, particularly in the Western Cape province. Proposals for bioregional planning have also been tabled as part of the new Biodiversity Act.
 - Consideration and integration of biodiversity factors generally also takes place to good effect in the planning of metropolitan open space systems (Roberts, pers. comm.).
 - At a broad project level, where biodiversity information and environmental sensitivity analyses are available or undertaken, development proposals can be refined to exclude or avoid important biodiversity areas. Emphasis is then placed on an ISO 14000 approved environmental management system, drawing on clearly defined limits of acceptable change, to ensure adequate mitigation (*eg* proposed Coega Industrial Development Zone development on the Eastern Cape coast; Raimondo, pers. comm.).
 - ❑ National legislation and the promulgation of the National Environmental Management Act
The promulgation of NEMA has had a number of positive implications for EA in general and biodiversity in particular:
 - The focus has shifted from minimising impacts to assuring sustainability.
 - Inclusion of the precautionary principle is seen to be significant.
 - The requirements of NEMA regarding the minimum requirements for EA procedures [S24(7)], are seen to be of significant potential benefit compared with those of the EIA Regulations with regard to improving consideration of biodiversity in EA, specifically with respect to:
 - The need to consider cumulative impacts;
 - The need to report gaps in knowledge, adequacy of predictive methods, assumptions and uncertainties;
 - The likely effectiveness of monitoring and management of impacts after implementation;
 - Co-ordination and co-operation between different organs of state in considering the EA where jurisdiction is shared.
- However, these benefits have not yet been realised or tested in practice.
- ❑ **Inclusion of the precautionary principle in recent legislation other than the NEMA,** for example in the Marine Living Resources Act, 1998, is also seen to have significant implications for EA and decision-making, particularly with respect to biodiversity considerations.

Biodiversity and EA

Screening

In South Africa the classification of the proposal is undertaken by the proponent, or appointed consultant, in consultation with the relevant authority. A list of scheduled activities for which compliance with the EIA Regulations is mandatory has been produced. On application, the relevant authority may grant exemption from these Regulations if, in their opinion, the proposed activity would not have substantial detrimental impacts.

Projects or activities not listed in this schedule may also require an EIA in terms of the NEMA if it is felt that they may result in significant adverse impacts. In practice, however, the list of scheduled activities effectively pre-empts the screening process and, to date, no EIAs have been called for in terms of the NEMA. In some instances where the activity is not included in the EIA Regulations (such as mining and mining-related activities), and is likely to have significant environmental impacts, DEAT has not required an EIA in addition to authorisation by other government agencies.

Potential impacts on biodiversity are often taken into account, principally through input from authorities responsible for environmental conservation. However, there are substantial differences in capacity between the provincial authorities in South Africa, leading to different levels of effectiveness in screening. For example, in KwaZulu-Natal province, it is felt that biodiversity impacts of most proposed development are identified during screening and refined during scoping and the assessment phases (Porter, pers. comm.). In the Northern Cape, however, it is felt that biodiversity considerations are seldom taken into account during EAs effectively (Koen, pers. comm.).

Biodiversity considerations tend to be triggered when proposed actions could affect unspoiled natural areas, wetlands and/or watercourses, but are frequently ignored in modified agricultural and/or urban environments.

Biodiversity EIAs are conducted in the absence of national and provincial biodiversity conservation plans or strategies, so it is difficult to “red flag” potential impacts.

Data on biodiversity are often insufficient to “red flag” cases consistently and reliably, and there are large differences between the availability and management of databases in the different provinces. Available biodiversity information is in many instances substandard (the Red Data Book for plants is outdated, for example, and there is little information on threatened habitats), scattered and difficult to access. Information on benthic marine habitats is extremely limited, if available at all.

In the Western Cape, the Cape Action Plan for the Environment (CAPE) project has evaluated the Cape Floristic Region, including estuarine and marine systems in this area, in terms of patterns of plant species turnover and process, taking into account the irreplaceability and threat to Broad Habitat Units, and has prepared a master plan for its conservation. The Western Cape Nature Conservation Board is in the process of establishing a bioregional planning unit to feed updated biodiversity information into spatial planning of the Cape Floristic Region in terms of the CAPE project. This initiative will allow sensitive or important biodiversity areas to be flagged, thus alerting planners and developers of areas likely to need specialist biodiversity studies and EIA.

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In KwaZulu-Natal, there is a large biodiversity database supported by a province-wide Geographic Information System and Environmental Atlas used by staff and consultants (Porter, pers. comm.).

In the Northern Cape, paucity of information contributes to inadequate consideration of biodiversity (Koen, pers. comm.).

Scoping

Scoping is generally carried out satisfactorily, but the absence of a certification system for EA practitioners who are responsible for co-ordinating and managing scoping is problematic.

Scoping in South Africa has become predominantly issues-based, relying heavily on the public, authorities, specialists and interest groups to identify potentially significant impacts. That is, the scope and scale of studies contributing to the EA are largely defined through such consultation. This “issues-based” approach in South Africa has some weakness, in that it places the onus on IAPs to identify and raise issues. Since the public, NGOs and CBOs (as well as many specialists) don’t fully understand biodiversity and the impacts of development on it, biodiversity issues are often not identified (Le Maitre *et al* 1997). These shortcomings are particularly pertinent where development is proposed in relatively remote areas where IAPs are few and far between, areas not previously targeted by specialist studies or surveys, and in areas where NGO groupings with an interest in biodiversity are either not well-represented or are overstretched.

Scoping often fails to identify biodiversity impacts on invertebrates or lesser-known organisms about which there is little popular knowledge. Relevant experts on these groups – often university or institution-based – do not typically respond to general calls for input to scoping and focused efforts are required to draw them into a process.

In some provinces (*eg* KwaZulu-Natal), the nature conservation authority plays an important role in making the EA consultant and proponent aware of potential impacts on ecological processes; without this input, such impacts are frequently missed (Porter, pers. comm.).

It is, however, common practice amongst reputable EA practitioners to conduct scoping amongst key non-government organisations and relevant authorities. Given the strength of a number of NGOs dealing with biodiversity issues (*eg* Botanical Society of South Africa, Wildlife and Environment Society of South Africa), many issues relating to biodiversity are identified, particularly near major towns and cities. Shortages of funds and capacity are, however, likely to curtail inputs by both NGOs and provincial conservation authorities in future and could lead to biodiversity issues being overlooked.

Environmental groups often express concerns that EA practitioners and/or authorities don’t adequately address issues raised by them.

Scoping often focuses on the particular development site, rather than taking a more holistic perspective in the context of a wider area.

The need to identify specific issues during scoping can result in a failure to integrate specialist studies, a prerequisite for addressing such issues as biodiversity which cross disciplinary boundaries (Le Maitre *et al* 1997). Segregation into scientific disciplines is contrary to biodiversity impact assessment which requires an integrated approach (Le Maitre and Gelderblom 1998).

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Impact Assessment

EIAs include assessments of impacts on biodiversity, mainly indirectly by way of impacts on particular species or habitats, particularly when proposed activities could affect unspoiled natural areas or widely recognised sensitive areas (*eg* coastal zone, wetlands or freshwater systems). The term “biodiversity” features rarely in Terms of Reference (TOR) for specialist studies, the St Lucia EIA being an exception.

The **intensity of study and level of detail** of the EA and related specialist studies is:

- ❑ broadly influenced by biodiversity importance, but especially by the presence of known threatened or Red Data Book species, or charismatic or commercially important species;
- ❑ largely related to the affected area - if the project is in a fragmented urban areas, the focus is on presence of threatened species and, occasionally, on functional links to surrounding open space or “green” areas. If the project is in a fragmented agricultural or peri-urban area, the focus is on the presence of threatened species, veld or habitat of known conservation importance (in particular wetlands and water systems) and, occasionally, on functional links to surrounding protected or conservation areas. For projects affecting relatively un-transformed “greenfields” sites, particularly those sites of known or potential importance to nature conservation (*eg* Case Study, Section 7.2) specialist studies are frequently undertaken and the intensity of study is greatest.
- ❑ heavily dependent on the awareness, judgement and discretion of the individual specialist/s appointed as part of the EA team. This observation is important, particularly in the light of poor Terms of Reference (TOR).

TOR for specialist studies forming part of EAs in South Africa are frequently absent (only found in 9 of 22 EIAs analysed by Le Maitre and Gelderblom 1998) or inadequate:

- ❑ TOR are frequently limited in focus, the emphasis being largely on Red Data Book species (the “rare and endangered” species);
- ❑ There is little instruction to specialists on why the study is being commissioned, what questions it needs to answer, how the results of the study are to be used and how information is to be presented (Raimondo, pers. comm.);
- ❑ Specialist TOR are too general and ambiguously phrased, and are not sufficiently explicit as to specific tasks to be undertaken or aspects to be addressed;
- ❑ Such TOR additionally emphasise compositional aspects of biodiversity and, to a lesser extent, the structural aspects. The functional component of biodiversity is often ignored;
- ❑ Time and budget constraints often dictate TORs, with inadequate attention being given to the details of biodiversity assessment, such as the need for seasonal sampling.

South Africa has a relatively large and competent EA consultancy sector. However, consultants have in some cases been appointed too late, with insufficient budgets or inappropriate expertise (Wood 1999).

Field studies are frequently carried out as part of specialist studies to collect biodiversity data in unspoiled natural areas, and particularly in the fynbos biome (Western Cape). In some instances such studies have made a significant contribution to an understanding of biodiversity and to databases on important ecosystems.

On occasion, specialists having little knowledge of an area are brought in to carry out biodiversity studies, rather than using people with local knowledge. This can lead to questionable findings. Where there has been little endorsement of the choice of, and TOR for, a particular specialist to give input to an EA by key IAPs, particularly where the proposed activity is contentious, the findings of such studies are frequently disputed.

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Many EA consultants don't have a sound understanding of the meaning of "biodiversity" and give it a limited interpretation. Further, Individual specialists/scientists contributing to EAs are invariably ill-equipped to make valid assessments of the impacts of perturbations on ecological and evolutionary patterns and processes across spatial and temporal scales (Cowling, pers. comm.). Most assessors lack appreciation of the spatial components of processes and don't consider the landscape in its entirety. Frequently consultants have little or no understanding of ecological patterns or processes important for biodiversity conservation. The EA practitioner needs a good grasp of the big picture and this is not always the case (Cowling, pers. comm.).

Functional biodiversity is generally inadequately assessed, whilst compositional aspects (species lists) and, to a lesser extent structural aspects, are covered (Le Maitre *et al* 1997). About half of EIAs cover structural, compositional and functional components of biodiversity at the community level only, not at species or – especially - landscape level; functional diversity at landscape level, with few exceptions, is neglected (Le Maitre *et al* 1997). When functional biodiversity is addressed, it is usually in the form of recommendations for future research or via reference to factors related to the function, rather than addressing the function directly (*eg* rehabilitation, disturbance) (Le Maitre and Gelderblom 1998).

In KwaZulu-Natal province, biodiversity assessment attempts to focus on the species, community, and ecosystem levels, including process considerations. The landscape level is often considered for large-scale developments such as afforestation (Porter, pers. comm.).

Biodiversity is largely considered at the level of species, with the emphasis on Red Data Book and charismatic species. Some attention is given to habitats and vegetation types. There is frequently limited information on, and consideration given to, ecological processes in time and space (Maze, Cowling, pers. comm.). That is, most biodiversity components of EAs comprise lists of species occurring on site, with little analysis of functional groupings of species, no or little information on ecosystem dynamics or processes and/or potential use of species as indicators.

Biodiversity at the genetic level is rarely if ever considered.

In marine systems, biodiversity is largely considered at the level of the ecosystem or particular species of commercial or conservation interest.

EIAs are mostly confined to the development site. It is, however, possible to contextualise impacts from information about species distributions or regional biodiversity studies. Very occasionally, in larger projects, there is scope to conduct off-site assessments (*eg* Case Study, Section 7.1) where surrounding areas were surveyed for similarity and differences compared with the development site. (Maze, pers. comm.). Frequently there is little information on the regional conservation context of a land use proposal. KwaZulu-Natal province has a comprehensive data base, and the Western Cape and Eastern Cape provinces have made some progress along these lines through the Cape Action Plan for the Environment (CAPE) project, which identified conservation priorities at a regional scale. The next step in CAPE is finer scale conservation planning at the local scale which will promote informed decision-making with regard to biodiversity. In the Northern Cape, detailed information on plant and animal taxa at many localities is not available due to insufficient collection or knowledge (Koen, pers. comm.).

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Uncertainties also impede adequate assessment:

- ❑ Indirect and cumulative impacts are difficult to deal with even when long term studies are possible, and many impacts on biodiversity may fall into this category.
- ❑ Scientific uncertainties and the difficulties of predicting impacts with any degree of certainty are a recognised problem area in biodiversity impact assessment (Le Maitre and Gelderblom 1998; Case Studies, Section 7).
- ❑ Lack of information on some ecosystems is a problem in EA on biodiversity impacts. An example of this is for ecosystems on the continental shelf off the west coast of southern Africa (*eg* Case Study, Section 7.4).
- ❑ The EA often fails to integrate various specialist studies (Le Maitre *et al* 1997); poor integration and coordination of specialist studies contributes to inadequate assessment of biodiversity impacts and their significance (Le Maitre *et al* 1997). Post-hoc synthesis of specialist studies tends to allow impacts on biodiversity at landscape scale to be addressed better than specialist studies (Le Maitre and Gelderblom 1998).
- ❑ Many EIAs fail to make testable predictions or to specify monitoring procedures to test predictions (Le Maitre and Gelderblom 1998).
- ❑ EIAs often overlook the recent history of disturbance to the site of proposed development, likely future scenarios which could affect the site, and trends or plans which are likely to influence the broader area (*eg* Case Study, Section 7.5). This oversight can lead to questionable findings.

Mitigation

Minimising environmental damage and identifying appropriate mitigation measures is seen as one of the key improvements to South African EIA in recent years (Weaver 1996). The emphasis on mitigation has shifted in recent years from an “add on” approach to reduce impacts of a specific development, to one which “builds in” mitigation by, for example, using a different location, design or technology for development. Biodiversity impacts can thus be avoided through sound, integrated and iterative planning.

Mitigation measures can be legally binding when specified as conditions of approval for development in terms of the EIA Regulations and other legislation where EA may be required (see Section 4). Often such conditions include the preparation and implementation of an Environmental Management Plan which may include penalties for environmental damage.

Mitigation measures are generally specified for impacts on biodiversity. Such measures tend to focus on the “Rs”, namely Restoration or Rehabilitation of disturbed areas, including the establishment of plant nurseries for rehabilitation, Rescue and Relocation of individual Red Data Book plants. For example, in a Namaqua Sands mining project north of Vredendal on the west coast, rehabilitation targets to be met were set at an 80% recovery of plant diversity and cover on mined areas compared with a benchmark site, with a proven ability to sustain such plant communities without management interference for a 3 year period (Raimondo, pers. comm.).

In a number of instances, particular habitats or sensitive areas are excluded from development. In places, however, these areas represent isolated islands with little functional links and thus are of questionable biodiversity value in the longer term.

In a few instances, securing substitute or replacement areas of comparable biodiversity have been suggested to mitigate adverse impacts on important systems (*eg* Case Study, Section 7.1).

Often, mitigation measures are ineffective in contributing to biodiversity conservation. For example, in the case of plants, there is a mindset that plant rescue is good mitigation. Setting aside

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small areas of vegetation between developed areas is also often recommended. Often the tangible and more marketable mitigation options succeed, although in effect such measures have little real value in terms of conserving biodiversity.

Mitigation, monitoring and management assurance – often rather academic and unrealistic recommendations for mitigating adverse impacts - are seldom fully implemented. Improved evaluations of the likelihood of implementation are needed, as well as assurances or guarantees if these goals are not attained.

The level of mitigation is generally influenced by the biodiversity importance or value. There are a number of examples in all provinces where areas of sensitive habitat have been set aside for conservation, protection, or rehabilitation, or where a commitment to sound ecological management has been made as a tradeoff for development on part of such areas.

Sometimes opportunities for avoiding biodiversity impacts are missed, where for example impacts could be avoided easily by modifying development layouts and/or the development footprint, through sound conservation management and innovative thinking. Such approaches could be an important move away from traditional approaches of rehabilitation, restoration, rescue and relocation of threatened species.

In order to be implemented reliably, mitigation measures need to be seen to be reasonable, cost-effective and critically important.

In some instances, where little information or data were available on which to base prediction of impacts, mitigatory measures have been formulated and implemented based on the precautionary principlesuch cases emphasis is placed on monitoring and evaluation tied into an ISO 14000 - approved environmental management system, with clearly defined limits of acceptable change (see case study section 0).

Evaluation of impacts

Assigning significance to biodiversity is contentious. Biodiversity EAs have been conducted in the absence of national and provincial biodiversity conservation plans, clear targets for protection and/or defined limits of acceptable change in different veld types or ecosystems, so it is difficult to contextualise and evaluate the potential significance of impacts.

Interpretation of what may be excellent baseline information, is poor, and factors such as representivity, processes or significance of the information are not considered. Numerous practitioners use arbitrary or unsound approaches to determining potential significance of impacts.

Where the assessment of impacts on biodiversity is based on little information (*eg* 0) there is heavy reliance on sound professional judgement.

There has been, in a number of instances, conflict between specialists in the same field of expertise as to what constitutes a “significant” impact on biodiversity. In some cases the conflict is exacerbated by additional review which brings in yet another viewpoint rather than achieving consensus on significance.

The use of an explicit convention for terminology and use of criteria in determining significance has been used to good effect in some of the larger EAs (*eg* 0)

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The implications for the decision-maker of levels of uncertainty, unknowns, and/or lack of adequate information in the EA with regard to biodiversity impacts are frequently not evaluated, making it extremely difficult for the decision-maker to apply the precautionary principle with any confidence.

Review

The South African EIA Regulations are silent about EIA report review, beyond dictating that the relevant authority consider the application after it has received an environmental impact report (EIR) that complies with the regulations.

A number of guidelines for reviewing EIAs have been produced in South Africa: The Department of Environmental Affairs and Tourism's Review Guideline (Volume 4 of the IEM Guideline Series, 1992) and the Guideline document for Implementing the EIA Regulations, 1998), the Western Cape's Department of Environmental and Cultural Affairs and Sport's Environmental Impact Unit's Guidelines for Scoping Report Review (1999), and the Gauteng Department of Agriculture, Conservation and Environment's Draft EIA Review Manual (1998). None of these documents, however, provides other than superficial guidance on the review of biodiversity assessment.

The Guidelines for implementing the EIA Regulations provide considerable detail on, and criteria for reviewing EIA applications. However, no mention is made of biodiversity impacts or of evaluating the significance of impacts on biodiversity. The degree to which impacts are irreversible, impacts occurring in "ecologically sensitive areas" or in "rare undisturbed areas" are, however, given as likely to be of "key concern".

The fact that authorities implementing the Regulations have insufficient experience to review EIAs adequately is believed to be a significant constraint.

Formal review criteria for impacts on biodiversity are not available, although broad review criteria for EIAs are included in DEAT's Integrated Environmental Management Guideline Series (1992).

Draft guidelines for reviewing EIAs have been prepared for the Cape Metropolitan Council Administration, City of Cape Town (CMCA), synthesising available information contained in provincial (Gauteng and Western Cape), national and international guidelines. These draft guidelines were prepared to assist the reviewer ensure that the assessment and evaluation of potential impacts are sound. One of four fundamental principles in the guidelines, to be applied in both review and decision-making, states that ecological sustainability is the enabling factor for social and economic sustainability [the other three being: the environment is held in public trust for the people; pursuit of ecological, social and economic sustainability; application of the precautionary principle]. The potential to jeopardise ecological sustainability is thus highlighted, incorporating a number of biodiversity considerations, and drawing attention to the need to consider reasonable alternatives, planned mitigation – including rehabilitation and compensation (*eg* substitutes), and to apply the precautionary principle where there is major uncertainty, low levels of confidence in predictions, poor data or an inadequate information base. Although not yet formally adopted by the CMCA, it is hoped that these guidelines in their generic form will be adopted at metropolitan, provincial and possibly national levels.

Extracted from “Draft Review Guidelines for Environmental Impact Assessment in the Cape Metropolitan Area” by deVilliers Brownlie Associates, in association with Arcus Gibb (Pty) Ltd, Environmental Evaluation Unit, University of Cape Town, Sue Lane & Associates. Prepared for the Environmental Management Department, Cape Metropolitan Council Administration. November 2000.

Potential to Jeopardise Ecological Sustainability if Impacts are Likely to:

- Lead to loss of biological diversity – species, ecosystems.
- Threaten key ecological processes.
- Exceed thresholds, capacities, safe minimum standards, regenerative and/or assimilative capacities of natural systems.
- Threaten life support systems.
- Threaten protected, important, unique, sensitive, irreplaceable, stressed, highly dynamic, rare or special areas.
- Exacerbate human-induced climate change.
- Lead to irreversible loss of natural capital.
- Be unable to be predicted with confidence due to inadequate knowledge or inherent uncertainty.
- Lead to substantial negative cumulative impacts.

Decision-Making:

The Guidelines for implementing the EIA Regulations give no detail on the factors which need to be considered in reaching a decision or about the relative weighting of different social, economic, and environmental issues.

The NEMA, through its environmental management principles, provides some guidance on decision-making. However, no clarity is given as to what would constitute acceptable losses of biodiversity and disturbance to ecosystems, or to ways in which social and/or economic gains can be weighed up against such losses (the NEMA principles could in fact be seen to allow for a continual erosion of biodiversity).

South Africa’s history of discrimination and inequity, combined with high levels of poverty and unemployment, has resulted in a situation whereby the potential socioeconomic benefits of a proposed development are frequently seen to outweigh possible irreversible negative impacts on biodiversity.

Weighing up socio-economic versus biodiversity considerations is problematic. For example: What is the loss of a species worth? Do species differ in conservation value? The basis for weighing up such issues is neither explicit nor transparent, and there are no clear criteria which are consistently applied. The outcome of decision-making is thus heavily influenced by diverse societal values, particularly in a society such as that in South Africa, which is multi-cultural with widely divergent priorities.

Biodiversity issues do play a role in decision-making, particularly where they form the basis for significant objection to a proposed development. That is, the relative weighting given to biodiversity issues is often proportional to the level of IAP lobbying and interest.

Given the absence of clear guidelines regarding appropriate and acceptable trade-offs in the interests of sustainability, biodiversity issues often emerge as “losers” in decision-making. Political

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factors, too, may have a substantial influence on decision-making even when biodiversity impacts could be significant.

There is no clear guidance on application of the precautionary principle by decision-makers: When are levels of uncertainty and potential consequences such that a proposed action should not proceed? When are proposed mitigatory measures – including monitoring and corrective action – sufficient to allow the proposed action to proceed in spite of uncertainty?

Given capacity problems in those authorities tasked to implement the EIA Regulations, the decision to grant authorisation of a proposed action or development is sometimes made by overwhelmed provincial staff, rather than through comprehensive consideration of the full range of factors internationally recognised as good EIA practice (Wood 1999).

Frequently, frustration is expressed by EA practitioners about the perceived reluctance of some authorities to take a clear stand on issues, and/or give clear criteria, guidance and specific direction with regard to that authority's needs in relation to EAs, and how/on what basis they use the findings of EAs to make decisions.

There seems to be lack of clarity about how to assess and allocate responsibility to developers for cumulative impacts on natural resources, in particular where incremental impacts occur on the receiving environment over time (*eg* additional loads on existing pipeline outfalls, increasing emissions in a particular area, incremental use of biocides/herbicides and fertilizers in particular catchments).

Inconsistencies between different government agencies in the approach to resolving environmental problems and authorising proposed activities which have potentially significant impacts on the environment, including on biodiversity, diminishes understanding of the EA process by EA consultants, proponents and the wider public.

Implementation:

The EIA Regulations focus exclusively on the role of EIA in decision-making and provide little guidance on post-decision implementation of projects, including management, monitoring and auditing.

Inadequate follow up and monitoring of environmental impacts in the construction, operation and decommissioning stages of a project is seen to be one of the most significant shortcomings of EA in South Africa. In practice, authorisation of projects is often conditional on preparation and approval of an environmental management plan or programme. However, the checking and enforcement of implementation of such plans and programmes is rare.

There is a need to formalise environmental audits after project implementation. The need for and commitment to such audits is often lacking (Porter and Raimondo pers. comm.). Poor requirements for enforcement of compliance and the setting of enforceable terms and conditions are seen as problem areas (Weaver 1996).

Conditions of approval in both rural and urban areas is weakly monitored (*eg* Case Study, Section 7.3). Where biodiversity impacts are monitored; monitoring is frequently related to projects where water quality and wetlands are affected (Kristal Maze, pers. comm.).

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The degree to which implementation is effective depends on the levels of public interest and “watchdogging” by the public. This in turn is influenced by the clarity of the mitigatory measures and their ease of implementation.

Case studies

Proposed Gamsberg Zinc Mine

Location: Aggeneys, Northern Cape province

Proponent: Anglo-American

- ❑ Gamsberg is one of a series of similar inselbergs of succulent karoo vegetation in northern Bushmanland. Succulent karoo is one of 25 internationally recognised biodiversity hotspots, also recognised in the Biodiversity White Paper as a priority for conservation. Additionally, the South African National Parks has identified the need for a national park to protect a representative area of inselbergs. Of all inselbergs in the region, Gamsberg is unique in terms of its rare habitats and species composition, comprising 34 known Red Data Book species and constituting the single most important site for conservation in the region. It is also seen as the mainland source and principal refugium for most of the lineages that have diversified across this inselberg complex.
- ❑ Anglo-American plan an open pit mine of approximately 3km long, 1.2km wide and 600m deep to yield low grade zinc ore over a period of 25 years. One alternative ore body was considered, as well as alternatives in terms of open pit or underground mining, and the siting of infrastructure and waste dumps. Underground mining was not investigated in depth due to cost implications in mining low grade ore and this option was rejected early on in the planning process.
- ❑ The proponent points out that there would be considerable socio-economic benefits to the region during the 25-year lifespan of the mine. Critics point to the fact that if the mine goes ahead, it could compromise opportunities to conserve the unique biodiversity of the northern Bushmanland inselbergs (Maze, pers. comm.) and severely constrain options for the persistence of evolutionary processes (Cowling, pers. comm.). It is unclear at this stage whether these potential impacts can be mitigated in some way.
- ❑ Mining requires an EMP Report in terms of the Minerals Act, 1991 and an EIA was carried out to inform the preparation of the EMP Report. The EMP Report has since been approved by the Department of Minerals and Energy, which has authorised mining in the area.
- ❑ However, the proposal to mine seems to have the potential to contradict a number of the objectives of the NEMA. Amongst others, the NEMA principles aim to ensure the consideration of environmental attributes in decision-making which may have a significant effect on the environment; application of a risk-averse and cautious approach, avoiding the disturbance of ecosystems and loss of biological diversity and, where they cannot be altogether avoided, to minimise and remedy such disturbance and loss [S2(4)(a)(i)]. A decision to mine could also be seen to be counter to the spirit of the International Convention on Biodiversity to which South Africa is a party. DEAT’s stance is that the EIA Regulations did not apply to the mining application per se, but that associated activities such as the laying of a pipeline would need authorisation in terms of the EIA Regulations. No EIA was called for the proposed mining activity in terms of the NEMA and this has raised considerable concern among several IAPs.

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With regard to the EA process:

□ **Scoping** was adequate.

Well-qualified specialists were used to conduct the **specialist studies**. Extensive effort went into field studies: existing species records from the site and other areas in the vicinity were used, and inventories of all fauna and flora were made at the correct seasonal intervals. The information collected is significant and contributes to a better understanding of the area's biodiversity and to databases. Integration of the various specialist studies was poor, however, and in some areas lack of interpretation of data was of concern.

□ **Impact Assessment**

Impacts on biodiversity both on site and in a regional context were studied in detail. Initially, the information collected was not translated into meaningful significance ratings, or implications in terms of sustainability, equity or efficiency. An attempt was later made to address these shortcomings.

A number of potential impacts on biodiversity were not investigated and/or given to be “not definable”: acid-mine drainage and groundwater pollution, alteration of the local catchments, dust fallout from the mine and tailings dam, cumulative impacts on flora, impacts on small mammals and primates.

No clear distinction was made between those impacts which could not be mitigated, and the probable effectiveness of mitigation measures suggested for those impacts which could be mitigated. That is, the overall significance of the proposed mine on biodiversity, addressing the residual impacts after effective mitigation, as well as uncertainties and risks, was not clear.

□ **Mitigation.**

Input from IAPs resulted in amendments to the layout of the proposed mine, and a tailings dam initially abutting sensitive slopes of the inselberg was moved to a less sensitive location. A full botanical study is to be undertaken on remaining areas of the inselberg to inform management and monitoring. Mitigation includes fencing off “ultrasensitive” areas on site, and plant rescue (vulnerable plants will be taken to reputable botanical gardens for propagation and display).

Rehabilitation is addressed, but of 11 different soil types, only 6 have rehabilitation potential. The question of the proponent securing substitute areas for protection to offset the negative impacts on biodiversity should mining go ahead is currently under discussion and negotiation between key IAPs; the proponent has made a commitment to contribute R10 million for in-situ conservation and approximately R4 million for ex-situ conservation. The WWF (South Africa) has in turn committed itself to contributing R10 million to in-situ conservation. It is proposed that a number of alternative sites, which could meet the needs of conservation of genetic integrity, be identified and evaluated, and that a conservation plan be prepared. In addition, a social development plan is to be prepared to promote sustainable development in the area.

□ **Management and monitoring.**

There is to be an environmental control officer on site to ensure implementation of the EMPR and to monitor such things as effect of acid mine drainage, dust, alteration of catchments, *etc* on biodiversity. Control sites on adjacent inselbergs are to be set up to assist in monitoring and evaluation.

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Proposed dredge mining for rutile, ilmenite and zircon

Location: Eastern Shores of Lake St Lucia, KwaZulu-Natal province

Proponent: Richards Bay Minerals

- ❑ The Eastern Shores of Lake St Lucia are situated within the Greater St Lucia Wetland Park, a designated Ramsar site and wetland of international significance which was accorded World Heritage Site status in 1999. The Park contains a spectrum of habitats including forested coastal dunes, dry savanna woodland, and a range of estuarine and wetland habitats, marine and coastal systems. Situated in the Maputaland Centre of Endemism it comprises 734 plant genera (44 recorded endemic plants); 50 amphibian species, 109 reptiles, 521 species of bird, and 97 terrestrial mammals. It is also the principal breeding ground for loggerhead and leatherback turtles, and includes 147 threatened species.
- ❑ A large part of the proposed mining area comprised commercial pine plantation.
- ❑ Two major alternatives were considered in the area: mining over a 20-year period in the 3419ha lease area; and nature conservation and tourism as proposed by the then Natal Parks Board, responsible for nature conservation in that province. In terms of the former proposal, mineralised sands in the 3419ha-lease area were to be dredge mined over a 17 year period, followed by 3 years of rehabilitation. In terms of the latter proposal some 3000 additional tourism “beds” would be phased in over the 20-year period.
- ❑ One local alternative ore body was considered by the proponent; known other options further afield were not considered.
- ❑ The proposal to mine occurred prior to the promulgation of the EIA Regulations. The South African Cabinet directed that an EIA be undertaken in 1989, charging the then Department of Environment Affairs with the responsibility for ensuring that this task was carried out.
- ❑ Twenty-three specialist studies were undertaken using existing information and gathering new information on the vegetation, fauna, topography, soils, wetlands and biodiversity of the area. Over 50 scientists and experts contributed to the EIA.
- ❑ Unusually, biodiversity was specifically targeted as a specialist study in its own right. TOR for specialist studies were explicit and sound. Specialists were required to liaise with others to ensure that cross-discipline impacts were covered.
- ❑ Specialist studies addressed not only the compositional and structural components of biodiversity, but also the functional component: the EIA looked at impacts on the functioning of terrestrial ecosystems, wetlands, and estuarine and marine ecosystems.
- ❑ Various factors made it impossible to predict accurately the impacts on biodiversity. These included inadequate data, especially on invertebrates and micro-organisms; concerns about 18 species of mammal, bird and reptile where a reduction in population sizes would be unacceptable in terms of long term viability of threatened species; and topographic changes post-mining which could affect biodiversity.

With regard to the **EA process**:

- ❑ **Scoping.** Scoping raised concerns by numerous conservation bodies, authorities and NGOs as to the conservation importance of the site and its unique context.
- ❑ **Impact Assessment.** Conventions on terminology for assessing and evaluating impacts were used, including for spatial and time scales, significance ratings and degree of certainty in predictions. These conventions helped to standardise the different studies and facilitated their integration.
- ❑ A number of the specialist studies were contentious. The likelihood of realising the tourism and related development potential was challenged, as were a number of studies assessing the

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potential impact of mining on drainage and wetlands, the likelihood (and levels of uncertainty) of acceptable levels of rehabilitation, and the economic case for mining.

- **Mitigation.** Proponents of mining placed considerable emphasis on rehabilitation, but the endpoint of successional processes was uncertain: It was felt by many that rehabilitation would be unlikely to restore fully functioning ecosystems characteristic of the area. Mitigation focused on rescue of Red Data Book species from the mine path, and relocation, and the establishment of a plant nursery to propagate locally occurring plants for use in rehabilitation. Mitigation of the conservation-tourism option focused on sound spatial planning and management of impacts. It was recommended in the EIA that a mitigation monitoring committee be set up as part of the conditions of authorisation should mining go ahead. The function of this committee would be to report on performance and compliance to the relevant authority.
- **Impact evaluation.** The impact evaluation was generally sound, following a number of iterations and revisions of the EA after IAP comment.
 - The evaluation of likely significance of some of the impacts by specialists was challenged, in some instances by other specialists in the same field! Concern focused in particular on uncertainties inherent in the proposed rehabilitation programme and on the long-term impact on ecosystem processes, possible effects on the uniqueness of the affected area, the opportunity costs of mining within a major conservation and tourism area, as well as on the economic studies which were felt to have ignored the value of the natural environment and its functions and services.
 - The EIA highlighted the potential significance of residual impacts, taking into account proposed mitigation.
 - The findings of specialist studies were translated into evaluation of the overall sustainability, efficiency and equity of alternative land uses; an extremely useful synthesis.
 - An attempt was made to weigh up trade-offs between economic gain and environmental damage, although this section of the EIA posed more questions than supplying answers!
- **Decision-making.** Debate focused on the fact that St Lucia was a special place from cultural and biodiversity perspectives, that mining would be incompatible with the current nature conservation-tourism land use, that irreparable and unacceptable damage could occur, and that there were a number of important uncertainties and risks associated with mining. Although the conservation-tourism option would result in localised irreparable damage to vegetation and impacts on the quality of tourism due to increased numbers, such damage was not considered to be unacceptable. Also, risks associated with this option were not thought to be as significant as those linked to mining.
- **Monitoring.** A number of monitoring programmes and additional research projects were proposed in association with the mining proposal, focusing on water impacts.
- The **biodiversity values** of the area were indirectly addressed in the EA through the “sense of place”, or socio-cultural value which local communities, IAPs and visitors to the area ascribed to St Lucia. In addition, the potential value of the area for ecotourism and the contribution of natural resources to adjacent communities from the St Lucia Wetland Park reflected the value of biodiversity.
- **Review.** A Review Panel, set up to advise the Cabinet on the proposals concluded in 1993 that no mining should be allowed, since St Lucia was unique, and that there were a number of key uncertainties and risks associated with mining whose consequences could be irreparable and unacceptable. It recommended that the area be proposed as a World Heritage Site and that nature-based tourism be developed to provide maximum benefit to local communities without affecting the character of the area.

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- ❑ Subsequent to the 1994 democratic elections in South Africa, the Minister of Land Affairs and Agriculture commissioned a NGO, the Land and Agriculture Policy Centre, to undertake an investigation to check that the recommendations of the Review Panel were still pertinent. A resource economics study into nature-based tourism at St Lucia showed that such development had the potential to out-perform mining, alleviate poverty, was sustainable, and would have relatively greater benefits for building the local economy. The study thus supported the Review Panel's recommendation.

With regard to lessons learned:

- ❑ The social and cultural value attached to the species and, more importantly, landscape biodiversity of the area, and its uniqueness, were central factors in the Cabinet decision not to allow mining;
- ❑ Use of the precautionary principle was believed to be a significant aspect;
- ❑ Principles underpinning the EA process were made explicit, and were strictly managed and adhered to by all role players. This was a major factor contributing to the success of the EA.

Administration of the EIA Regulations in the Western Cape with regard to agricultural land

In the Western Cape, authorisation for the change in use of agricultural land is divided between three statutory agencies with different – and in part conflicting – objectives.

- ❑ Cultivation of virgin land is subject to authorisation by the national Department of Agriculture's Directorate of Agricultural Land and Resources Management (DALRM), responsible for maintaining the productive potential of agricultural land, in terms of the Conservation of Agricultural Resources Act 43 of 1983.
- ❑ Any change in land use from grazing to other agricultural use has to be authorised by the Western Cape Department of Environmental and Cultural Affairs and Sport (DECAS) in terms of the EIA Regulations.
- ❑ Responsibility for evaluating EIAs in the Western Cape was recently transferred from what was Cape Nature Conservation to the DECAS, the former being transformed into a statutory board, the Western Cape Nature Conservation Board (WCNCB), responsible for conservation and management of biodiversity and natural ecosystems.

There is a co-operation agreement between the former Cape Nature Conservation and DALRM that applications for new cultivated lands are to follow a single co-ordinated process when applying for authorisations. This agreement is now seen to be between DECAS and DALRM, although it has not been formally amended to reflect the changed administrative functions of these two departments.

WCNCB continues to make specialist scientific input into the evaluation of applications for change of land use, and staff undertake joint site inspections with local agricultural extension officers to determine whether the EIA Regulations should apply or an application for exemption from the Regulations should be submitted. Joint reports from WCNCB and DALRM are forwarded to DECAS for processing of applications.

At times this system does not work; authorisation by DALRM to cultivate land precedes contact with WCNCB.

Uncertainty exists as to the landowner's rights if the authorisation granted by DALRM to cultivate virgin soil is either not authorised or refused by DECAS in terms of EIA Regulations.

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In terms of its new role, WCNCB could be seen as a statutory interested and affected party or, alternatively, as a statutory agency acting on behalf of DECAS. There is no clarity on its legal or administrative status and/or standing as regards its involvement in administering the EIA Regulations.

Applications are often evaluated on a site by site basis, rather than through assessment of landscapes. At the regional level, no clear determination of areas of biodiversity importance has been undertaken, and this precludes effective biodiversity planning and assessments. There is a clear need for bioregional conservation goals and easily accessible information as to biodiversity priorities and areas of importance against which to evaluate applications.

Monitoring of conditions of approval is extremely poor and it is estimated that less than 10% of landowners comply with measures applying to the cultivation of virgin land and burning of veld in terms of existing legislation.

Offshore diamond mining

Location: Continental shelf, West Coast of Southern Africa

Proponents: Governments of South Africa and Namibia and private companies (De Beers Marine, Namdeb, Alexkor, Namco, Benco and Diamond Fields International)

- ❑ **Proposal:** mining companies plan to suction diamond-rich sands off the ocean bottom off the Namibian/South African coast, potentially affecting benthic communities living in the soft substrata on the continental shelf.
- ❑ **Alternatives:** no alternative sites were considered in locating the mining activities. Blocks of viable reserves were identified, and target sites within blocks decided upon without consideration of biodiversity factors. Alternative techniques to dispose of tailings were considered to reduce the plume effects on water quality.
- ❑ **Existing information:** a major problem was that there was a lack of information about the affected environment:
 - Some information existed on fish and mammal species known to occur in the area, but there was limited information on invertebrate species.
 - No information was available about the structure and composition of undisturbed benthic communities living in soft substrata, and there was limited information about the physical and chemical environment - likely to have a significant influence on these communities. Moreover, small-scale patchiness is very pronounced at macrofaunal level and especially at meiofaunal level and can be influenced by individual species within communities.
 - Existing impacts of trawling made it difficult to isolate and assess additional impacts of mining.
 - Problems with data collection and sampling are especially pronounced in off-shore environments.
 - Little is known about the recovery rates of benthic communities following disturbance and nothing about recolonisation; there is however some suggestion that the remote effects of mining could delay the recovery of proximate mined areas.
- ❑ **Scoping:** offshore mining requires an EMP Report in terms of the Minerals Act, 1991. Scoping was initiated in 1991, obtaining the best available specialist opinions.
- ❑ **Impact prediction and assessment** was carried out initially via desk-top studies and modelling, then some field sampling. A number of observations on biological communities and the likely effects of mining have been made from a submersible research vessel. The assessment of impacts is thus based largely on professional judgement: with current rates of

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mining, and assuming a “worst case” scenario for recolonisation and recovery, there is unlikely to be a significant long-term impact on west coast biota.

- ❑ **Mitigation** focuses on minimising impacts on water quality, halting mining activities to allow for crayfish migration, and on monitoring and evaluation. The precautionary principle is applied to the design of mitigation measures, given uncertainties in prediction abilities.
- ❑ A generic Environmental Management Programme Report for offshore mining has been prepared and implemented, based on the ISO 14001 International Standard. This requires the demonstration of continual improvement in conducting operations in an environmentally responsible manner.
- ❑ **Monitoring** of performance is ongoing but is expensive and physically difficult. This is compounded by the lack of capacity of authorities to interpret and evaluate results.

Proposed low cost housing and light industrial development

Location: Strand, Western Cape

Proponent: Asla Devco (Pty) Ltd

- ❑ **Proposal:** Asla proposed to develop a mix of light industry and housing on land situated approximately 50km east of Cape Town, within a designated urban area. The land is partially covered by invasive acacias and shallow wetland areas are scattered over the site. The site has been – and continues to be – settled by informal residents. Increasingly, the wetlands on site are under threat from rubbish dumping and occupation.
- ❑ **Alternatives:** alternative layouts and mixes of housing and light industry were considered but there was limited flexibility with respect to these options given the need for low cost housing in the area.
 - Concern was expressed initially by IAPs and the local authority about the wetlands on the site, which were thought to have potential conservation significance. However, after preliminary investigation, it was found that the wetlands were of recent origin, forming as a result of poor stormwater drainage provision on adjacent, developed sites. No species of conservation significance were found in the wetlands.
 - It was recognised that, albeit disturbed, the wetlands perform a valuable ecological service in terms of absorbing and cleansing surface drainage, and that an area of similar dimension and capacity should be provided on the site. In addition, it is accepted that, unless the wetlands are seen to be valuable and of use to the neighbouring communities, their degradation is inevitable.
 - For the above reasons, provision has been made in the subsequently approved layout plan for the creation of a “wet” area on one part of the site, to serve as both wetland habitat for wildlife and as a stormwater retention pond. Wetland plants are included in the design and management of the area, to allow for their continued harvest by local communities for craft, medicinal and other commercial purposes. Local communities are participating in this exercise.

Future actions to improve the effectiveness of environmental assessment and biodiversity conservation

Government

At national government level:

- ❑ Legislation should be introduced requiring EA on policies, plans and programmes; not only projects.
- ❑ EAs should be required for proposed prospecting, mining and mining-related activities, marine traffic, release of genetically modified organisms into the natural environment, the introduction of all alien species into the country and their release into the environment, as well as for commercial exploitation of – including trade in - naturally occurring species.
- ❑ EAs should take into account the sensitivity or vulnerability of the receiving environment. In other words, the need for EA should be triggered by protected status, and/or recognised conservation importance or environmental sensitivity.
- ❑ There is a need to coordinate and integrate the various legislation and authorisation procedures for land-use planning and change, to ensure that biodiversity considerations don't "fall through the gaps".
- ❑ Authorities need to give EA practitioners, proponents and the public clear, unambiguous guidance and explicit criteria for EA, reflecting those criteria that they would use as the basis for decision-making. With specific regard to biodiversity, there is a need to define clear and unambiguous criteria and principles on which to base decisions affecting biodiversity, since existing principles appear to be ambiguous. There is also a need for clearly defined limits of acceptable change and "bottom lines" beyond which trade-offs for biodiversity loss should not be considered.
- ❑ Consistency in EA requirements should be ensured between and among the various government agencies affecting or having responsibility for the environment in general, and biodiversity in particular.
- ❑ Memoranda of Agreement between neighbouring countries should be explored as a mechanism to ensure a co-ordinated and consistent approach to EA and biodiversity conservation.
- ❑ There is a need to look into ways of improving EA of cumulative chemical loads/pollutants on biodiversity and the allocation of responsibility to contributing parties for mitigation and management.
- ❑ Follow-up monitoring and compliance auditing should be improved to check that mitigation management is sound and in accordance with the conditions of authorisation. Innovative and effective ways of monitoring compliance require further investigation.
- ❑ It is important to ensure that EAs are adequately reviewed by appropriate specialists.
- ❑ Many of these suggestions apply equally at provincial and local government levels, although at this level there is also an urgent need to determine clear conservation goals through comprehensive and spatial biodiversity plans and strategies. Local goals could be developed through district and local integrated development plans in conjunction with provincial and national departments.

EA Practitioners

- ❑ EA should be applied at policy, plan and programme level, not just at project level.
- ❑ It is essential to ensure that the relevant provincial nature conservation authority has input to scoping.
- ❑ Practitioners should move away from the current passive reliance on IAPs to respond to public advertisements and to identify biodiversity issues, towards a more "active" approach.

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“Active biodiversity scoping” would target known specialists and conservation authorities to identify biodiversity issues of potential concern.

- ❑ Best available specialists with local knowledge should be used to optimise input on biodiversity.
- ❑ Practitioners should seek the input and support from key IAPs (authorities, lead NGOs and the proponent) on the choice of specialist, as well as the specialist’s TOR – most especially for potentially controversial or contentious projects. Alternatively, sound and explicit TOR should be prepared for specialist studies after scoping, and these should be sent out for public/external review in a scoping report (Le Maitre and Gelderblom 1998).
- ❑ TOR for specialists:
 - Need to be explicit regarding the level and scale of study, questions to be answered, spatial and temporal boundaries, and the form of report to be prepared. Some indication should also be provided as to how the results of the study are to be used.
 - Need to provide standard terminology for assessing and evaluating impacts, should be tailored to the needs of each project, and should facilitate comparison of specialists’ findings in terms of the significance of impacts.
 - Need to specify that attention should be given to functional biodiversity impacts, not just structural or compositional aspects (*ie* not only species lists).
 - Need to specify that EA on biodiversity should take into account impacts beyond the immediate site; the wider area, and indirect and cumulative impacts, including impacts at the landscape scale.
 - Specialists should be required to state clearly any uncertainties and risks, confidence levels in predictions, and the adequacy of the information base, in ways and using terms that can be understood and integrated into the overall EA by the EA practitioner.
 - Specialists should be required to take into account the existing or potential values of affected biodiversity (see Section 8.3) in evaluating potential significance of impacts thereon.
 - Specialists should be required to highlight the potential significance of impacts on biodiversity after proposed mitigation and/or where impacts cannot be mitigated.
 - Need to specify the collaboration required with other specialists at key junctures.
- ❑ Practitioners should ensure that different specialist studies can be appropriately scheduled, integrated and co-ordinated, and that there is collaboration between specialists across disciplines where needed.
- ❑ Practitioners should ensure that any uncertainties and risks, confidence levels in predictions, and the adequacy of the information base identified by specialists, IAPs and themselves during the course of the EA are highlighted and clearly stated. In addition, an evaluation as to the significance of gaps in information and uncertainties with regard to reliability of predictions should be made.
- ❑ Practitioners need to take into account the “gut feel” judgements of experienced specialists/naturalists (Le Maitre and Gelderblom 1998), as well as local and traditional knowledge.
- ❑ There is also a need to ensure that all components of EA are covered, including evaluation (the “so-what” of assessment or data collection), and recommendations for mitigation, monitoring and management.
- ❑ Practitioners should ensure that impacts and their significance are considered both at a site-specific scale and in the context of the broader landscape with regard to functional biodiversity.
- ❑ Practitioners need, where appropriate, to include relevant experts in the EA team to work with biodiversity specialists to ensure that an evaluation of the significance of impacts on

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biodiversity takes into consideration not only the conservation value of natural resources, but their use or subsistence value to affected human communities, their value in providing ecological services, their social, cultural, “sense of place” and economic value.

- ❑ There is a need for practitioners to address and evaluate, in consultation with the appropriate specialists and the proponent, the assurance for – and probability that – mitigation, management and/or monitoring measures recommended by specialists would be effectively implemented.
- ❑ Ideally, practitioners should be paid by an independent body or government department. This could for example work through the developer depositing funds into a dedicated fund to finance consultants (Cowling, pers. comm.).
- ❑ In general, there is a need for some form of certification system for EA and biodiversity specialist consultants, to promote quality control in biodiversity work and related EAs. This could be accompanied by a list of certified expertise for specific areas for use by consultants and for EA review.

Specialists who Contribute to EA from a Biodiversity Perspective

- ❑ Specialists should address all the different components of biodiversity – functional, compositional, structural at different scales from site specific to landscape.
- ❑ Attempts should be made to make optimum use of species lists to introduce consideration of threatened or keystone species, distributions and habitat associations, possible use as indicators, *etc.*
- ❑ Specialists should state clearly inherent uncertainties and levels of certainty of predictions, together with any risks and potential implications (“best” and “worst case” scenario of impacts).
- ❑ Future scenarios for the affected area without the proposed activity should be considered and potential impacts evaluated accordingly (*ie* probable trends and predictable changes should be taken into account).
- ❑ Where biodiversity information is lacking, and such information is likely to have a significant effect on predictions of impacts, there is a need to undertake field studies and data collection to acquire relevant information on biota and ecological processes.
- ❑ Clear, realistically achievable and effective measures for mitigation should be presented, with use of indicators and monitoring programmes to allow remedial action as appropriate. Recommendations for mitigation should move beyond conventional approaches such as rehabilitation of disturbed areas and rescue of Red Data Book species, towards a focus on *in situ* conservation.
- ❑ Significance ratings for potential impacts should be clearly motivated, to ensure that such ratings can be justified, evaluated by independent reviewers where appropriate, and easily “unpacked” and understood by decision-makers.

EA Reviewers

Reviewers should:

- ❑ Have intimate knowledge of review processes and the local environment.
- ❑ Ensure adequate consideration of alternatives (*eg* localities).
- ❑ Use peer review for specialist biodiversity studies.
- ❑ Ensure adequate integration of specialist studies.
- ❑ Check that the different components of biodiversity have been addressed at different scales.
- ❑ Check adequacy of scoping, assessment, evaluation and use of appropriate criteria.
- ❑ Check adequacy of information used, and that uncertainties, risks and levels of confidence in prediction are clearly stated.
- ❑ Ensure that mitigation, management and monitoring are addressed adequately

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- ❑ Ensure that there is sufficient assurance that mitigation would be implemented to the satisfaction of the relevant authority, including adequate monitoring of implementation, available funds, *etc.*
- ❑ Ensure adequate consideration of biodiversity values, including the conservation value of natural resources, the use or subsistence value to affected human communities, their value in providing ecological services, and their cultural and economic value.
- ❑ Check the soundness of trade-offs in terms of sustainability, biodiversity conservation, equity and efficiency, taking biodiversity values into account.

Information Collection, Storage and Accessibility

- ❑ There is also a need to investigate what information is available in different institutions and government agencies, and to synthesise such information in an appropriate form.
- ❑ Biological data should be collated into user friendly and current computer databases, readily accessible to consultants and developers who can pay for the service (Koen pers. comm.).
- ❑ Sensitive area maps should be produced and areas with insufficient data should be identified. These areas should need more detailed investigations or inventories during the EA process.

Guidelines and Capacity Building on Biodiversity

- ❑ Guidelines should be prepared for EA consultants, project managers, and decision-makers on what is meant by “biodiversity”, how to assess and evaluate impacts on biodiversity, the need to consider different components of biodiversity at different spatial scales, and the meaning and relevance of Red Data Book taxa in the biodiversity context, amongst others.
- ❑ Clear and unambiguous guidelines and criteria should also be prepared for EA consultants and decision-makers on how to weigh up the loss of biodiversity – with sustainability implications - against economic and social benefits, emphasising the different time scales, values and costs inherent in the different impacts.
 - These should include consideration of the use/subsistence value for affected human communities, cultural and economic value, information value, amenity value, as well as value in providing ecological goods and services, and future option (insurance) value.
 - They should address such aspects as replacement costs for lost biodiversity, compensation for loss of value of natural capital, possible loss of livelihoods and subsistence for affected human communities, and costs of providing similar ecological services.
 - They should consider inter-generational equity, and the ethical dimensions of the current generation knowingly allowing loss of biodiversity with consequences thereof potentially affecting future generations.
 - They should provide guidance on when and how to apply the precautionary principle.
- ❑ Guidelines for EA practitioners, specialists and EA reviewers should be prepared on how to improve scoping to ensure that biodiversity issues are more effectively identified. This entails a move away from the current heavy reliance on voluntary contributions by IAPs towards an approach that is more proactive, involving for example an identification of those authorities and institutions who should be contacted during screening and scoping; common “red flags” in the affected area which could indicate a need for more detailed investigation of biodiversity components; and a stronger focus on functional biodiversity considerations in space and over time.
- ❑ It is clearly neither appropriate nor sound to undertake comprehensive studies, covering all components and scales of biodiversity, for each and every EA carried out. That is, as with EA in general, emphasis should be placed on the need for scoping, using particular triggers and indicators to inform the level of study appropriate for the specific proposal. A suggestion is to

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develop some form of decision tree for authorities, practitioners, specialists and reviewers so that the appropriate level of detail, scope and focus can be determined. For example:

- “IF in a protected area or within an area recognised as being important for biodiversity, THEN need to carry out studies and assessment at all scales (site-specific to landscape) on all components of biodiversity; functional, compositional and structural.
- IF provides important ecological corridors or links to adjacent conservation or protected areas, be they from “crest to coast”, along or across particular ecosystem gradients, THEN.....
- IF particular species of importance or value (full range of possible values) could be affected, THEN
- IF affected area plays a role in providing ecological services, THEN ...

Guidelines, information documents and workshops should also be developed for the public, NGOs, and CBOs, to help build capacity and improve participation with respect to biodiversity considerations in the EA process.

Research into the Biodiversity Values of Different Systems and Species

- In general there is a need for better information on resource economics – the values of ecosystem and species goods and services, and the opportunity costs of biodiversity loss, to inform decision-making and consideration of trade-offs to ensure sustainability.

Conclusions

- The formalisation of requirements for EA in South Africa has been useful in general and has benefited biodiversity conservation, although it is seen to slow down development consent processes. It has also increased levels of awareness about biodiversity.
- EA at the project level relies heavily on a sound spatial planning framework with clear biodiversity priorities that are mapped and accessible. Without such planning and formal protection, EA at the project level is likely to remain flawed.
- EA in South Africa commonly incorporates biodiversity considerations, albeit often indirectly through specific aspects (*eg* terrestrial mammals, wetlands, *etc*).
- The scope of legal requirements for EA in South Africa is currently limited to projects, and some key activities are omitted from the present legislation. The recently promulgated NEMA, the current law reform process, and the development of biodiversity legislation are seen to present significant opportunities to improve EA and consideration of biodiversity.
- Biodiversity issues are frequently triggered in “greenfields” projects or in widely recognised sensitive systems such as coastal areas, wetlands or freshwater systems. Biodiversity receives inadequate attention in less obvious sites.
- Terms of Reference for specialists contributing to EA from a biodiversity perspective are frequently inadequate.
- Biodiversity studies in EA commonly focus on Red Data Book species, charismatic or commercially important species. The functional component of biodiversity is largely neglected and impacts at the genetic level are seldom if ever addressed.
- Consideration of spatial and temporal implications, including indirect and cumulative impacts on biodiversity, is poor in most EAs.
- Biodiversity information is often difficult to access, as it is scattered and not comprehensive. There is a significant difference in the availability of information between different provinces in South Africa.

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- ❑ There are often low levels of understanding of biodiversity amongst EA practitioners, decision-makers and the public, to the detriment of sound integration of biodiversity considerations in the EA process.
- ❑ Assigning significance ratings to biodiversity impacts is frequently contentious and problematic, particularly in the absence of clearly defined targets for biodiversity conservation or limits of acceptable change for particular ecosystems. These problems are exacerbated by difficulties in accessing relevant data and information.
- ❑ There is a lack of clarity as to how and when the precautionary principle should be applied in the face of uncertainty and/or lack of information and/or risks. This is a key problem area in effectively integrating biodiversity in EA and decision-making.
- ❑ The social and cultural values associated with biodiversity often emerge as key factors in EA, but are seldom addressed.
- ❑ The absence of clear, unambiguous criteria and principles to be used to weigh up biodiversity loss in the long term against socioeconomic gains in the short to medium term is a significant problem in EA. The current approach seems to favour gradual erosion of biodiversity in favour of socioeconomic benefits, since there are no clear “bottom lines”. There is an urgent need to develop a system whereby “limits of acceptable change” are adopted and rigidly implemented. One mechanism may be through the designation of special protected habitats, veld types or ecosystems – an approach proposed in South Africa’s draft biodiversity legislation.
- ❑ There is much reliance on restoration, rehabilitation and rescue in mitigation, and insufficient emphasis on other more innovative ways of making provision for biodiversity conservation.
- ❑ Follow up checks to ensure sound mitigation, monitoring and management of impacts on biodiversity are seldom conducted and there is little auditing of environmental performance after project authorisation.

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