



Guidelines for Impact Assessment in the Western Indian Ocean Region



Tools for implementing the Nairobi Convention

October 2007

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This document also draws on the Capacity Building for good practice in Biodiversity and Impact Assessment (CBBIA) guidance materials produced in 2006 for the International Association for Impact Assessment (IAIA). The CBBIA guidance materials were compiled by Susie Brownlie, Bryony Walmsley and Peter Tarr on behalf of Southern African Institute for Environmental Assessment (SAIEA) and deVilliers Brownlie Associates.

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LIST OF ABBREVIATIONS

- CBBIA - Capacity Building for good practice in Biodiversity and Impact Assessment
- COP – Conference of the Parties
- DEAT – Department of Environmental Affairs and Tourism
- EA – Environmental Assessment
- EIA – Environmental Impact Assessment
- EIS – Environmental Impact Statement
- EMP – Environmental Management Plan
- GEF – Global Environment Facility
- GMO – Genetically Modified Organism
- Ha – Hectares
- IAIA- International Association for Impact Assessment
- ISO – International Standards Organisation
- IUCN – The World Conservation Union
- NBSAP – National Biodiversity Strategy and Action Plan
- RoD – Record of Decision
- SADC – Southern African Development Community
- SAIEA – Southern African Institute for Environmental Assessment
- SAP – Strategic Action Plan
- SEA – Strategic Environmental Assessment
- SHE – Safety, Health and Environment
- TDA – Transboundary Diagnostic Assessment
- TIA – Transboundary Impact Assessment
- UNEP – United Nations Environment Programme
- WIO – Western Indian Ocean
- WIO-LaB - Addressing Land-based Activities in the Western Indian Ocean (WIO-LaB)

Definitions

Alternatives

A possible course of action, in place of another that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The “no-go” alternative constitutes the ‘without project’ option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.

Assessment and evaluation of impacts

Assessment of impacts means using a systematic and explicit approach to determine the extent, duration and magnitude of impacts. The evaluation of impacts involves determining their potential significance.

Direct, indirect and cumulative impacts¹

Decision makers need to know the direct, indirect and cumulative impacts of a proposed activity on the environment, if they are to take informed decisions in line with sustainable development.

Direct impacts are those that take place at the same time and in the same space as the activity. e.g. clearing of natural vegetation for agriculture.

Indirect impacts occur later in time or at a different place from the activity. E.g. extraction of groundwater for irrigation leads to changes in the water table and affects distant water users.

Cumulative impacts are the combined or additive effects on the environment over time or geographically. They may seem to be insignificant when seen in isolation, but collectively they have a significant effect. An example is a small mine that discharges effluent into a river, but in such small quantities that it is of no cause for concern. However, if there are many such mines in the catchment, all discharging small amounts of effluent into the river, then the combined impact could be very serious.

Impact assessment

A process that is used to identify, predict and assess the potential positive and negative impacts of a proposed development (including reasonable alternatives) on the environment and to propose appropriate management actions that will enable the avoidance or minimisation of environmental impacts. The impact assessment should propose a monitoring programme that tracks the effectiveness of both mitigation and compliance. The process includes some or all of the following components: screening, scoping, impact assessment and decision-making. For the purposes of this guideline, the terms EIA, SEA and TIA are further discussed below:

Environmental Impact Assessment (EIA) is the application of impact assessment to individual projects. Typically, *EIA* is not proactive in its approach, since it focuses on a

¹ Cooper, L.M. 2004. *Guidelines for Cumulative Environmental Assessment in SEA of plans*. EMPG Occasional Paper, May 2004. <http://www.env.ic.ac.uk/research/empg>

specific project and the affected site, and seldom considers landscape scale or cumulative impacts.

Strategic Environmental Assessment (SEA) is the application of impact assessment to policies, plans, and programmes. There are many different approaches to **SEA**. One is the ‘EIA’ model where the impact assessment is carried out on a policy, plan or programme once it has already been developed (i.e. reactive). Another is an integrated and/or ‘sustainability led’ approach that strives to meet sustainable development objectives. This is more proactive and can be ‘built into’ policy and planning processes. Importantly, impact assessment at strategic level encourages an ‘opportunities and constraints’ type approach to development, where such things as natural resources and ecosystem services at landscape scale define the ‘framework’ within which development can take place and the types of development that could be sustained.

Transboundary Impact Assessment (TIA) is an uncommon term, but is used in some countries that have a tendency to “split” definitions. A TIA will be conducted specifically if a project is likely to have impacts on the environment in another country (e.g. a large dam in a shared river). However, most countries (and practitioners) recognise that any EIA or SEA will broaden its scope if transboundary impacts are likely to occur. The key to ensuring that this happens is to ensure that the Terms of Reference (ToR) for the EIA/SEA stipulate the need for transboundary assessment. If this is done, then there is no difference between an EIA and TIA. For the purposes of this guidelines, a separate impact assessment type known as TIA is not regarded as justifiable.

Issue

A context-specific question that asks “what, or how severe, will the impact of some activity/aspect of the development be on some element of the environment?”

Monitoring

Actions taken to observe, take samples or measure specific variables in order to track changes, measure performance of compliance, and/or detect problems. The objective of monitoring should always be to improve management.

Offset

An offset replaces or provides ‘like for like or better’ substitutes for residual negative impacts on the environment. Such offsets could include formal commitment to managing substitute areas of comparable or greater value for conservation, entering into a secure and permanent conservation agreement with the conservation authority, setting aside protected natural areas, establishing a trust fund for conservation, thereby enabling land acquisition or management, etc. Offsets focus on areas of recognised value to conservation, and on ensuring the persistence of landscape-scale processes.

Opportunity cost

The lost opportunities that might result from the implementation of a certain alternative. For example, a mine in a national park will likely reduce the tourism potential of the area. If the benefits from tourism are higher than those from mining, then the opportunity costs are high in such a case. However, opportunity costs might only be temporary, as the mine could have only a short lifespan and, provided the mine is

properly rehabilitated, the area could within a few years revert to conservation and tourism. If this scenario is possible, then a 'win-win' can be achieved.

Scenarios

A description of plausible future environmental or operating conditions that could influence the nature, extent, duration, magnitude/intensity, probability and significance of the impact occurring (e.g. concentration of sulphur dioxide emissions during normal operations vs. during upset conditions; dispersion of atmospheric pollutants during normal wind conditions vs. during presence of an inversion layer).

Scoping

The process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an impact assessment. The main purpose is to focus the impact assessment on a manageable number of important questions and to ensure that only key issues and reasonable alternatives are examined in the ensuing EIA. The outcome of the scoping process is a Scoping Report that includes issues raised during the scoping process, appropriate responses and, where required, terms of reference for specialists.

Screening

A decision-making process to determine whether or not a development proposal requires environmental assessment, and if so, what level of assessment is appropriate. Screening is usually administered by an environmental authority or financing institution.

Significance

A term used to evaluate how severe an impact would be, taking into account objective or scientific data as well as human values.

Significance thresholds

A significance threshold is the level at which impacts would change a significance rating, e.g. from low to medium, or medium to high. These thresholds are often linked to current societal values which determine what would be acceptable or unacceptable to society and may be expressed in the form of legal standards or requirements (e.g. for water quality, protected areas, ecosystems or species, requirement to make provision for the 'ecological reserve' in river systems, etc.), as objectives or targets for conservation (e.g. in the National Biodiversity Strategy and Action Plan), protocols (e.g. SADC protocols), guidelines (e.g. for managing sensitive or dynamic ecosystems), or conservation status of species or ecosystems (e.g. Red List or CITES species, threatened ecosystem, centre of endemism, biodiversity 'hotspot').

The significance of potential impacts thus needs to be explicitly interpreted within the context of international conventions, a Regional context, and national, provincial and local laws, policies, plans and strategies, which reflect the values of broader society. The evaluation of impact significance should thus take into account not only the current situation and known trends in the affected area but also any vision, objectives or targets for that area.

Some environmental management systems make use of upper and lower ‘limits of acceptable change’ or thresholds within which activity is permitted (e.g. a range of acceptable conditions for that particular ecosystem).

Thresholds of potential concern is another term used, in particular by managers of freshwater systems. The thresholds are linked to a hierarchy of targets for managing ecosystems, rather than just defining a single desired outcome or endpoint. The hierarchy may include a range of ‘warning’ signs of increasing intensity of ecosystem degradation that trigger action to halt or reverse that degradation, and ‘danger’ signs indicating that there is unacceptable deterioration and radical steps need to be taken.

Trigger

A particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an *issue* and/or potentially significant *impact* associated with that proposed development that may require specialist input.

Vulnerable communities

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

Methodology

Compiling this document required a combination of literature research, personal communications with representatives from the various Western Indian Ocean countries and other resource persons familiar with these countries, visits to some of the countries in the course of many years of working in the region, and expert opinion based on experience gained through this and many other projects in the past.

A Regional Task Force on Environmental Assessment (EA) was established under the Nairobi Convention to guide the process of development of these Guidelines. The task Force was constituted of delegated EA experts from relevant Government Institutions in countries participating in the project “Addressing Land-based Activities in the Western Indian Ocean (WIO-LaB)”, a project executed by the Nairobi Convention.

Consultative workshops of this Regional EA Task Force held in Mozambique, Zanzibar and South Africa in 2006 and 2007 enabled detailed discussions on the existing status of EA in the WIO region and on the specific issues to be taken into consideration with regard to the proposed “Guidelines for EA in the WIO Region”. The consensus reached during these discussions provided a platform upon which knowledge and ideas could be built and developed.

Once the draft report was compiled, it was circulated widely in the Western Indian Ocean (WIO) countries for comment, a process which culminated in the Zanzibar feedback workshop at which there were detailed discussions about the report.

The draft report was finalised during the course of 2007, based upon comments received from various stakeholders.



Photo: Members of the WIO LaB project Regional EIA Task Force on a field inspection amongst the mangroves in Zanzibar © P.Tarr

Part A: Introduction and general considerations

A.1 Purpose and applicability of the guidelines

The purpose of these guidelines is to:

- Highlight the issues of concern in the WIO region, especially how transboundary impacts on coastal and marine ecosystems could foreclose future livelihood and development options.
- Provide guidance on how transboundary impacts should be assessed, using Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) tools.
- Advise on how best to develop and/or strengthen legal and administrative instruments in the WIO Region.

This document is primarily intended for people who have to make decisions on environmental issues through the impact assessment process, namely: national, provincial/state and local authorities who comment on impact assessment reports and make decisions about the environment and development. These authorities include, but are not limited to: local authorities, departments or ministries of environment, planning and land use, mines, energy, water, fisheries, agriculture, forestry, housing, roads, tourism, heritage and health.

While most countries within the region have EIA legislation, which broadly follows a similar process of studies and approvals, the terminology applied to these studies and approval processes is slightly different. In order to avoid confusion, Box 1 provides a listing of equivalent terms for each country in the region, together with the World Bank definitions for each stage. This guidelines will use the World Bank terminology and the reader is referred to Box 1 to check the equivalent terms for his/her country.



Photo: Decision makers in the Western Indian Ocean countries need to appreciate the use of Impact Assessment as a front-line tool in the pursuit of sustainable development. © P.Tarr

Box 1: EIA Terminology used by each WIO country and the World Bank

COUNTRY	EIA STAGE					
	Screening	Scoping	EIA	Permit, Licence Authorisation	EMP	Follow up
World Bank	Screening	Scoping	EIA	-	EMP	
Comoros	Screening	Scoping	EIA	-	EMP	
Kenya	Screening	Scoping	EIA	Environmental Authorisation	EMP	Environmental Audit
Madagascar			EIA	Environmental Permit	EMP	Environmental Audit
Mauritius	Project document	-	EIAR	EIA Licence	-	Post-EIA monitoring
Mozambique	Screening	Pre-assessment, OR Scoping	Combined EIA + EMP	Environmental Licence	Included in EIA	Environmental audit and inspection
Seychelles	Application	Appraisal Report, OR Scoping	EIA	Environmental Authorisation	EMP	Monitoring of EIA implementation
South Africa	Lists of activities which trigger level of assessment	Basic Assessment, OR Scoping	Combined EIA + EMP	Record of Decision for Environmental Authorisation	Included in EIA	
Tanzania	Registration and Screening	Preliminary EIA, OR Scoping	EIS	Environmental Permit	-	Environmental Auditing

A.2 Context

International context

The Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region was enacted in Nairobi on 21 June 1985. The Convention constitutes the current regional legal framework for the protection and conservation of the marine and coastal environment of the WIO Region. Article 4 of the Convention states that parties "shall co-operate in the formulation and adoption of Protocols to facilitate the effective implementation of (the) Convention".² Two Protocols were earlier enacted, together with the framework Convention, on 21 June 1985 : (1) the Protocol on Protected Areas and Wild Fauna and Flora (SPAW Protocol) and (2) the Protocol concerning Co-operation in Combating Marine Pollution in Cases of Emergency (Emergency

² The Nairobi Convention, Article 4(2). See also Article 18, 19 and 25 of the Convention.

Protocol). A third Protocol, on the management of Land-Based Sources and Activities (LBSA Protocol) is currently under development.

The "Convention area" is the marine and coastal environment of that part of the Indian Ocean situated within the Eastern and Southern African region and falling within the jurisdiction of the Contracting Parties to this Convention. The countries that are Parties to the Convention are Comoros, Kenya, Tanzania, Mozambique, South Africa, Madagascar, Seychelles and Mauritius (see map - <http://gridnairobi.unep.org/CHMPortal/>, accessed 2 July 2007).



Article 13 of the Convention³ deals specifically with Environmental Assessment, and it requires the Contracting Parties, in cooperation with competent regional and international organizations if necessary, to develop technical and other guidelines to assist the planning of their major development projects in such a way as to prevent or minimize harmful

³ This Article is under revision

impacts on the Convention area. Each Contracting Party must assess, within its capabilities, the potential environmental effects of major projects which it has reasonable grounds to expect may cause substantial pollution of, or significant and harmful changes to, the Convention area. They must also develop procedures for the dissemination of information and, if necessary, for consultations among the Contracting Parties concerned.

Environmental Impact context

According to the preliminary Transboundary Diagnostic Analysis (TDA) for the WIO region (UNEP, 2002a)⁴ the WIO region currently experiences both localised and transboundary impacts which combine to cause:

- Shortage and contamination of fresh water;
- Decline in harvests of marine living resources;
- Degradation of coastal habitats (mangroves, seagrass beds, and coral reefs), and resultant loss of biodiversity, and
- Overall water quality decline: Contamination of coastal waters, beaches and living resources.



Photos above: Important resources are being lost or degraded as a result of poorly planned development that does not adequately apply environmental safeguards. © P. Tarr

According to various stakeholders, from discussions during the various workshops and from the IAIA CBBIA study⁵ completed in 2006, part of these problems are due to the fact that there are at present a number of weaknesses in the way that sustainable development tools, notably Impact Assessment, are applied in the region, resulting in poor quality studies and processes. These include:

- The timing of biodiversity considerations is often too late in the impact assessment process to influence the proposal;

⁴ The preliminary TDA is currently being updated and expected to be available by early 2008. It is, however, not expected that the main categories of transboundary problems will change significantly.

⁵ This study (IAIA, 2005) covered some (but not all) of the WIO countries.

- The relevance of information provided in EIA reports is not made explicit, leaving the non-specialist with the question “so what?”
- Lack of sufficient environmental information, either due to lack of data, or lack of effort to find existing data;
- The implications of gaps in information, uncertainty and/or risks are often not made explicit in terms of irreversibility of impacts, irreplaceable loss of resource, etc;
- Environmental input is often focused on the affected site and at species-level, rather than addressing broader, landscape-scale effects on ecosystems and processes;
- There is little consideration of indirect, cumulative and transboundary effects;
- The economic value of ecosystem goods and services is seldom appreciated or considered;
- The Terms of Reference for many impact assessments and specialist studies are often poorly defined;
- The criteria used to determine the significance of impacts are often questionable. They are often not linked to a broader strategic context (e.g. policy objectives, spatial frameworks, conservation plans);
- The linkages between the environment, ecosystem services and human wellbeing, including the dependence on resources by vulnerable communities, are seldom clearly articulated. Consequently, the effects of development on these linkages – and ultimately communities – are not appreciated or considered; and,
- There is inappropriate reliance on environmental management plans and programmes for effective mitigation; the so-called ‘proper management will fix all ills’ approach.

It is not surprising, therefore, that authorities find it difficult to make informed decisions when the information being supplied to them is inadequate. However, there are many cases where the impact assessment report is adequate, but decision making does not seem to support sustainable development. There are several possible reasons:

- The development imperative in most WIO countries requires short-term socio-economic benefits to be realized;
- There is a general lack of clear guidance or criteria on which to base decisions. This often results in inconsistencies in decision making e.g. the lack of clarity about sustainability principles (such as the Precautionary Principle) and how to apply them;
- Inadequate consultation and cooperation between authorities, either within a country or between countries;
- Inadequate experience within the government departments to properly guide and review environmental studies;
- Cumulative and transboundary effects are seldom addressed at project-level EIA and therefore developments are approved on a piecemeal basis, without the bigger picture being considered, and
- Records of decision or letters of authorization are vague and the associated conditions of approval are often impossible to implement or audit, and are vulnerable to legal

challenge.

An additional issue of concern is that the implementation of conditions of authorization is seldom, if ever, followed up by authorities.



Photo: Environmental impacts of projects must be well understood before they are authorised. © G Batchelor.

A.3 Overview of the marine and coastal environment of the WIO Region

The WIO Region has the following three international biodiversity ‘hotspots’:

- Madagascar and the Indian Ocean islands (including the Seychelles Islands)
 - The coastal forests of Eastern Africa (including Tanzania)
 - The Maputaland-Pondoland-Albany hotspot (South Africa, Swaziland, Mozambique).
- There are numerous registered (natural) ***World Heritage Sites*** in the Region (one each in Madagascar and Mozambique, two in the Seychelles, three in South Africa, and four in Tanzania).
 - Most WIO countries have designated more than one ***Ramsar site***. The region has a number of major watersheds, especially on the East African mainland and Madagascar. By far the largest is the Zambezi River which has a drainage basin estimated at more than one million km². Other large and biologically important wetlands include the basins of the Rufiji, Juba, Limpopo and Tana rivers.
 - A large proportion of the population is fully or partially dependent on natural resources for their livelihoods, subsistence and survival.
 - Nature-based tourism, or ‘ecotourism’, is one of the fastest growing sectors and comprises a major part of the economy of all WIO countries.

Coastal ecosystems

The coastal ecosystems of the region are generally both rich in natural resources and highly productive. Especially important habitats include mangrove forests, coral reefs, and seagrass meadows. Of the 38 designated marine and coastal habitats, at least one third are found within each country of the region; the greatest known diversity was reported in Mozambique where 87% of all habitat types are recorded (UNEP, 2002a). These ecosystems sustain a great diversity of marine life and represent an important food source for most coastal communities.

The conditions within each ecosystem are influenced by the adjacent ecosystems. For example, mangrove ecosystems are a nursery ground for a variety of fish, some of which mature in coral reefs and seagrass meadows. There is also nutrient, sediment, and organic matter interchange between the ecosystems.

Mangroves/Coastal Forests

In the intertidal areas of the WIO, there are many areas with conditions favourable for mangroves. These areas include estuaries, bays, protected shores, and lagoons. While mangroves are found scattered along much of the Region shoreline, the most significant stands occur in Kenya, Tanzania, Madagascar, and Mozambique. Matthes and Kapetsky (1988) found that the WIO Region has a total of 654 species of algae, molluscs, crustaceans, echinoderms, and fishes of economic importance which are associated with mangroves.

Table A1. Distribution of mangrove forests (source: modified from UNEP 2002a and <http://earthtrends.wri.org> (1997 data))

Country	Mangrove area (ha)
Comoros	2,620
Kenya	62,027
Madagascar	320,700
Mauritius	80
Mozambique	84,800
South Africa	1,100
Seychelles	2,900
Tanzania	133,500

Seagrass Beds

The seagrass beds which occur throughout the region are a common feature of intertidal mud and sand flats, coastal lagoons, and sandy areas around the bases of shallow fringing and patch reefs. They are found in all countries of East Africa, the most extensive beds being around Bazaruto archipelago in Mozambique. In Tanzania, seagrass beds are found in all bays and the west side of Pemba, Unguija, and Mafia islands. In Kenya, seagrass and algal beds are prominent in Mombasa, Diani, and Malindi, and in Seychelles they are dominant in Platte, Coetivy, and Aldabra.

Coral reefs

Coral reefs are among the most biologically diverse ecosystems. They occur all along the coast of East Africa, with Mozambique, Tanzania, Madagascar, and Kenya having the largest coverage by area. They provide habitats for a wide variety of marine species and protect coastal areas from erosion and storm damage. The island states have a wide variety of reef formation, including atoll formations such as in Aldabra Seychelles, Comoros, Mauritius, and Rodriguez. The east coast of Madagascar, Kenya, and Tanzania all have extensive fringing reefs except where they are broken in the vicinity of rivers and bay mouths (delta areas of Zambezi and Limpopo in Mozambique and Rufiji in Tanzania). The barrier reefs along the southern coast of Madagascar extend for 200 km forming one of the largest true barrier reefs in the world.

Like mangrove forests, coral reefs are under pressure from human activities threatened by land use practices and siltation, water turbidity, fishing practices involving dynamite, poisoning, and over-harvesting to extract their rich biological and mineral wealth.

Endangered Species

Five species of endangered marine turtles have been recorded in the region, of which the most common ones are the hawksbill and green turtle. Green and loggerhead turtles are often caught in the inshore beach seine fishing which indicates the presence of these species in the inshore waters of Mozambique (Chacate, 2005).

Table A2. The common breeding sites for different species of turtle (source: UNEP 2002a)

Species	Breeding Area
Hawksbill	Aldabra and other small islands in the region
Green	Mainland and island beaches
Olive Ridley	Northern Mozambique
Loggerhead	Mozambique, South Africa
Leatherback	Northern Natal, South Africa

Another endangered species is the dugong, which is threatened worldwide due to loss and degradation of seagrass habitat, fishing pressure including indigenous use and hunting, and coastal pollution. Dugong are normally found in shallow, sheltered waters close to the coastline in bays and lagoons. The largest population of dugong along the East African Coast is found in Mozambique in Maputo Bay, Inhambane Bay, and Bazaruto Archipelago while in Tanzania known from a number of recent captures in gill-nets off the Rufiji Delta in Tanzania, and are also reported from the northern Tanzania and southern Kenya region, as well as the Lamu area in northern Kenya.



Photo: The Bazaruto Island Archipelago off Mozambique is the last refuge for dugong in the WIO Region. The authorities and other stakeholders are highly protective of this area (see inset). © P.Tarr.

Fisheries

The marine fishery in the region is divided into three categories: Artisanal Fisheries, Coastal Commercial Fisheries, and High Sea Commercial Fisheries. Total production from marine fisheries in the region reached 211,000 tonnes in 1990, an increase of 72% over 1980, with an estimated value of about US \$670 million.

Artisanal Fisheries

The coastal fisheries are dominated by artisanal fisheries, which concentrates its fishing activities in the coral reefs, seagrass beds, and reef flats. Artisanal fisheries are an important source of food, employment, and income in most of the coastal communities in the region.

For Tanzania, Kenya, Comoros, and Madagascar, the artisanal fisheries accounts for more than 80% of the total marine fish catch. The artisanal fishery catch is dominated by relatively limited number of specific groups, namely scavengers (wrasse), shallow-water herbivores (rabbit fish), reef predators (barracudas), pelagic (sardines and mackerels), crustacea (crabs and lobsters), and molluscs (clams, cockles, numerous gastropod snails, squid and octopus).

The productivity of coastal waters is dependent on the health of mangroves, coral reefs, and seagrass beds as well as the amount and the quality of runoff from the rivers.

Coastal Commercial Fisheries

This type of fishery is mainly dependent on the shrimp fisheries. Shrimp fishing occurs mainly in the estuarine fishing grounds such as off Rufiji, Wami, and Rufiji rivers in Tanzania, Ungwana Bay in Kenya, Sofala Bank and Maputo Bay in Mozambique, and off the west coast of Madagascar. The catch is dominated by the species *Fenneropenaeus indicus*, *Penaeus monodon*, and *Metapenaeus monoceros*. In Madagascar, the shrimp export was the second largest source of foreign currency in 1995.

High Seas Commercial Fisheries

There are two types of high seas fisheries in the region:

- The purse-seine fishery concentrates mainly on surface schools of shipjack, yellowfin, albacore and bigeye tuna. This fishery is dominated by Spanish and French fleets.
- The longline fishery concentrates on the larger, deep-swimming bigeye tuna, yellowfin tuna, and bill fish. Most of the longliners are from Taiwan, Japan, and Korea.

The tuna fishery based in Port Victoria is operated by foreign vessels. In 1995, there were between 47 and 55 purse-seines which were licensed in Seychelles. The same year, purse-seine transshipment in Port Victoria was over 187,145 metric tonnes, or about 61% of total catch. The tuna purse seine fishery accounts for about 60% of the total Mauritian annual fish catch and provides a significant proportion of the raw material for canning industries. Canned tuna represents more than 90% of the total export of fish. In 1995, the Mauritian purse seines landed 736 tonnes of tuna, while 14,772 tonnes of tuna and related species were transhipped by longliners during the same period.



Photo's: Both high-end tourism (l) and subsistence fishers(r) rely on coastal and marine resources for their survival © P.Tarr.

A.4 Projects and developments with potential transboundary impacts

A great variety of ‘upstream’ projects or developments are likely to have transboundary impacts if appropriate safeguards are not anticipated during the planning stage and put in place during implementation. These include (but are not limited to):

- Irrigation projects (return flows will likely contain agrochemicals, salts and other pollutants).
- Agriculture – including dryland cropping and stock farming. The degradation of catchments is perhaps the most serious transboundary problem as it increases water runoff and silt loads. Land degradation usually occurs over many decades and often goes unnoticed until it is too late – a classic example of cumulative impacts.
- Factories and manufacturing industries (wastewater discharges invariably contain a cocktail of pollutants – sectors of concern include tanneries, textiles, chemical and paint producers, etc.).
- Urban areas (stormwater runoff and direct discharge of sewerage into rivers is a major concern. Also, the use of lower-lying areas as cemeteries should be discouraged).
- Oil and gas exploration and exploitation – both onshore and offshore developments may impact severely on the marine and coastal environment, with risks of creating potentially dramatic emergency situations.
- Mines – both because of physical damage and the release of pollutants.
- Dams – either for water storage or hydro (which alter hydrology, reduce water flow, accumulate pollutants and in some cases, create floods during emergency water releases, increase downstream scouring and result in disruptions to ecological functioning).
- Aquaculture projects (these are usually located in estuary areas and are thus normally in a ‘downstream’ country, but where they require major mangrove clearing, they will likely impact heavily on biodiversity associated with mangroves. In such cases, impacts might be felt far from the project area).
- Bulkwater abstraction schemes or river diversions – usually when water is needed for cities or major development nodes.
- Tourism – especially where many hotels congregate in the same area. This is a problem in many coastal areas but the impacts are usually localised rather than transboundary.
- Transport – especially when rivers are used as the transport corridor. Chemical and oil spills can lead to environmental disasters both to freshwater and marine environments.
- SMEs which, as noted earlier, seldom benefit from Impact Assessment studies but which can result in serious cumulative impacts, some of which could be transboundary in nature.

Part B: Principles of Impact Assessment in the WIO Region

The following principles should be applied during impact assessment at either strategic or project levels (refer to Part D on Strategic Environmental Assessment, and Part E on Environmental Impact Assessment, for more detailed information).

B.1 Using the ecosystem approach

The ecosystem approach is advocated by the Convention on Biological Diversity (CBD). It recognizes that people and biodiversity are part of the broader ecosystems on which they depend, and that they should thus be assessed in an integrated way⁶. The main principles for implementing the Ecosystem Approach are given in Box B-1.

Box B-1: Principles of the Ecosystem Approach (source: adapted from Brownlie *et.al.*, 2006)

- The objectives of ecosystem management are a matter of societal choice.
- Ecosystem managers should consider the effects of their activities on adjacent and other systems, especially when such systems are shared with other countries.
- Conservation of ecosystem structure and functioning, to maintain ecosystem services, should be a priority target.
- Ecosystems must be managed within the limits of their functioning.
- The approach must be undertaken at appropriate spatial and temporal scales.
- Objectives for ecosystem management should be set for the long-term.
- Management must recognise that change is inevitable.
- The approach should seek an appropriate balance between, and integration of, conservation and use of the environment.
- All forms of relevant information should be considered.
- All relevant sectors of society and scientific disciplines should be involved.

B.2 Considering alternatives

Good planning and impact assessment should clearly identify and select those alternatives that offer the greatest overall benefits and avoid undesirable impacts for the good of society, not only in the country envisaging the development but also for people in neighbouring countries. Decision making, too, should strive to this end. This principle is especially important in the context of transboundary impacts in the WIO region, as countries share many important ecosystems and they have an obligation to their neighbours to avoid unnecessary impacts. That is, the ***evaluation of alternatives is an essential part of impact assessment and decision making.***

⁶ Shepherd G (2004). *The Ecosystem Approach: Five Steps to Implementation*. Ecosystem Management Series No 3. IUCN Commission on Ecosystem Management. IUCN, Cambridge.

Where reasonable alternatives are not considered in impact assessment and decision making, these decisions are invariably flawed and open to challenge by stakeholders, leading to delays, costs and possibly conflicts. Where there is thorough consideration of alternatives, stakeholder buy-in is usually achieved and an optimum proposal emerges (see Box B3 for more detailed guidance on public participation).

B.3 Using a hierarchy to mitigate impacts

There is a hierarchy of possible mitigation that can be used to avoid or reduce negative impacts (Figure B-1). The emphasis in this hierarchy is on avoiding or preventing impacts, and/or reducing or minimizing them.

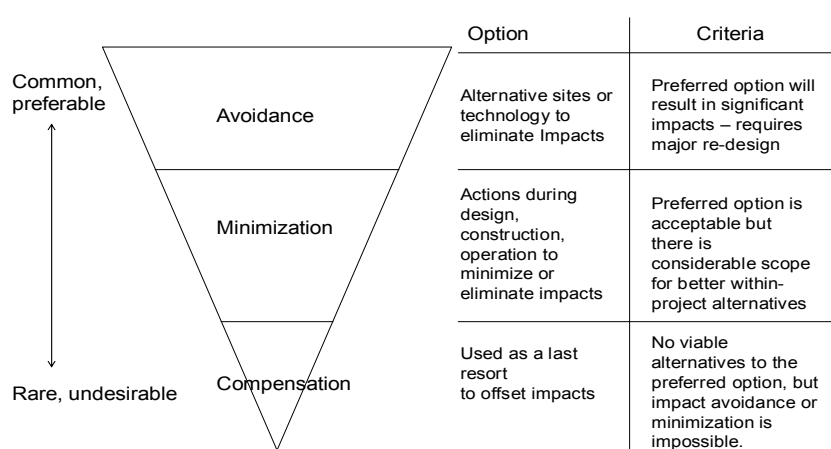


Figure B-1: Illustration of various levels of mitigation, with avoidance being the first choice (source: adapted from UNEP 2002c)

B.4 Applying the Precautionary Principle

Simply stated, if one is not sure what's going to happen as a result of doing something, and the effects could be severe and irreversible, and could compromise our future, one should avoid taking any risks. Action to avert serious, irreversible environmental impacts may be required before scientific certainty of the harm exists, and by the time one has gathered enough evidence to be certain, it may be too late to act⁷.

The combination of *uncertainty* and the *risk of irreversible effects* or *loss of irreplaceable resources* summarises the challenge to decision-makers in the WIO Region with regard to the sustainable use and development of both national and shared natural systems⁸.

⁷ The Precautionary Principle Project: www.pprinciple.net (accessed July 2006) A joint initiative of Fauna & Flora International, IUCN–The World Conservation Union, TRAFFIC–the wildlife monitoring programme, and Resource Africa.

⁸ Sadler B (1996). *International Study of the Effectiveness of Environmental Assessment*. Final Report. Environmental Assessment in a Changing World: Evaluating Practice to Improve Performance. CEAA and IAIA.

Important to note:

- An **irreversible impact** is one that arguably cannot be reversed in time (e.g. loss of a specific vegetation type or genetic diversity through reduction in size of populations of a particular species). Some, but not all, irreversible impacts will lead to irreplaceable loss of biodiversity.
- An impact causes **irreplaceable loss** when it results in the loss of a resource without substitute, and which cannot be replaced. An impact leading to irreplaceable loss of biodiversity is, by definition, irreversible.

Box B-2 describes the terms ‘risk’, ‘hazard’, ‘uncertainty’. Society as a whole, or affected parties in particular, choose the level of risk and/or hazard that they are prepared to accept. Where there is uncertainty and the probabilities of impacts - or their significance - cannot be determined with confidence, and/or the opportunity costs of choosing a particular path could be high, it is wise to apply caution in decision making. This is especially important in the context of the Nairobi Convention.

Box B-2: Risk, Hazard, Uncertainty, and the Precautionary Principle (source: adapted from Brownlie et.al. 2006)

- **Risk:** The likelihood of a significant impact, a hazardous impact, an irreversible impact, or impact leading to irreplaceable loss, occurring.
- **Hazard:** Anything that has a known potential to cause damage to life, property and/or the environment. The hazard of a particular material or installation is constant; that is, it would present the same hazard wherever it was.
- **Uncertainty:** The inherent unpredictability of response of the environment to an impact, the lack of knowledge and/or understanding of cause-effect-impact relationships between the activity and the environment, and/or gaps in information that don’t allow confidence in predictions of impacts. Uncertainty is inevitably linked to an unprecedented activity (i.e. something that has not been done before). Also, it is common in complex ecosystems (e.g. coral reefs).

Clearly, the penalties for taking decisions that allow for loss of biodiversity and negative impacts on ecosystem services could be substantial. In addition, they could be contrary to the goal of sustainable development, namely not to compromise the ability of future generations to meet their own needs. They are also contrary to the letter and spirit of the Nairobi Convention.

B.5 Ensuring equitable sharing

In line with sustainable development, the needs of future as well as current generations must be considered, and alternatives must be sought that don’t irreversibly ‘cash in’ biodiversity capital to meet short-term needs. Agenda 21 requires that development ensures the fair and equitable sharing of benefits arising from the use of the environment.

The Nairobi Convention specifies that:

The Contracting Parties are determined to protect and conserve the coastal and marine environment and ensure the sustainable development and/or use of the natural resources of the Eastern Africa Region, by, inter alia, proactive and inclusive planning processes, so as to meet the needs of the present and future generations in an equitable manner and thereby ensure inter-generational equity.

Where the negative impacts of development lead to an increase in vulnerability of poor people, and/or where society as a whole is left worse off with regard to ecosystem services as a result of development that benefits a few relatively wealthy parties, the condition of equitable sharing is not met.

Equitable sharing also applies to the fair access to natural resources and avoiding transboundary impacts on shared resources. It has been shown that insecure tenure or access to natural resources discourages sustainable natural resource management⁹.

B.6 Applying common principles in SEA and EIA

In addition to the above points, the following principles should be applied during impact assessment at either strategic or project levels in the WIO Region (refer to Parts D and E for more detailed information):

- **Involving all relevant stakeholders**, particularly those authorities responsible for biodiversity conservation, those groups with an interest in biodiversity and those parties who currently use or have access to, directly or indirectly rely on or benefit from,

affected ecosystems. Because so many systems and resources in the WIO Region are shared by many countries, transboundary consultations are essential.



Photo: Development planning and problem solving benefits greatly from broad-based stakeholder consultation. © P.Tarr.

- **Using all available and relevant information, including local, traditional and indigenous knowledge.** As well as scientific information, other types of information about, and values of, the affected environment, must be gathered and used. In most WIO countries, there is inadequate baseline data. For this reason, specialist studies must

⁹ World Resources Institute in collaboration with the UNDP, UNEP and the World Bank (2005). *The Wealth of the Poor: Managing Ecosystems to Fight Poverty*. World Resources Institute, Washington DC

focus on providing ‘need to know’ information rather than the more common ‘nice to have’.

- ***Defining time and space boundaries of the study.*** It is essential to ‘set the scene’ and the scope of the SEA or EIA, to ensure that it is sufficient to enable the impacts within and between ecosystems to be addressed, and to allow both long and short term impacts to be considered.

Box B-3. How public participation in EA can benefit development planning

(Source: adapted from SAIEA 2003)

CIVIL SOCIETY will benefit because:

- Capacity is built through people playing an active role during the process. The skills learnt can be used in other community projects;
- Civil society rights are exercised and protected by participating; and
- Inputs will influence the form and nature of the development and likely lead to better development that takes society needs into account.

DECISION MAKERS will benefit because:

- Public participation will improve decisions since there is access to a broader range of perspectives and opinions on the proposed development;
- The development is likely to be more sustainable as it takes peoples needs and views into account; and
- Governance and the legitimacy of government will be improved as people will have contributed to decision making.

DEVELOPERS will benefit as:

- The project may improve through access to local knowledge;
- Costs may be saved as key issues are identified by the public, and studies are focussed on these key issues as opposed to a broad range of issues;
- Measures to reduce impacts and enhance benefits will be identified with stakeholders;
- Relations with communities in the vicinity of the development will be improved;
- Delays in decision making may be reduced because of good participation early in the process;
- The public are unlikely to raise objections to the project; and,
- The developer’s image and reputation will be enhanced.

PRACTITIONERS will benefit because

- Public participation provides a good basis for accountability;
- Stakeholders provide information and identify alternatives, problems and solutions; and,
- The quality of the EA will be better as it will be grounded in broad-based public input.

- ***Drawing up good Terms of Reference.*** Good Terms of Reference are essential to ensure that answers to questions about impacts on biodiversity, ecosystem services and associated human wellbeing will be answered in the impact assessment and related specialist studies. Where the Terms of Reference are inappropriate (e.g. focus only a

specific site rather than the broader landscape, or on a specific stretch of river excluding downstream impacts), the impact assessment will not be reliable or useful as a planning and decision making tool. This refers in particular to activities having a potential for transboundary impacts, whereby the area of assessment might cross borders.

The Nairobi Convention requires that transboundary impacts be thoroughly assessed

Part C: Principles of environmentally sound decision making.

C.1 Making decisions to achieve sustainable development

Decision making for sustainable development requires critical examination of purposes and alternatives, needs to take into account the applicable regulatory framework, indirect and cumulative, as well as direct and immediate effects, transboundary impacts, uncertainties and risks, and scientific facts and societal values. It should seek to identify alternatives that offer the greatest overall benefits and avoid undesirable trade-offs, rather than merely enhancing or mitigating the effects of the already chosen options. It also needs an effective means of monitoring effects and enabling adaptive implementation of approved activities.

The **problem** with current decision making in Africa is that it frequently fails to adhere to the principles of sustainable development, due to a number of possible reasons:

- Decision makers' personal and/or professional opinions often count heavily in decision making.
- Decision making is often characterized by being 'short-term and reactive', ignoring the long-term consequences of irreversible and irreplaceable environmental impacts. That is, undesirable trade-offs are made between short-term socio-economic gains and long-term impacts on those ecosystem services that support human wellbeing.



Photo: Many developments in the WIO Region suggest a lack of long term vision. Coastal tourism is an example where authorities should be careful not to be seduced by quick money. High quality, low impact tourism will likely bring greater rewards in the long term than mass tourism. © P.Tarr.

Additional problems with current decision making include:

- Personal bias in decision making is aggravated by studies (including impact assessment reports) that are biased or give undue emphasis to one or other issue without providing supporting information.
- The problem of subjective decision making is that many decisions are neither in line with the objectives of sustainable development, nor are they transparent or defensible.
- Decision making is often inconsistent, leading to loss of credibility of the environmental authority by the public.
- Changes to the environment as a result of a proposed development are frequently compared to the current situation, rather than to a desired state of the environment. The additive effects of changes are seldom considered.
- Alternatives are not always required by decision makers or addressed in the impact assessment process, undermining the basis for environmental decision making.

C.2 Criteria and desired outcomes for decision making to support the objectives of the Nairobi Convention

Box C-1: Decision criteria and desired outcomes

Over-arching criteria and desired outcomes

Decisions should:

- Try to meet all the requirements for sustainability. In this context, the purpose and objectives of the Nairobi Convention must be bourn in mind, including the Environment Quality Objectives established in the WIO Strategic Action Programme.

Decisions should not:

- Accept compromises or trade-offs that go against official policies, plans, strategies, etc.
- Accept improved benefits as compensation for serious negative impacts.
- Accept significant negative effects on the integrity of social and ecological systems, or equity and social justice, just because of economic gain.

Protecting the integrity and resilience of social and ecological systems in the WIO Region

Decision criteria

Decisions should¹⁰:

- Protect the integrity of social and ecological systems, and the irreplaceable life-support functions

Desired outcomes

- No net loss of species or ecosystems diversity.
- Maintain and conserve natural linkages and corridors between habitats and between ecosystems.

¹⁰ The criteria in this table have been drawn from the work of Robert B Gibson (2005): '*Sustainability Assessment Criteria, Processes and Applications*', Earthscan, London.

<p>on which human and ecological wellbeing depends.</p> <ul style="list-style-type: none"> ○ Ensure that livelihoods are maintained or improved. ○ Favour those alternatives that are most likely to preserve and enhance the opportunities and capabilities of future generations to live sustainably. 	<ul style="list-style-type: none"> ○ The quality and quantity of natural / harvestable goods and ecosystem services, on which the livelihoods and resilience of society in general - and vulnerable communities in particular - depend, should be safeguarded. ○ Use of natural resources should be at or less than rates of replenishment or renewal, or agreed upon thresholds or limits of acceptable change.
<p>Decisions should not:</p> <ul style="list-style-type: none"> ○ Accept any significant long term loss. 	
<p><i>Precaution and adaptation</i></p>	
<p>Decision criteria</p> <p>Decisions should:</p> <ul style="list-style-type: none"> ○ Respect uncertainty and allow for adaptation. Avoid poorly understood risks that could cause serious or irreversible harm. 	<p>Desired outcomes</p> <ul style="list-style-type: none"> ○ Development should have minimal environmental risk. ○ High level of confidence in predictions as to the effects on the environment. Where there are major gaps in information, a precautionary approach should be adopted. ○ Mitigation and management of impacts will be effectively implemented.
<p><i>Equity and social justice</i></p>	
<p>Decision criteria</p> <p>Decisions should:</p> <ul style="list-style-type: none"> ○ Improve the welfare of the poor. ○ Build democratic governance. 	<p>Desired outcomes</p> <ul style="list-style-type: none"> ○ Decision making should consider all stakeholder values, and promote public participation. ○ The outcome of development should be an improvement in the fair distribution of benefits from the environment and ecosystem services. Fair distribution also means “transboundary equity”. ○ Development should not result in a net cost to society, particularly where the “beneficiaries” of a specific development are single individuals or corporations that derive personal benefit from collective loss. ○ Development should not result in future generations having to bear the costs of environmental impacts. ○ The environment should be conserved for future generations, to optimise their capability of living sustainably.
<p>Decisions should not:</p> <ul style="list-style-type: none"> ○ Displace significant negative effects from the present to the future. ○ Result in “downstream” communities suffering negative impacts while “upstream” countries enjoy the benefits of development. 	

Efficiency

Decision criteria

Decisions should:

- Ensure that the net overall effects of development are positive, and choose the development option that promises the greatest long-term gain overall – not only in the country where the development is located, but also in the greater WIO Region.
- Seek to provide a larger base for ensuring sustainable livelihoods for all while reducing threats to the environment.

Desired outcomes

- Negative effects on the natural environment should not result in a net cost for society, through having to pay to replace or substitute for lost or negatively impacted - and previously free - ecosystem services.

C.3 Co-operative governance and the Nairobi Convention

Governments and authorities in the WIO region must ensure that development complies and/or is consistent with a hierarchy of international conventions, regional protocols (e.g. Nairobi Convention LBSA Protocol), national and provincial/state laws, policies, plans, programmes and strategies. In most cases, consideration of the above instruments requires either co-operation between countries and/or co-operation between different government authorities and agencies.

Interesting to note:

Article 13 of the Nairobi Convention states that “In the planning process leading to decisions on development activities, programmes and processes that could significantly affect the coastal and marine environment, the Contracting Parties shall establish by law or other binding procedure, impact assessments and evaluations on the possible direct or indirect, immediate or long-term, environmental impact, including the cumulative and transboundary impact of the activities, programmes and processes being contemplated”

Thus, the Convention requires impact assessments to be as broadly defined as the issues that require consideration, whether local or transboundary.

It is essential to ensure co-operation and consultation with other government departments and ministries, both within countries and between neighbouring countries for a number of reasons:

- Co-operation as early as possible in the planning process allows for shared objectives, outcomes and criteria for both the impact assessment and associated decision making to be determined. In many instances, different countries or jurisdictions have different

laws, policies and priorities; the early rationalisation of these different formal requirements and value systems is important to ensure an optimum outcome for sustainable development.

- Because environmental issues are cross-cutting, most project applications will involve at least one other line ministry.
- Large-scale infrastructure projects may cross provincial or state boundaries and therefore more than one environmental authority may be involved, depending on the administrative structure of the country.
- Projects which are planned in and around an urban area may fall under both national and local authorities.

Interesting to note:

Article 14 of the Nairobi Convention requires Contracting Parties ‘to co-operate in scientific and technological fields related to pollution from land-based activities and sources, particularly research on inputs, pathways and effects of pollutants and on the development of new methods for their treatment, reduction or elimination’.

This is a clear requirement for intergovernmental collaboration.

C.4 Deciding on the most appropriate level of assessment – SEA or EIA?

One of the first and most critical decisions is to determine which level of assessment is appropriate for the application – a strategic environmental assessment (SEA) or an environmental impact assessment (EIA).

Box C-2 can help to decide whether an SEA or EIA would be the most appropriate tool to assess the impacts of a development proposal, plan, policy or programme.

Box C-2: Characteristics of SEA and EIA¹¹	
EIA	SEA
Is reactive to a development proposal.	Is usually pro-active and informs development proposals.
Assesses the effect of a proposed development on the environment.	May assess the effect of existing environmental conditions on development needs and opportunities.
Relates to a specific project and thus seldom considers cumulative effects.	Relates to areas, regions or sectors of development and thus has to consider cumulative effects.
Has a well-defined beginning and end and focuses on informing a specific decision at a particular point in time.	May be a continuing process.
Enables the identification of specific impacts.	May create a framework against which specific project types can be selected and where impacts and benefits can be measured.
Focuses on the mitigation of negative impacts and the enhancement of positive impacts.	May focus on maintaining a chosen level of environmental quality, e.g. through the identification of sustainability objectives and limits of acceptable change.
Has a narrow perspective and includes a high level of detail, though will consider transboundary impacts if this is specified in the ToRs.	Has a wide perspective and a low level of detail to provide a vision and overall framework. Depending on the spatial dimension, SEAs are generally well suited to addressing transboundary impacts, albeit at low resolution.

SEA and EIA as complementary tiers of impact assessment

To ensure that development meets the objectives of sustainable development, both SEA and EIA are desirable; the broad scope and low level of detail of the SEA being complemented by the narrow scope and relatively high level of detail of the EIA. It is important that the impact assessment of a project is ‘nested’ within a strategic environmental assessment, thus ensuring that it is contextually sound and consistent with broader development objectives.

Dealing with cumulative effects

Where a particular geographic area (e.g. the WIO region) is experiencing rapid development and/or additive impacts (e.g. destruction of offshore reef habitat or coastal dune cordon that protects inland villages), a focused strategic environmental assessment should be commissioned *for that area*, with a view to providing a robust framework within which to evaluate the cumulative impacts of future development. However, the conducting of an SEA does not rule out subsequent project-level EIAs. For example, a country such as

¹¹ Adapted from Department of Environmental Affairs and Tourism (2004): “*Strategic Environmental Assessment*.” Integrated Environmental Management Information Series 10, South Africa.

Seychelles may conduct an SEA for the tourism sector, which might set development parameters for the sector (e.g. number of beds, methods of waste management, degree of local ownership, etc.) and define the areas where establishments could be located. Within this strategic framework, individual hotels might still need an EIA, albeit “mini”, so that the project takes cognisance of site-specific circumstances (e.g. visual impact, relationship with the nearby village, protection of a bird breeding area). When impact assessment is tiered in this way, a big, consolidated and integrated effort goes into the SEA while the subsequent EIAs (which could be many in number) require less effort, cost and time. This is an efficient way to implement impact assessment in the WIO region.

*Photo right:
'Urbanisation' of
coastlines causes
encroachment on many
sensitive habitats and
can transform entire
landscapes. SEA can
assist coastal planning
through improving
zonation and setting
parameters to guide
future development.
© P.Tarr.*



*Photo left: Traditional
agriculture hardly ever
benefits from any form
of impact assessment,
even though impacts on
biodiversity are
cumulative and
significant. SEAs can be
used to assist land use
planning so that
important areas for
conservation can be
avoided. © P.Tarr.*

Therefore, the issue of cumulative and transboundary impacts is best addressed at a landscape, regional or sectoral scale through SEA, with project level EIAs providing greater focus and detail.

C.5 Dealing with uncertainties, gaps in information, and risks

When dealing with uncertainties, gaps in information and risks, decision makers should:

- Ensure that relevant information about the likely consequences of a proposed activity on the environment has been provided. That means ensuring that the right specialists, who can best answer questions about biodiversity and ecosystem services and impacts on these services, have been involved in the impact assessment.
- Ask for additional studies to be commissioned by the proponent where there are gaps in information that can be addressed relatively quickly, and where that information is highly likely to influence decision making. The findings of these studies should inform the decision. That is, the actual studies should not be included as conditions of authorization.
- Ensure that all reasonable alternatives that could avoid or minimize uncertainty and the risk of irreversible impacts and irreplaceable losses have been investigated. That is, that every effort has been made to find the best option for sustainable development.
- Ensure that the gaps in information, risks and uncertainties associated with a proposed activity are clearly explained. Also, that the level of confidence in each impact prediction is clearly stated. Where there are low levels of confidence, and there is a risk of negative and irreversible impacts, including transboundary impacts, a risk-averse approach (or the precautionary principle) must be taken.
- Consider the opportunity cost of taking a particular decision.
- Consider the costs of replacing or providing a substitute for any resources that could be lost.
- Apply a risk-averse approach when taking decisions where the consequences of actions are not certain but could be significant, could lead to irreversible effects or the irreplaceable loss of biodiversity and/or ecosystem services.

Interesting to note:
Article 4 of the Nairobi Convention makes it a general obligation for Contracting Parties to apply the precautionary and polluter-pays principles.

C.6 Overcoming inadequate capacity within regulatory authorities

When the decision-maker receives an application for an environmental authorisation, supported by the relevant impact assessment documents, the authorities must consider the following:

- **Match skills to complexity:** the capacity of officials to evaluate the adequacy of impact assessments should be carefully matched with the complexity of the proposed activity and the likely significance of effects or impacts.
- **Ask for expert opinion:** where there are likely to be significant adverse environmental impacts a person with sufficient competence and experience in ecology should be given

responsibility for handling that application.

- **Ask for independent review:** where the necessary capacity is lacking within the authority, and where the information provided to decision makers is inadequate, the authority should call for independent review of the impact assessment report (see part E). Review should contribute to building of local capacity (i.e. the authority and local specialists should participate in the review). Although independent reviewers can be used on a long term basis, the ultimate objective is for the authorities in a country to develop as much in-house capacity as possible.
- **Consultation and cooperation:** this is needed with other authorities that have relevant expertise, and with environment/conservation agencies (where they exist), as well as with authorities in neighbouring countries, to help to evaluate impact assessments.
- **Proponent pays:** authorities should establish and maintain a network of experts outside its structures, and use these persons strategically to assist them. The costs of this outsourcing should always be carried by the proponent. It is important, however, that the authorities make the proponent aware that external review might be required, along with associated costs. Experience gained in eastern and southern Africa over the past few years shows that proponents do not mind paying for professional, external review as long as this review serves the purpose of improving the quality of the EIA and assisting decision making. Costs for external review are usually a fraction of the EIA costs and even a smaller fraction of the overall project costs.



Photo: Independent review teams provide quality assurance, reduce pressure on thinly-spread government agencies and can add immense value to decision making processes. © P.tarr.

Part D: Steering the strategic environmental assessment process

D.1 The strengths of SEA

Impact assessment in most African countries is focused at the project level. At this level, indirect impacts are often ignored and potential cumulative impacts are extremely difficult to evaluate.

The main advantages of SEA include:

- Its potential to address cumulative impacts;
- Its ability to provide 'big picture' frameworks within which a variety of projects can be assessed; and

- Its potential to inform land use planning in such a way that important areas for biodiversity and/or ecosystem services are ‘red flagged’ as early as possible during initial planning stages.

The importance of a clear strategic context in which to evaluate potential environmental impacts, and of taking into account cumulative and transboundary effects, points to a need for authorities in the WIO Region to give greater consideration to SEA as a valuable tool. The need for environmental considerations to be built into policy formulation processes, spatial and land use planning should be a priority in eastern and southern African countries.

Important to note:

- *SEAs are best integrated into policy formulation and the planning process, rather than being carried out as a separate exercise or in parallel.*
- *SEAs should seek to find the specific policy, plan, programme or other strategic alternative that will **best** meet the criteria and desired outcomes for sustainable development given in Box C-1. They should thus strive not only to minimize negative effects, but should look for opportunities to maximising benefits and improve ecosystem services.*

D.2 The SEA process

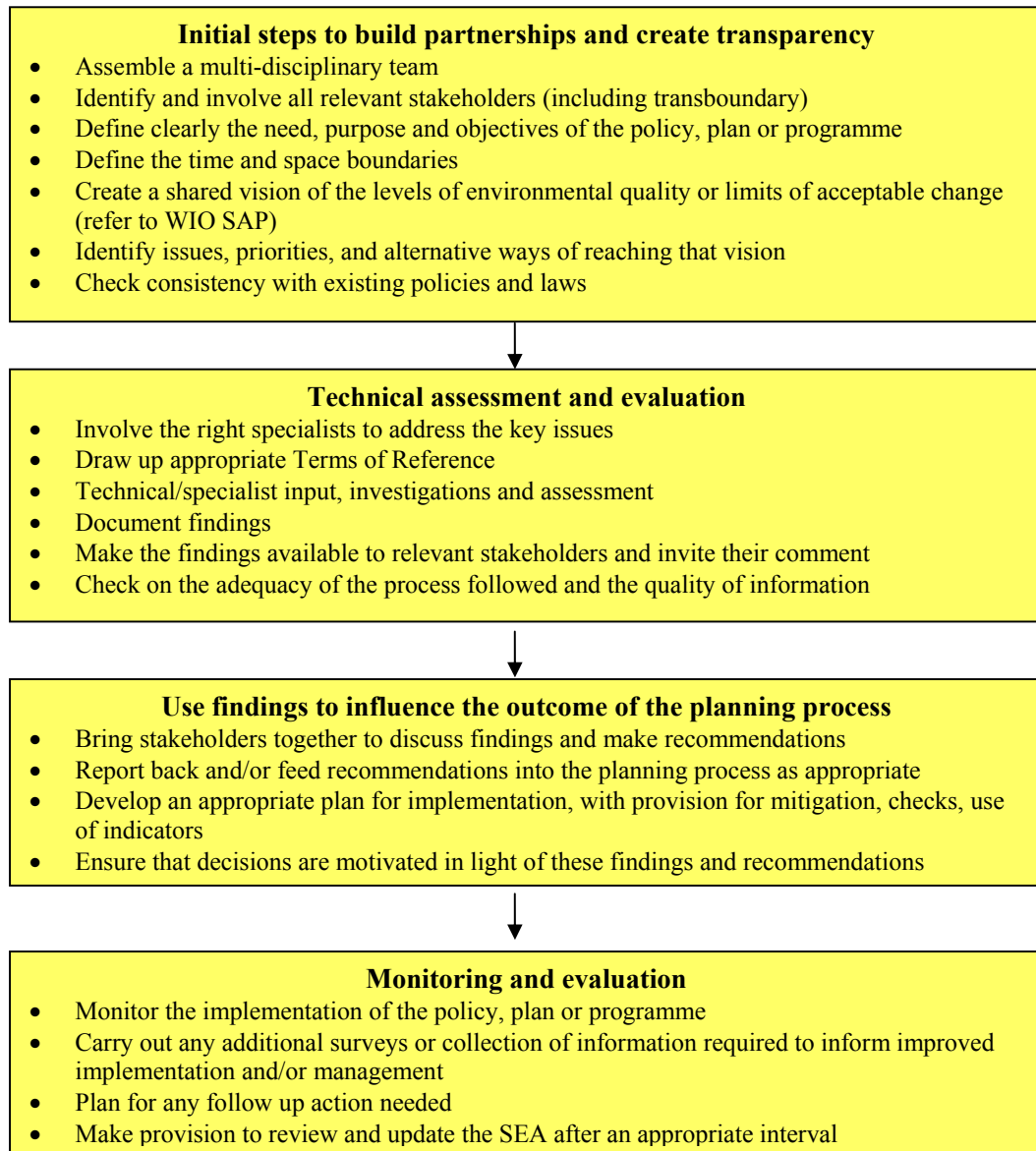
Policies, plans and programmes ‘set the scene’ in a proactive way for sustainable development and are important tools for achieving the Millennium Development Goals (e.g. Poverty Reduction Strategy Papers, Spatial Development Frameworks and Development Strategies). SEA will also assist in the meeting of the Environment Quality Objectives that appears in the WIO Strategic Action Plan.

SEA can lead the planning process, be carried out in parallel with that process, or be integrated within the process; good practice SEA should ideally be fully integrated into a policy development or planning development process.

Typically, the SEA steps can be described as shown in Figure D-1¹². Each stage will vary depending on the particular context being investigated. The outcome of an SEA may be a report, or may simply be information that feeds into, and influences, the policy or planning process.

¹² Adapted from the UNEP Convention on Biological Diversity (2006): *Voluntary Guidelines on Biodiversity-inclusive Impact Assessment*. Adopted at the COP-8 meeting, March 2006, Curitiba, Brazil.

Figure D-1: Typical SEA process



Critical success factors in the SEA process are as follows:

- **Involving all the right people** in the planning and decision making process early in, and at regular intervals throughout, the SEA process:
 - regional representatives and relevant country representatives (where trans-boundary impacts are anticipated);
 - competent national authorities responsible for sectors or specific interests that could be affected by the proposed activity;

- the authority responsible for biodiversity conservation;
- interested parties from relevant sectors;
- potentially affected parties (particularly local communities, poor and vulnerable people); and
- probable beneficiaries.

It is often useful to establish a forum at the start of the SEA, comprising the key authorities and interested / affected parties, to steer the SEA.

The key competent authorities should commit themselves at the start of the SEA, to that SEA process, and to using the results in the planning or policy formulation process and implementation. The following bullets are a checklist that could help to structure the SEA:

- **Using explicit sustainable development criteria and associated desired outcomes** as the overarching direction towards which the SEA process should strive (Box C-1).
- **Deciding on a ‘vision’, with explicit goals, objectives, desired outcomes and/or targets** of the strategic proposal. The competent authority/authorities must participate in this exercise. Unless one has a clear idea of what one wants to achieve, one can’t get there. The SAP for the WIO has articulated the desired Environmental Quality Objectives/Standards and it is important that all countries in the region strive to achieve these.
- **Determining appropriate time and space boundaries** for the SEA. Some policies, plans or strategies, for example, might have implications for neighbouring countries, the region or the globe (e.g. trade or transport policies, energy generation strategies, etc.). The effects of these policies, plans or strategies might be felt almost immediately, or only much later by future generations (e.g. climate change). For the purposes of measuring the effectiveness of the strategic activity, clear timeframes are needed.
- **Adopting an ‘ecosystem approach’** that recognizes the inter-dependencies of social and ecological systems, and explores and evaluates the implications of change on these systems against desired outcomes and/or limits of acceptable change (the upper and lower thresholds within which those ecosystems would be resilient to disturbance or change, and beyond which impacts could be irreversible or lead to irreplaceable loss of natural capital). This exercise needs to take into account possible scenarios that may influence these services. It is important to note that the key ‘drivers’ of the local economy might be dependent on the environment (e.g. fisheries reliant on healthy water bodies, tourism reliant on clean beaches and undamaged coral reefs).
- **Identifying the opportunities and resource constraints** of the natural environment, to enable the policy, plan, or programme to respect the capacity of the supporting ecosystem services. That is, the potential constraints that the natural environment places on the proposed activity (e.g. floodlines, dynamic or mobile sand systems, unstable areas, erosion prone soils, etc.) as well as the opportunities it

provides (e.g. source of food, fibre, medicines, grazing, flood regulation, water cleansing, etc.), should inform the identification of areas most suitable for specific activities. Another way of identifying constraints is to explore any factors that may prevent the development vision or Environment Quality Objectives from being reached (e.g. shortage of good quality drinking water, unemployment, etc.). These factors should be prioritized in the SEA process

- **Ensuring that the proposed activity is consistent with ‘the broader picture’** of protocols, policies, plans, programmes and strategies, as appropriate. The strategic informants should include the TDA/SAP, as well as any national or local conservation plans.
- **Identifying and evaluating alternatives** that could meet the need, purpose and objectives of the proposal. This process should be continual and repeated as necessary throughout the planning / SEA process.
- **Involving the right independent specialists** who can address the key issues. Where appropriate, independent review of specialists’ work should be carried out to check and verify their findings, and ensure that links across disciplines have been made and tracked by relevant specialists (e.g. between ecosystem services, and social and economic factors).
- Striving to ensure that the **full spectrum of environmental costs and benefits**, incorporating consideration of biodiversity and ecosystem services, is evaluated in an integrated way, adopting an ecosystem approach.
- Ensuring that **not only the potential negative effects of different alternatives, but also the opportunities** presented by each alternative, should be explored to maximise potential benefits. For example, opportunities for supporting or contributing to the realisation of, amongst others, the WIO Strategic Action Plan, should be sought.
- Ensuring that **ways to mitigate** the likely residual effects of the proposed policy, plan or programme (or of the cumulative and/or transboundary effects of projects within a sector or geographical area) have been explicitly stated. Provision should be made for **monitoring and feedback** loops to allow for adaptive management and continual improvement, as well as for changes to the policy, plan or programme, in response to any ‘alarm bells’ regarding significant negative effects on the environment.
- Providing a **robust framework** for ‘downstream’ planning, management and impact assessment.

D.3 Governmental co-operation, consultation and co-ordination in SEA

SEA demonstrates commitment to positive planning and opens the door for close co-operation and integration between different departments with the shared objective of sustainable development. Co-operation between government departments within a country, and/or between governments of different countries where trans-boundary effects are likely, is of the utmost importance to set a firm foundation for sustainable development, for the

effective implementation of the Nairobi Convention and for meeting the Millennium Development Goals. Co-operation enables shared objectives and desired outcomes of planning, impact assessment and decision making to be determined. In the case of the WIO countries, these objectives have been defined in the Strategic Action Plan and outcomes may link directly to formal regulatory requirements (i.e. EIA and emission standards). The involvement of the authority/ies or agency/ies responsible for the environment is essential. All of these authorities and/or agencies should make a commitment to accepting, implementing and enforcing the findings of the SEA.

D.4 When should an SEA be done, and by whom?

SEA should be carried out for policies, plans and programmes that have the potential to influence significantly a geographic region or area, a particular sector, and/or the environment within a region/area. In addition, where there is a major risk of cumulative impacts in a sector or region/area arising from repeated projects of a similar nature, it is appropriate to take a broader view and carry out a strategic level assessment. This is especially important in the WIO region as the key objective of the Nairobi Convention is to prevent transboundary impacts, especially from land based activities. It is clear from the TDA that most of the problems in the region are because of cumulative impacts of many projects, both along the coast and in catchments.

It is important to consider potentially significant and predictable direct and indirect effects of a proposed activity, either through obvious environmental impacts, or through impacts on social and economic systems that in turn impact on ecosystem services.

Important to note: Triggers for SEA in the WIO Region:

Typical triggers for an SEA on policies, plans or programmes would include¹³:

- *Proposals that would negatively affect **coastal ecosystems, mangroves, coastal forests, seagrass beds, coral reefs, endangered species, human livelihoods and freshwater resources.***
- *Proposals known for their potentially significant environmental impacts, either direct or indirect. These include **conversion of land, polluting industries, intensive utilisation of natural resources, industries that introduce alien organism into nature, major changes in settlement patterns, opening up unspoiled natural areas, changes to river flows and ecological functioning.***
- *Proposals with uncertain indirect environmental impacts (e.g. changes in consumption or land use patterns, changes in trade agreements or policy, changes in technology).*

In practical terms, an SEA should be required:

- *Where a particular sector or industry is expanding rapidly, or likely to do so (e.g. in response to incentives or economic climate), and repeated environmental impacts are probable, a strategic environmental assessment should be commissioned with a view to providing a robust framework within which to evaluate future development **within that industry or sector.** The time and spatial scales of that SEA must be carefully determined to address the nature and scale of impacts anticipated.*
- *Where a particular geographic area is experiencing rapid development of a diverse nature, and/or additive environmental impacts (e.g. overuse of water resources, conversion of natural habitat such as mangroves for fisheries, proliferation of tourism developments, etc.), a strategic environmental assessment should be commissioned **for that area,** with a view to providing a robust framework within which to evaluate future development.*
- *Where a particular geographic area is experiencing rapid development and/or additive impacts (e.g. destruction of offshore reef habitat or coastal dune cordon that protects inland villages), a focused strategic environmental assessment should be commissioned **for that area,** with a view to providing a robust framework within which to evaluate future development, addressing **that specific environment** as a limiting factor for sustainable development.*

In many areas of eastern and southern Africa, urban and industrial development is proceeding rapidly and natural areas are being transformed for other uses. These natural areas often provide valuable ecosystem services that ensure supply of good quality water, and support livelihoods by providing grazing for livestock, 'wild' food, fuel wood, materials for informal trade (e.g. craft), etc. They also provide areas for recreation, and some contain unique biodiversity. In rural areas throughout Africa, there is major conversion of natural habitat for agriculture, forestry, mining or other projects. There is

¹³ Adapted from the UNEP Convention on Biological Diversity (2006): *Voluntary Guidelines on Biodiversity-inclusive Impact Assessment*. Adopted at the COP-8 meeting, March 2006, Curitiba, Brazil.

growing recognition that impact assessment on a project-by-project basis fails to see the bigger picture: living landscapes and human wellbeing being supported by ecosystem services.

SEAs are usually commissioned by a government authority or authorities, and co-ordinated and managed by environmental consultants, either alone or in partnership with the authority/ies. SEAs are predominantly funded by government or donors. Specialist input is frequently required during the SEA process, and independent review may be appropriate to check the adequacy of the process and/or findings of either the specialist inputs and/or the SEA. In unusual circumstances, a particular industry or sector may commission or fund an SEA where it is seen to be an advantage to its strategic direction.

Important to note:

SEAs should be undertaken by certified and independent environmental practitioners and specialists, to provide assurance of the quality of work.

In some instances, SEA is needed to satisfy the requirements of funding agencies such as the World Bank.

D.5 What information should WIO countries expect from an SEA?

Each and every SEA will want different questions answered, depending on its strategic level (i.e. policy, plan or programme) and on the nature of the particular planning or policy formulation. That is, since SEA *must be flexible* and shaped according to the particular requirements of the context, set Terms of Reference are difficult to prescribe. The SEA process and Terms of Reference should, however, always respond to the steps shown in Figure D-1.

As with all impact assessments, the risk of irreversible change to ecosystem services that underpin human wellbeing, tied to uncertainty, and the penalties for getting predictions wrong, are pivotal to the questions asked in SEA. Typical questions and associated information needs are given in Box D-1; these questions relate to the criteria and desired outcomes for impact assessment and decision making given in Box C-1.

Box D-1: Key questions to be answered in the SEA process (source: adapted from Brownlie et.al. 2006)

- Is the proposed activity consistent with existing protocols, policies, plans and/or programmes?
- Will the proposed activity compromise the Environmental Quality Objectives defined in the WIO SAP?
- What are the reasonable alternatives that could meet the stated need for, purpose and desired outcomes of the policy or planning process?
- What are the probable environmental impacts – direct, indirect, cumulative and transboundary - of the different alternatives?

- What are the probable effects on ecosystem services (in the context of human wellbeing, livelihoods, and the resilience of society in general and vulnerable communities in particular) of the different alternatives?
- What are the probable effects of the different alternatives on social justice and equity, with regard to the use of the environment?
- What mitigation measures are recommended for potentially significant negative effects associated with each alternative, and how feasible and effective are they likely to be?
- What is the capacity of the competent government institutions to monitor and enforce compliance with the various provisions of international conventions (e.g. the Nairobi Convention), national laws, regulations, standards and/or conditions that might be stipulated?
- What levels of uncertainty and risk of significant impacts are associated with different alternatives?
- What are the opportunity costs associated with different alternatives?
- What potential opportunities are there for different alternatives to act as a catalyst for sustainable development, through direct, indirect, induced and/or cumulative effects in the short- to long-term?
- Which of the alternatives best meets the criteria and desired outcomes of sustainable development given in Box C-1 and as defined in the WIO SAP?
- What are the recommendations for monitoring and the use of indicators during implementation, and do the responsible parties have sufficient capacity to carry out that monitoring?
- Is sufficient provision made for 'feedback loops' after implementation, to allow for corrective action or appropriate changes?
- What, if any, recommendations are there for additional surveys or studies, as appropriate, to inform optimum implementation? Do the responsible authorities/agencies have sufficient capacity to finance or undertake these surveys or studies?
- What is the 'framework' within which subsequent EIAs should be undertaken that fall within the ambit of the SEA? Guidance should be given on the triggers for EIA, parameters for optimising potential benefits and avoiding or minimizing risks and potentially significant negative impacts, where appropriate, and significance thresholds or limits of acceptable change.

D.6 What to look for when reviewing SEA

Review should seek to ensure that the SEA provides appropriate information to inform and guide the formulation of policy, plans and programmes towards the outcomes given in Box C-1 and the Environmental Quality Objectives as defined in the WIO Strategic Action Programme.

D.7 Decision-making criteria

The SEA process provides greater opportunity and flexibility with regard to working towards the best outcomes for sustainable development than project-level EIA, through its ‘sustainability’ driven approach.

The criteria for measuring the effectiveness of SEA and taking decisions based on SEA are the same for both EIA and SEA (Box C-1). However, SEA integrated with the planning process accommodates an iterative approach to assessment, evaluation and consideration of alternatives throughout that process, rather than being geared to one fixed decision point at the end of the process, like EIAs.

Part E: Steering the environmental impact assessment process

It is important when steering EIAs to understand where the various components of EIA could slot into general project planning. In most countries, economists, engineers and project managers use different terms than those used by environmentalists doing EIAs. However, figure E-1 shows that there are logical connections between the EIA process and project planning. Figure E-2 shows the decision points in a typical EIA.

Figure E1: Linkages between the EIA process and a typical project life cycle (source: Brownlie et.al. 2006)

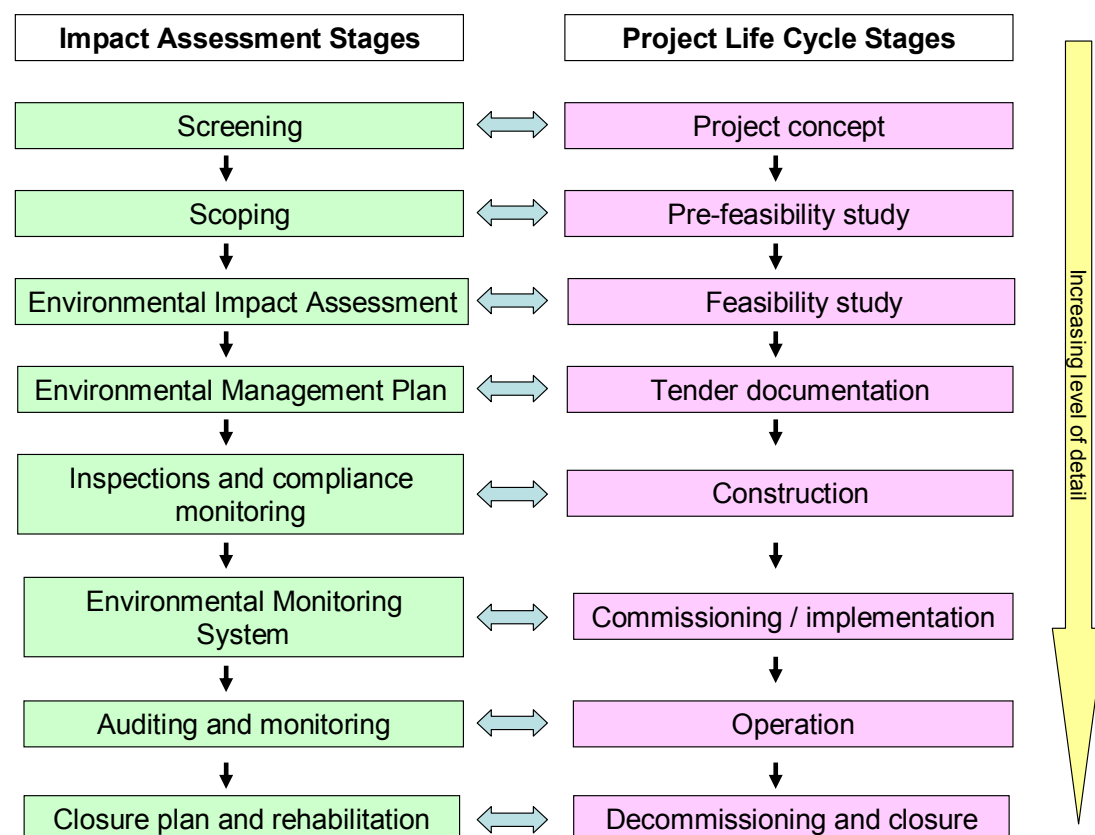
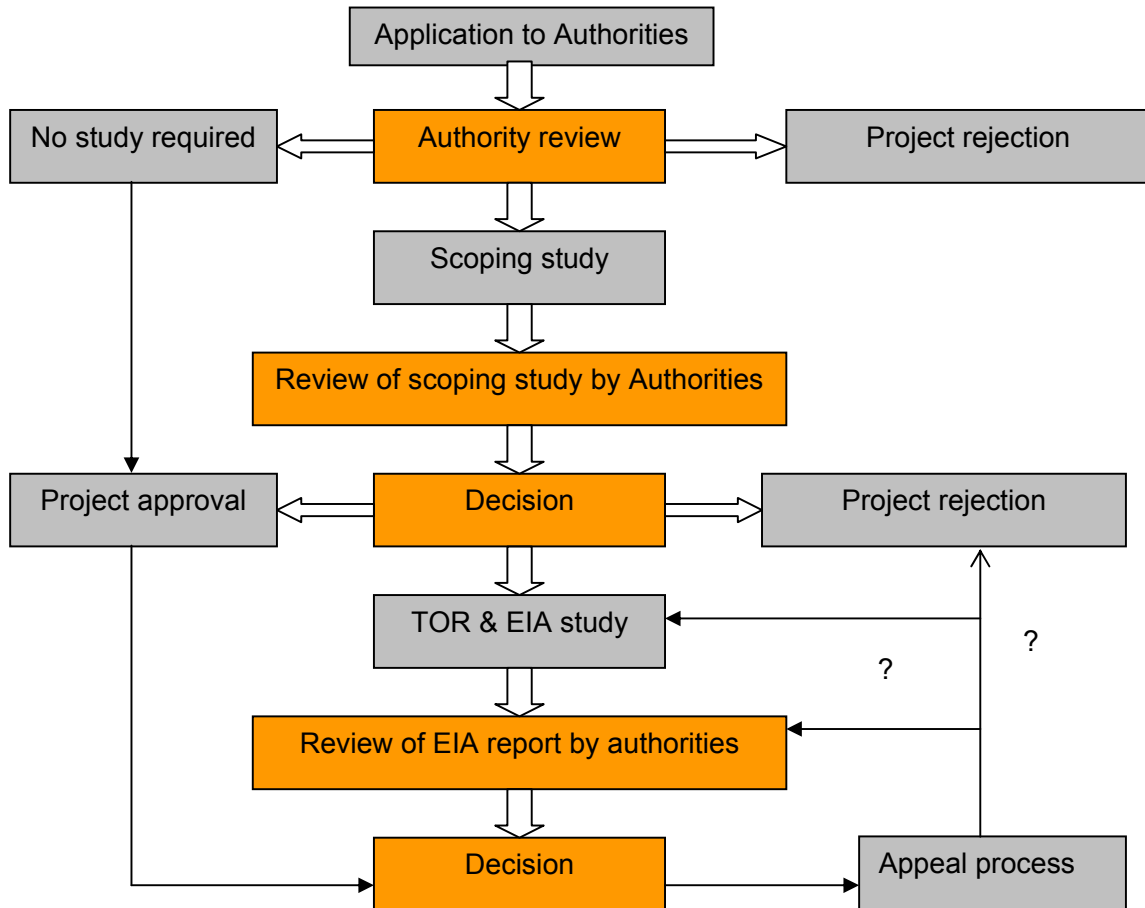


Figure E-2: Decision points in the EIA process (source: adapted from Brownlie et.al. 2006)



Note: some WIO region countries may have more or fewer decision making points in the process

E.1 Guidance on applications and screening

Screening is used to determine which proposals should be subject to EIA, to exclude those unlikely to have harmful environmental impacts and to indicate the level of assessment required (Box E-1).

Most WIO countries have lists of activities which require different levels of assessment, e.g. just an initial assessment/scoping study or a full EIA. Some of the countries also have lists of sensitive environments which would trigger an EIA. Since the TDA has identified the most vulnerable habitats in the WIO region, the countries might consider agreeing that this list will form the basis for a screening process, at least in respect of coastal and marine environments. Figure E-3 illustrates how decisions can be made on whether a project needs an EIA or not.

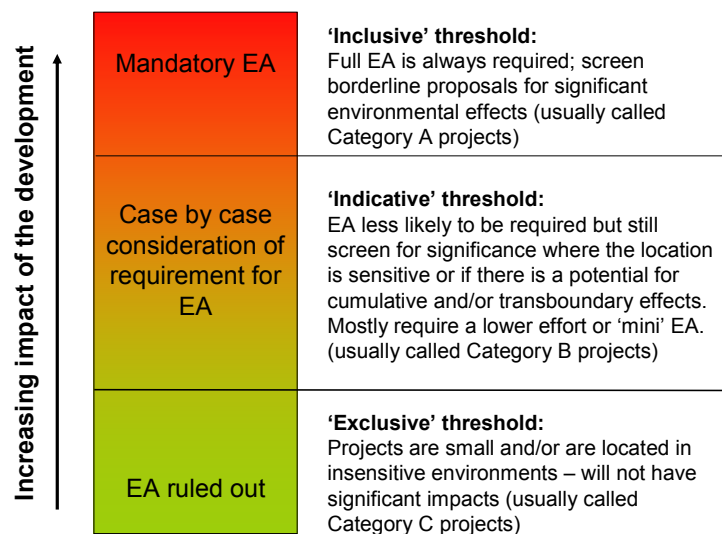


Figure E-3: Framework for deciding on whether an EIA is required or not (source: adapted from UNEP 2002c)

If in doubt, the decision maker should request a full EIA if any of the sensitive environments listed in Box E-1 are likely to be affected directly or indirectly by an activity.

Box E-1: Typical conditions or proposed activities that would require an EIA (source: adapted from Brownlie et.al. 2006)

Decision makers should ask for scoping to be undertaken and, after scoping, a full EIA if appropriate, where the proposed activity would affect one or more of the following:

- A protected area.
- A threatened ecosystem located outside a protected area.
- Areas identified as being important for key ecological and evolutionary processes, including areas with a high level of endemism (such as regional or local ecological corridors, important habitat for threatened, protected or commercially valuable species, highly dynamic or unstable systems, or the need to maintain key processes which 'drive' ecosystems). The TDA/SAP has identified **freshwater systems, mangroves, coral reefs, seagrass beds and fisheries production areas** as being priorities for protection in the context of the coastal and marine environment.
- Habitat for threatened, protected or local endemic species.
- Habitats that provide important ecosystem services (e.g. reserves of harvestable goods, wetlands or reefs which regulate water supply and protect or buffer coasts, mangroves, natural or living landscapes or species having heritage or other cultural value, and unique opportunities offered by biodiversity to enhance development (e.g. ecotourism). etc).
- Areas traditionally used by local communities for natural goods or services.
- Downstream ecosystems (e.g. river mouth).
- The integrity of ecosystems (typical examplaes being the introduction or removal of species, harvest or extraction of indigenous species, pollution of air or water or soils).



Photos: Amongst others, ecologically sensitive areas include indigenous forests, wildlife refuges, wetlands and biodiversity-rich coastlines. © P.Tarr.

If a proposed activity is inconsistent with international or national conventions, policies or laws, the decision maker should advise the proponent not to pursue their proposal in its current form, together with the reasons why. It is important that the developer should NOT be given the option of proceeding at their own risk, because as the level of the developer's investment increases, so does the pressure on the authority to approve the project.

E.2 Guidance on scoping

Scoping is the process of determining the spatial and temporal boundaries and key issues to be addressed in an impact assessment. The main objectives of the scoping phase are:

- To focus the impact assessment on a manageable number of important questions on which decision-making is expected to focus;
- To ensure that only key issues and reasonable alternatives are examined;
- To inform the interested and affected parties and other key stakeholders about the project and to obtain their input;
- To identify key gaps in the availability of data and information;
- To identify fatal flaws in the proposed project;
- To provide input to the project pre-feasibility study to assist the project proponent in his decision making; and
- To determine the appropriate methodology for the EIA if one is required.

The outcome of the scoping process is a Scoping Report which should include issues raised during the scoping process, appropriate responses, an evaluation of alternatives, the identification of fatal flaws and, if project planning continues, terms of reference for further specialist studies and the EIA.

In some eastern and southern African countries, the authorities actively guide the scoping process by setting the terms of reference. In other countries, the scoping study cannot proceed until the proposed scope of work has been approved first by the authorities. Box E-

2 contains a list of items that should be included in a proposed scoping process and are addressed in any scoping documentation.

Box E-2: Ask for, or check the following in a scoping proposal and report (source: adapted from Brownlie et.al. 2006)

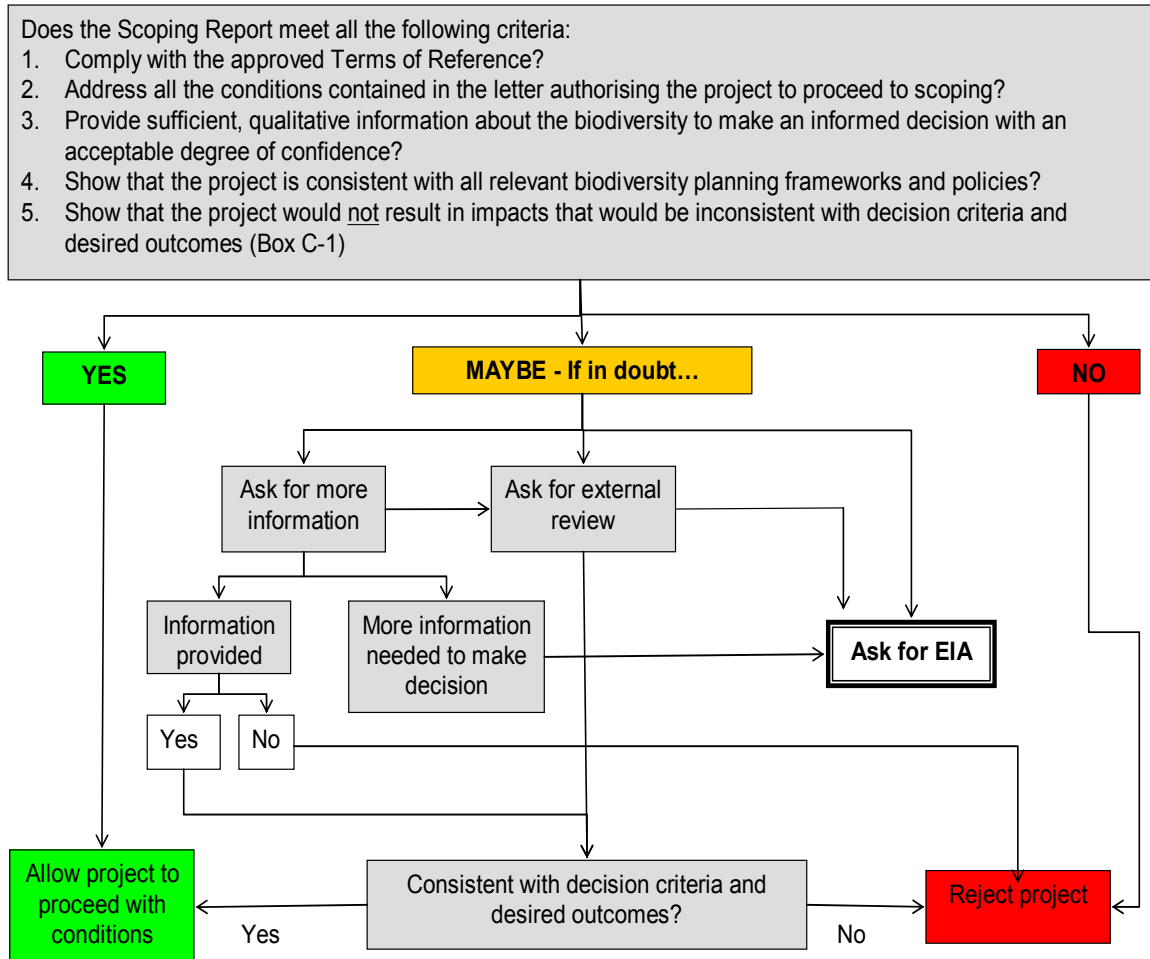
- Need and motivation for the project;
- Preliminary identification of constraints and key negative issues and how they may be avoided/mitigated through project design, siting or routing alternatives. Especially ask whether transboundary impacts are likely;
- Preliminary identification of any potential opportunities to contribute to meeting the Environmental Quality Objectives as set out in the SAP.
- Consistence/compliance with laws, policies, other thresholds;
- Preliminary identification of likely effects of the proposed project and its alternatives on the environment and ecosystem services, including transboundary impacts; and
- Preliminary identification of opportunity costs associated with any impacts on the environment or ecosystem services. Especially important is impacts on downstream livelihoods or natural resource based industries;

When a scoping report is received by the relevant authorities a range of factors must be considered, including the biophysical, social, economic and cultural impacts of the proposed project. Figure E-4 provides a framework for making decisions based on a Scoping Report. Reference should be made to Box C-1 in Part C for guidance on criteria and desired outcomes of decision making.



Photo's: During a scoping exercise, expert advice and basic research (left) and public opinion and knowledge (right) must be sought so that the EIA study is focussed and relevant. © P.Tarr and B.Jones

Figure E-4: Decision making framework for assessing a Scoping Report (source: adapted from Brownlie et.al. 2006)



E.3 Guidance on Environmental Impact Assessments

The EIA is the detailed study of the significant issues raised during the scoping phase. The main objectives of the EIA report are:

- To provide the decision maker with sufficient, quality information to enable him/her to make an informed decision;
- To ensure that the key issues and concerns raised by the interested and affected parties, both within the country and transboundary, have been properly and meaningfully addressed;
- To continue providing information about the project to the interested and affected parties and other key stakeholders and to obtain their comments on alternatives and proposed mitigation; and

- To provide input to the project feasibility study to assist the project proponent in his/her decision making.

The outcome of the EIA phase is an EIA Report or Statement, which should include issues raised during the entire impact assessment process, demonstrated responses, a detailed project description, a detailed evaluation of project alternatives, specialist studies, an integrated synthesis of the specialist reports and a clear and concise summary of the impacts of the project on the receiving environment. The EIA reports also provide suggested mitigation measures, and impacts are rated on the basis of their significance before and after the recommended mitigation is applied. It is important that the environmental authority should consult with other relevant government departments and line ministries and with stakeholders in countries likely to be impacted - throughout the EIA process in order to determine/specify the scope of the EIA with particular reference to:

- Appropriate boundaries for the study (time and geographic area);
- Reasonable alternatives;
- A positive planning approach (opportunities and constraints);
- Relevant planning frameworks (protocols, laws, policies, standards, targets, strategic development frameworks, zoning plans, etc); and
- Key stakeholders to involve in the process.

In some WIO countries, the authorities actively guide the EIA by setting the terms of reference. In other countries, the EIA study cannot proceed until the proposed scope of work has been approved first by the authorities. Box E-3 contains a list of the minimum requirements that should be checked in any proposed EIA process, and be explicitly addressed in the EIA documentation.

Photo: EIA is not a paper exercise that delivers volumes of thick reports that 'gather dust' in government offices. Instead, EIA must be outcomes oriented processes that results in improved project design and implementation, and fewer negative impacts on the environment. © P.Tarr.

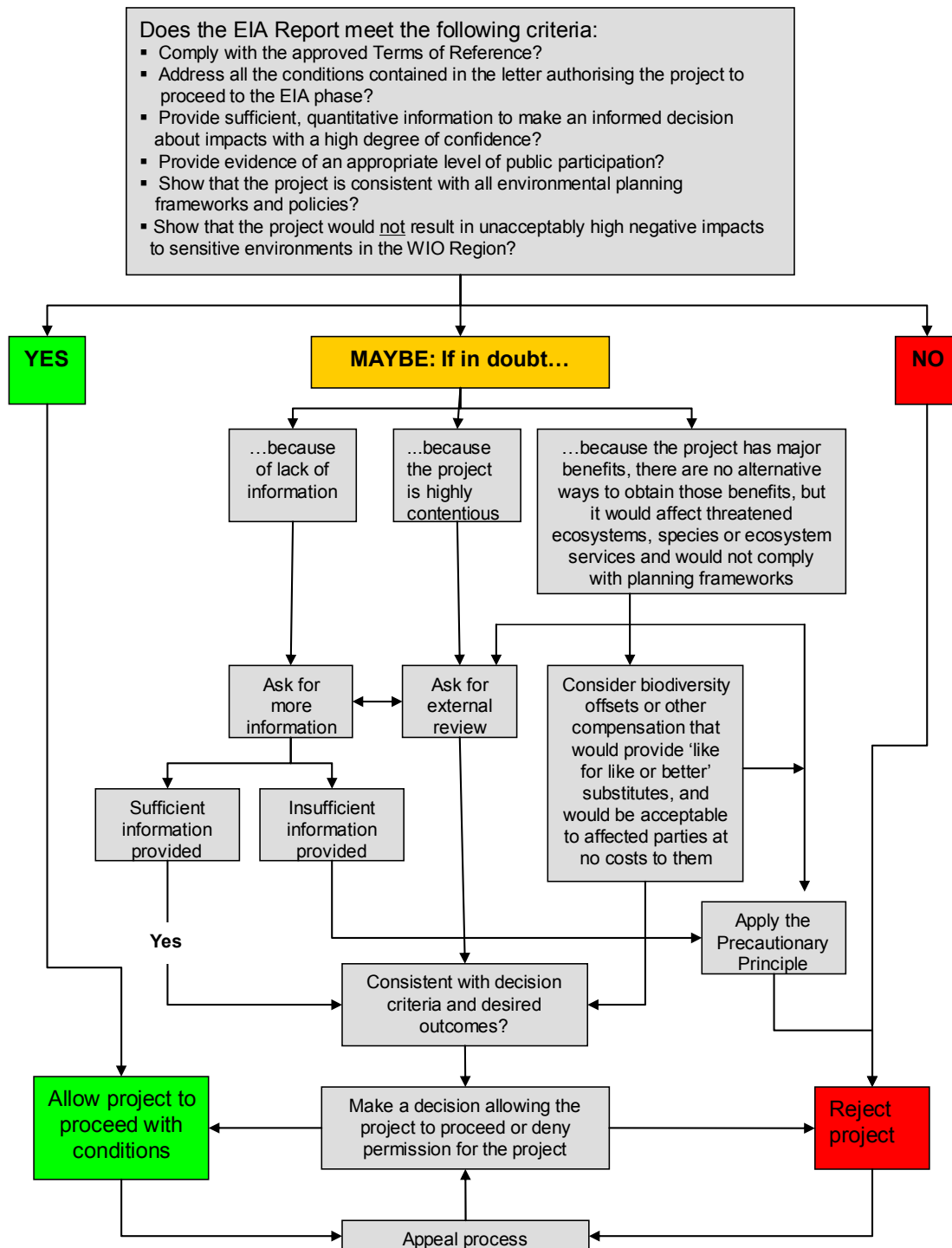


Box E-3: Checklist for an EIA report (source: adapted from Brownlie et.al. 2006)

- Consistence/compliance with laws, policies, other thresholds;
- Assessment and evaluation of the impacts of the project and its alternatives on the environment and ecosystem services, especially transboundary impacts;
- Determination of the costs of compensating for impacts;
- Quantification of the opportunity costs associated with impacts;
- Statement of confidence in findings;
- Explicit statements regarding gaps in information, uncertainties, risks;
- Probability of significant indirect and/or cumulative effects;
- Clear statement of likely irreversible or irreplaceable impacts – take into account the most threatened components of the environment as identified in the WIO TDA, namely freshwater resources, mangroves, coral reefs, seagrass and fisheries production areas;
- Assessment and evaluation of effects on human livelihoods, access to and/or dependence on ecosystem services, and changes in resilience, health or vulnerability of affected communities. These effects may need to be addressed by specialists across disciplines (e.g. biodiversity, social, economic, health etc.) and the various findings must be integrated with each other and synthesized in the main EIA report.
- Clear statement of any advantages for, or benefits to, the environment and ecosystem services;
- Significance of impacts relative to thresholds, before and after planned, **realistic** mitigation. Bear in mind the targets set in the WIO SAP;
- Feasibility and effectiveness of, and commitment to any mitigation measures (these should be specified in the EMP. However, in some countries, the EMP is only drafted after the EIA report has been completed).

Figure E-5 provides a framework for analysis of the EIA report, with section G providing a template for reviewing an EIA report.

Figure E-5: Decision making framework for EIA Report (source: adapted from Brownlie et.al. 2006)



E.4 Projects likely to require an EIA

Power generation

- Thermal power stations and other combustion installations with a heat output of 50 megawatts or more and nuclear power stations and other nuclear reactors.
- Hydro scheme with an installed capacity of 10mw or more.

Agriculture, aquaculture and forestry

- Deforestation of areas greater than 100 hectares.
- Irrigation schemes greater than 100 hectares
- The ploughing or cultivation of land in excess of 100 hectares which has not at any time during the preceding ten years been cultivated.
- The breeding, cultivation or farming of marine or freshwater living resources or aquatic animals or aquatic plants.
- The introduction of any species of alien invasive plant, exotic or non-endemic animal, exotic or non-endemic pathogens or living modified organism into coastal public property or into a place from which it is likely to invade coastal public property.

Transport

- Harbour or trading port which permits the passage of vessels of over 500 metric tonnes.

Mining

- Major mining, on-site extraction and processing of metal ores or coal.
- Hydrocarbon exploration and/or production.
- The removal of any sand, stones, minerals or other natural material –
 - for commercial purposes;
 - in such quantities that the material would have a commercial value; or
 - in a manner that may have an adverse effect on any aspect of the marine or coastal environment.

Manufacturing

- Crude oil refineries and/or installations for the gasification and liquefaction of 50 metric tonnes or more of coal or bituminous shale per day.
- Installations for the production or enrichment of nuclear fuels, for the reprocessing of irradiated nuclear fuels or for the storage, disposal and processing of radioactive waste.
- Major installations for the initial smelting of cast-iron and steel and for the production of non-ferrous metals.
- Installations for the extraction of asbestos and for the processing and transformation of asbestos and products containing asbestos: for asbestos-cement products, with an annual production of more than 5,000 metric tonnes of finished product; for friction

material, with an annual production of more than 10 metric tonnes of finished product; and for other asbestos utilization of more than 50 metric tonnes per year.

- Integrated chemical installations.
- Large-diameter oil and gas pipelines.
- Pulp and paper manufacturing of 50 air-dried metric tonnes or more per day.
- Major storage facilities for petroleum, petrochemical and chemical products.

Urban and land development

- The draining or reclaiming of any wetland.
- The establishment of a settlement designed to accommodate more than 1000 people or any significant urban expansion project
- The disturbance of any coastal public property in a manner that has or is likely to have an adverse effect on the coastal environment, including any excavations, dredging, draining, drilling or tunnelling.

Waste management

- Waste-disposal installations for the incineration, chemical treatment or landfill of toxic and dangerous wastes.
- The disposal of solid waste, rubble, unprocessed sewage or any other effluent likely to cause an adverse effect on the coastal and marine environment.

Water management

- The construction of any large dam or reservoir
- Bulkwater abstraction from a river.
- Groundwater abstraction for commercial purposes.
- The abstraction of water from coastal waters for agricultural, commercial or industrial purposes, including for aquaculture and desalination, or in a manner that is likely to have an adverse effect.



Photo's: Common sense is required to decide on whether Impact Assessment is needed or not in development planning. For example, a small traditional fish market (left) will not need an EIA, though its owner will need to abide by some rules. Depending on its locality, a small lodge (middle) might only require a 'mini EIA', but a hydro-scheme (right) will definitely need a full EIA. © P.Tarr

Tourism

- Any lodge, hotel or resort with a capacity of more than 80 beds
- Irrespective of its capacity, any lodge, hotel or resort located at or near a wetland, beach, mangrove forest, coral reef or ecologically sensitive area.

E.5 Guidance on Environmental Management Plans

While it is important to identify environmental issues (scoping), and then to analyse and quantify them in detail (EIA), this effort is of little value unless the management and mitigation measures are implemented on the ground through a well-formulated Environmental Management Plan (EMP). An EMP can follow a decision based on scoping or after a full EIA.

The aims and objectives of the EMP are:

- To provide a detailed action plan for the implementation of the recommendations made in the impact assessment report;
- To provide goals and targets for environmental control that are measurable and auditable;
- To provide a basis on which the prospective contractor can accurately price for environmental management in his/her tender document;
- To specify particular roles, responsibilities and time scales;
- To provide a basis for monitoring compliance; and
- To provide a site management tool.

A meaningful EMP cannot be developed until the design and layout of the project have been defined. The specified actions within the EMP must relate to definite project activities and not concepts or vaguely stated alternatives. In other words, both the impact assessment and project stages must be aligned at the same level of detail (Figure E-1).

It is essential to include the signed off and approved EMP in the invitations to tender for construction, otherwise it is both difficult and expensive to get the contractor to implement any of the required environmental management measures retrospectively.

The EMP is perhaps the least developed aspect of the impact assessment process in WIO countries, which may explain why it is also the activity which usually falls far short of its desired aims and objectives. The EMP should also adopt a holistic approach to environmental management and should cover all components of the environment: biophysical, social, cultural and economic.

Box E-4 contains a list of things that you be specifically ask requested, or checked for in an EMP.

Box E-4: Checklist for an EMP (source: adapted from Brownlie et.al. 2006)

General

- Preamble setting out:
 - The structure of the document
 - Useful contacts
 - A summary of applicable legislation and permits
 - Table showing applicable quality standards, guidelines and limits of acceptable change (refer to the WIO SAP)
 - Glossary of terms
 - List of abbreviations
 - Background information on the project and affected environment
- Relevant environmental policy of the proponent and contractor
- Specification of roles and responsibilities
- Reporting structure (organogram) and frequency
- A statement as to whether the EMP forms part of a larger management system, e.g. ISO 14001

Layout

For each impact identified in the impact assessment report, the EMP must provide the following:

- A management objective
- The management action to achieve the objective
- The target, standard, guideline to be achieved (refer to WIO SAP)
- The person (or organisation) responsible for carrying out the action
- The frequency of the action (if repeated) or the date for completion of the action.
- The budget required for carrying out the action.

Separate sections must be devoted to each of the five stages of project execution:

- Construction
- Commissioning
- Operations
- Decommissioning
- Closure

Within each major project phase, the EMP actions should be grouped by administrative area e.g. workshops, concrete batch plant, camp, etc., or specific, clearly-defined sub-activities, so that the person (or organisation) responsible for that area knows exactly what must be done with regards to environmental management and can be held directly responsible for any non-compliance.

Action should NOT be grouped by environmental component e.g. water, air, waste etc because then each area manager has to look through pages of the EMP to try and find out where their actions are. This makes the document less than useful. It also becomes impossible to audit when the actions relating to one workshop are scattered throughout the document.

Content

The EMP should include:

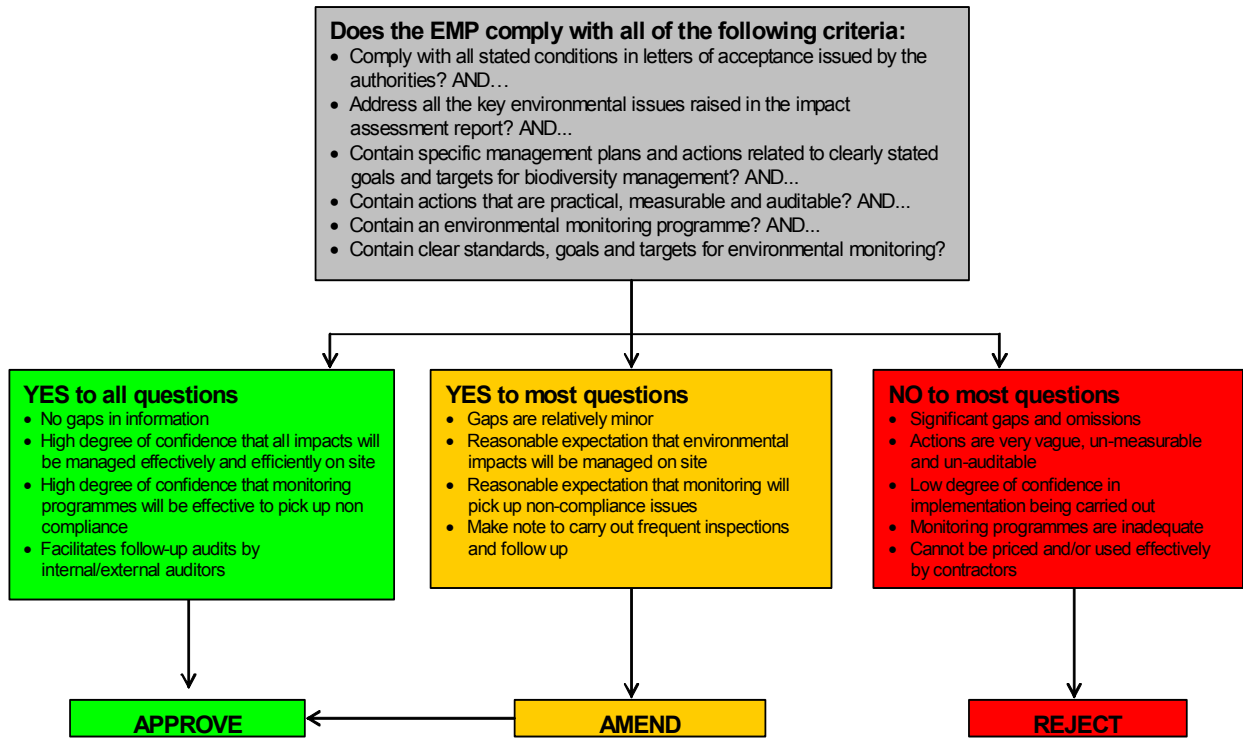
- Code of conduct, induction and environmental awareness training programmes
- Specified EMP compliance auditing programme, including checklists
- Specified programme for EMP review and update
- Document distribution and control methodology
- Schedule of incentives and penalties that will be applied
- Procedures to be followed for corrective actions, complaints and environmental incidents
- Specific plans to control a range of environmental issues by area of activity (see Box E-5 for checklists)
- Resettlement plan (if required)
- Compensation plan (if required)
- HIV/AIDS awareness and prevention plan
- Health and safety awareness programme for the local community
- Emergency procedures for a range of identified risks
- Public communication and disclosure plan

Monitoring Programme

For each element to be monitored e.g. water quality, the EMP should specify:

- *What has to be monitored e.g. pH, SO₄, NO₃, PO₄, Fe, Mn, EC and suspended solids*
- *Where the monitoring stations should be e.g. provide map and precise coordinates of all sampling points*
- *Who is responsible for monitoring e.g. Environmental Control Officer or external consultancy. Be sure to include the need for transboundary monitoring*
- *Monitoring frequency e.g. monthly*
- *The EMP should provide monitoring/sampling protocols, chains of custody and the accredited laboratories that will be used for specific analyses.*
- *The EMP should include an outline of the monitoring report formats to be used.*

Figure E-6: Decision making framework for EMPs (source: adapted from Brownlie et.al. 2006)



When an EMP is received, consideration is needed as to whether the measures and plans specified will actually eliminate, minimise or control the impacts identified in the impact assessment. A framework for making decisions about environmental issues in EMPs is provided in Figure E-6.



Photo: An Impact Assessment must be operationalised through an EMP, and both the developer and the authorities must be committed to monitoring its implementation and to taking corrective action when necessary. © P.Tarr

E.6 Guidance on writing Letters of Authorisation or RoDs and conditions

Letters of authorisation or Records of Decision usually have three major objectives:

1. To authorise formally in writing that a development may proceed.
2. To set out the reasons for the decision in writing.
3. To set out the terms and conditions under which the development is authorised.

In order to avoid any confusion, the letter of authorisation must specify clearly:

- The name and contact details of the applicant;
- A precise description of the activity that is being authorised, preferably with the aid of a large-scale map. This is particularly important for multiple-phase developments, so that future phases cannot be ‘included’ under the current decision;
- The location and coordinates of the proposed activity;
- The criteria used in making the decision. This could include public comments, international obligations (e.g. the Nairobi Convention), legal instruments, regulations, policy objectives, spatial planning frameworks and any other biodiversity planning documents, lists, maps, etc.;
- The reasons for arriving at the decision;
- The dates for which the authorisation is valid;
- The lines of communication that must be followed including *inter alia*, the submission of reports;
- The transfer of rights and obligations if there is a change of ownership of the project or property; and
- Specific conditions to protect the environment (see Box E-5).

Box E-5: Guidelines for writing conditions (source: adapted from Brownlie et.al. 2006)

The conditions must be:

- **Clearly and explicitly stated**, indicating what is required, who is responsible, when it should happen, where it applies, why it is required and how it must be carried out (if known). It is not acceptable to state ‘initiate an investigation into...’ when what is meant is to ‘implement the findings’ of such investigation.
- **Consistent** with each other and not conflicting;
- **Practical**. It is not acceptable to state for example that “no work shall be done in the rainy season”. Rather, it is better to give explicit instructions to deal with the issues around working in the rainy season such as: “construct stormwater cut-off trenches to accommodate the 1:100 year flood”, or “provide catch dams to contain runoff and settle out the sediment load”;

- **Measurable.** Statements such as “keep disturbance to a minimum” are not adequate. This is a commonly encountered condition. It cannot be measured because there is no quantifiable target. Rather say: “demarcate the construction zone as per plan and do not allow any disturbance of the environment beyond this zone”. Any disturbance outside the demarcated area can then be measured and reported on.
- **Auditable.** Stating for example “there may be no erosion” is not acceptable. With the best will in the world, erosion will happen and as a result the auditor will always find this a non-compliant issue. Rather set quantitative targets e.g. “erosion channels with a mean depth of 20cm shall not cover more than 10% of [specified] area”. Or use a more outcomes-based approach and state that “suspended sediment at the sampling site immediately downstream of the site will not exceed 20mg/l”.
- **Based on specific targets and goals.** The targets and goals must be consistent with published national standards e.g. water quality or air quality standards, or must comply with targets set by the authorities or must be consistent with stated goals in the EIA, e.g. x% of the area will be set aside for conservation.

E.7 Checking implementation and compliance with Letters of Authorisation

This section examines the role of the authorities in compliance monitoring. The main aims of compliance monitoring are to:

- Evaluate the adherence by the contractors and developer to the conditions attached to the letter of authorisation;
- To check compliance with the Environmental Management Plan (EMP) and any other legal requirements referred to in the letter of authorisation;
- To assess the contractor’s and applicant’s effectiveness in implementing the conditions of authorisation and the EMP; and
- To recommend how and where improvements could be made to ensure compliance, enhance environmental performance and promote sustainability of the development.

Most WIO countries make provision for post-EIA audits or inspections by the authorities. In some countries, post-EIA auditing or inspection can result in criminal prosecutions being made for non-compliance.

Four different aspects of auditing are addressed below, namely: composition of the audit team, the audit process, the audit report, and the frequency of audits or inspections.

Audit team

The audit team should comprise a lead auditor with additional auditors commensurate with the size of the operation being audited. A small tourism lodge construction site could be done by one person, whereas a large aluminium smelter site may need a team

of 3-4 auditors. The lead auditor should preferably be certified as an environmental auditor, but at the very least should have at least 5 years of applicable experience in environmental management relating to the subject being audited.

The auditors' names should be clearly stated on the audit report.

Audit process

It is good practice to develop an audit outline prior to the audit, using specific questions regarding compliance which can be answered with a judgment rating, such as "compliant", "partially compliant", "not compliant", "not applicable". The audit may just be of the conditions contained in the letter of authorisation or the latter may make specific reference to compliance with an approved EMP. The audit therefore needs to be directed at exactly what is to be audited. The audit outline should be in the form of a table with headings provided in Box E-7:

Box E-7: Suggested layout of an audit protocol (source: adapted from Brownlie et.al. 2006)

- **Item reference number** (cross-reference to the conditions contained in the letter of authorisation and/or EMP).
- **Environmental conditions as listed in the letter of authorisation, and/or the EMP requirement**, presented as an auditable statement or question e.g. "Are drip trays being used where necessary in the [name] workshop?"
- **Audit judgment** e.g. "Partial compliance".
- **Audit finding** e.g. "Drip trays are present under all drum outlets, but from direct inspection of the ground (ref photo) and work practices observed by (name of) Person during the audit, it would appear that drip trays are not being used during vehicle servicing. This finding is corroborated by the presence of [BTEX, light petroleum products etc] in the last [number] groundwater monitoring results in Borehole X."
- **Corrective action required** e.g. "While the concentrations of [state determinants] are not yet over the stated standards, the trend is rising and corrective measures need to be taken as a matter of priority. These include: training of personnel in the workshop; excavation and removal of contaminated soil to [state place]; purchase of additional drip trays; etc."
- **Priority ranking** (very high, high, medium, low) e.g. High.
- **Responsible person** e.g. Safety Health and Environment Manager; Workshop Foreman, Contractor.
- **Date for completion** e.g. within one month from [date].

The audit should commence with an opening meeting with the developer and/or contractors to outline the audit programme and to establish the audit scope (geographical, legal and administrative). The audit team should then commence the audit covering work areas, documentation, roles and responsibilities. The principal audit methods include:

- Observation;
- Document checks;
- Interviews;
- Photographs (but not digital photo's that have been manipulated);
- Verification and cross-checking; and
- Measurement and sampling, if serious doubts arise.

The audit should end with a close-out meeting with site management to present the key findings and to highlight any serious liabilities which may need urgent attention.

The audit protocol should be arranged by work area, so that the foreman and/or Safety, Health and Environment (SHE) Officer in each area can be held directly responsible for the findings, e.g. each contractor's work area, workshops, waste disposal site, etc.

Each finding should be substantiated with:

- An actual result or reading, and/or
- Monitoring trends, and/or
- Attributed statements, and/or
- Direct observation by the auditor, and/or
- Photographs, and/or
- Documentary evidence (receipts, agreements, permits etc).

In some cases it may be necessary to take spot samples, (e.g. pH readings) to verify data provided, if there is some doubt as to the authenticity of the data, or to take measurements on the ground or on plans, e.g. to verify areas that have been rehabilitated.

Audit report

The final audit report should be submitted no more than 2 weeks after the audit has been completed. The report should clearly explain:

- the composition of the audit team;



Photo: Checking on compliance with the Letter of Conditions and/or the EMP is essential. This task is often overlooked by African governments. © P.Tarr.

- the scope of the audit;
- any constraints or limitations placed on the auditors;
- the aims of the audit;
- the methods used;
- a list of persons interviewed; and
- a list of all the work areas visited.

The completed checklists (framework) should form the body of the audit report and a quantitative analysis of the findings must be provided. If the same procedure is followed for each audit, it is then possible to monitor progress towards full compliance. The report should conclude with a clear set of recommendations for corrective action, ranked according to priority. Each action should have a responsible person assigned to it and a date by which it should be started/completed.

Audit frequency

This will be determined by the nature of the development, the length of the construction programme, its location, the degree of confidence that can be placed in the implementation of the EMP being carried out and the degree of compliance. Sites with good environmental management may not need to be audited as frequently as those with a more suspect track record.

Part F: Sector guidelines (source: adapted from Brownlie et.al. 2006)

In this part you will find guidance on the key activities and impacts associated with various sectors. The sectors have been selected on the basis of the types of projects that will likely cause impacts on the coastal and marine environments in the WIO Region. The sectors covered in this Part include:

- Mining and quarrying (opencast, open pit and underground);
- Hydropower (dams, run-of-river, pumped storage);
- Thermal power generation (oil, coal, gas and biogas-fired power stations);
- Offshore oil and gas developments;
- Roads and bridges;
- Agriculture and forestry (irrigation, dry land arable, grazing, animal production, plantations, orchards, vineyards etc);
- Water resources development (dams, reservoirs, pipelines, canals, inter-basin transfers);
- Water-based infrastructure and related activities (ports, harbours, marinas, jetties, shipping, water-based recreation);

- Peri-urban and urban fringe developments (housing, golf courses, water treatment works, landfills, commercial developments etc); and
- Ecotourism (lodges, trails, safaris, fly fishing, canoeing, rafting, game viewing, bird watching, camping, conservation areas, diving, snorkelling etc).

For each sector there is a list of typical activities which are commonly associated with each stage in the project life cycle:

- Planning/design/exploration
- Construction
- Operations
- Decommissioning and closure

The listed activities are merely indicative and most projects will either have additional or fewer activities depending on the circumstances.

Associated with each list of project activities, there is a list of the main impacts which may occur on the **natural environment** if no mitigation is applied. Given the focus of these guidelines, social, health and economic impacts have NOT been included in this synopsis. Again, these lists of potential impacts are indicative and not exhaustive. The impacts have not been listed in any order of importance because this will differ from project to project. However, the lists should act as a useful checklist for the compilers and reviewers of EIAs in these sectors.

While this Part has focussed on project-level guidance, it should be noted that national policies and trade agreements can have significant direct and indirect impacts on the environment, particularly those policies and trade agreements relating to: agriculture, energy, water, forestry, land tenure and resettlement. Large scale land use changes resulting from radical shifts in policy can have widespread impacts on the ability of ecosystems to provide 'free' goods and services in a sustainable manner. It is therefore imperative that policies and trade agreements should be subjected to SEA to ensure that the direct, indirect and cumulative impacts on the natural environment are minimised.

Mining and Quarrying

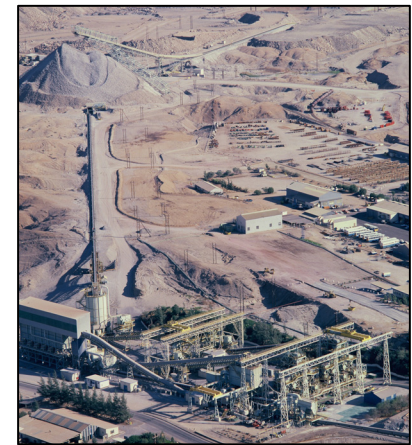
Open cast, open pit and underground

Main Exploration Activities

- Survey and mapping
- Establish cut lines
- Trenching, pitting, drilling and bulk sample collection
- Trial mining
- Pilot plant construction and operation
- Exploration camp
- Servicing vehicles and equipment (fuel and lubricant management)
- Waste disposal

Main Impacts of Exploration on the natural environment

- Temporary disturbance of species at local level
- Temporary local loss of habitat
- Road collisions with wildlife
- Dust smothering of vegetation
- Poaching and firewood collection by workers
- Introduction of alien species
- Sediment runoff
- Opening up remote areas which could result in impacts on the natural environment.



Main Construction Activities*

- Vegetation clearance
- Topsoil stripping
- Overburden removal and blasting
- Access roads and tracks
- Fence construction
- Contractor's camp, yard and workshops
- Waste dump establishment and waste disposal
- Bulk earthworks
- Concrete batch plant
- Building and plant construction
- Installation of temporary and permanent services (water, sewage, power, telecoms, etc)
- Laying of pipes and conveyors

Main Impacts of Construction on the natural environment

- Temporary and permanent loss of habitat
- Road collisions with animals, birds
- Dust smothering of vegetation along access roads
- Sedimentation of streams, rivers and wetlands
- Poaching and firewood collection by workforce and itinerant job seekers
- Habitat fragmentation and loss of ecological corridors
- Local loss of species
- Introduction of alien species e.g. through seeds on vehicles and equipment
- Providing access to remote areas and indirectly putting pressure on ecological

- Stormwater drainage and effluent management
- Labour force
- Construction traffic
- goods and services
- Loss of access to ecological goods and services by local communities with resultant impacts on livelihoods
- Indirect impacts on the natural environment due to resettlement of local communities to other areas

Main Operational Activities*

- Drilling and blasting
- Waste rock dumps
- Ore conveyance (road, conveyor, cableway)
- Processing plant
- Smelter or refinery
- Heap leach, bioreactors
- Acid plant
- Tailings and/or slimes disposal
- Slag and/or process waste dumps
- Water abstraction and use
- Effluent disposal
- Hazardous materials storage and disposal
- Industrial waste disposal
- Traffic
- Workshops, offices, accommodation etc

Main Impacts of Mine Operations on the natural environment

- Direct loss of habitat
- Direct loss of species in the area
- Road collisions with birds and animals
- Direct and indirect loss of habitat through water pollution, dust smothering, acid rain, air pollution, reduction in river flows, soil contamination
- Impact on vegetation due to lowering of water table resulting from groundwater abstraction
- Effects of greenhouse gases on climate change and subsequent effects on the natural environment
- Habitat fragmentation
- Interruption and/or loss of migration corridors and disturbance of source-sink relationships
- Indirect impact on food web functioning through bioaccumulation of metals, loss of diversity, lower species resilience
- Alien species invasion (plants, pests, vermin, water weeds)

Main Decommissioning and Closure Activities

- Presence of open pit
- Rehabilitation of dumps
- Removal of all structures and waste
- Water pollution control measures

Main Impacts of Mine Closure on the natural environment

- Re-colonisation of disturbed areas by fauna and flora
- Creation of new/different habitats
- Potential for invasive species
- Physical traps for wildlife e.g. open pits, shafts, trenches.

**Note: Activities and impacts associated with water supply and roads are addressed in the respective sector guidelines.*

Hydropower

Dams, pumped storage, run of river

Main Planning and Design Activities

- Site selection
- Choice of technology
- Positioning of turbines (above ground, underground, in the dam wall)
- Operational parameters (base load, peaking power)
- Site layout and design options



Main Impacts of Planning and Design on the natural environment

The following impacts on the natural environment need to be taken into consideration during the planning and design stage in order to try to avoid or minimise many of the impacts during later project stages:

- The conservation status of the river
- The presence of important downstream conservation areas
- Fish migration patterns and fisheries
- The importance of riverine vegetation for habitat, erosion control, ecosystem functioning and provision of goods and services
- The flood regime and the importance of wetlands in regulating floods
- Sediment movement
- Water flow characteristics
- Water quality and the importance of wetland loss on downstream water quality
- The impact on the country's ability to meet international obligations with regard to protection of the natural environment

Main Construction Activities*

- Vegetation clearance
- Topsoil stripping
- Blasting
- Quarrying for fill materials
- Water diversion works and coffer dams
- Access roads and tracks
- Fence construction
- Contractor's camp, yard and workshops
- Waste disposal
- Bulk earthworks
- Building and plant construction

Main Impacts of Construction on the natural environment**

- Temporary and permanent loss of habitat
- Road collisions with animals, birds
- Dust smothering of vegetation
- Alteration of sediment dynamics in streams, rivers
- Poaching and firewood collection by workforce and itinerant job seekers
- Habitat fragmentation
- Local loss of species
- Interruption of migration routes, especially fish

- Concrete batch plant
- Installation of temporary and permanent services (water, sewage, power, telecoms)
- Dam filling
- Traffic
- Labour force

- Loss of ecological corridors
- Introduction of aquatic alien species.
- Providing access to remote areas and indirectly putting pressure on ecological goods and services
- Loss of access to ecological goods and services by local communities with resultant impacts on livelihoods
- Indirect impacts on the natural environment due to resettlement of local communities

Main Operational Activities*

- Impoundment of water
- Controlled release of water to suit operational requirements
- Drawdown of water level in impoundments
- Power generation
- Dredging/sluicing and disposal of silt
- Hazardous materials storage and disposal
- Industrial waste disposal
- Workshops
- Employee accommodation

Main Impacts of Hydropower Operations on the natural environment

- Direct loss of habitat and species (direct inundation and loss of flow upstream of tailrace)
- Change in habitat from flowing river to an impoundment
- Indirect loss of downstream habitat and species through perturbation in river flows and flood regime, altered physical and chemical characteristics of water
- Altered patterns of erosion and silt deposition downstream of the installation
- Habitat fragmentation
- Interruption and/or loss of migration corridors especially for fish
- Changes in predator-prey relationships
- Alien species invasion (terrestrial and aquatic weeds)

Main Decommissioning and Closure Activities

- Removal of all structures

Main Impacts of Closure on the natural environment

- Re-colonisation of disturbed areas by fauna and flora
- Creation of new/different habitats
- Potential for invasive species.

**Note: Activities and impacts associated with quarries, water supply and roads are addressed in the respective sector guidelines.*

Thermal power generation

Oil, coal, gas, biogas

Main Planning and Design

Activities

- Site selection
- Secondary effects relating to the sourcing of energy (mines, gas wells, biodiesel plant production, etc.)
- Choice of technology
- Operational parameters (base load, peaking power)
- Site layout and design



Main Impacts of Planning and Design on the natural environment

The following impacts on the natural environment need to be taken into consideration during the planning and design stage in order to try to avoid or minimise many of the impacts during later project stages:

- Proximity to proclaimed and future conservation areas;
- Proximity to, or effect on priority ecosystems identified in the WIO SAP;
- Impact on country's ability to meet international obligations pertaining to environmental protection;
- Fatal flaws relating to permanent loss of species or habitat.



Main Construction Activities*

- Vegetation clearance
- Topsoil stripping
- Access roads and tracks
- Fence construction
- Contractor's camp, yard and workshops
- Waste dump establishment and waste disposal
- Bulk earthworks
- Concrete batch plant
- Building and plant construction
- Installation of temporary and permanent services (water, sewage, power, telecoms, etc)

Main Impacts of Construction on the natural environment

- Temporary and permanent loss of habitat
- Road collisions with animals, birds
- Dust smothering of vegetation along access roads
- Sedimentation of streams, rivers, wetlands
- Poaching and firewood collection by workforce and itinerant job seekers
- Habitat fragmentation
- Local loss of species
- Introduction of alien species through seed transfer from vehicles and equipment

- Laying of pipes and conveyors
- Stormwater drainage and effluent management
- Labour force
- Construction traffic

Main Operational Activities*

- Combustion of raw materials to generate heat
- Turbines and generators
- Cooling units
- Exhaust stacks
- Switchyard
- Compressors and boilers
- Liquid fuel storage tanks
- Cooling water intake and outlet structures
- Water storage facilities
- Waste water treatment plant
- Hazardous materials storage and disposal
- Industrial waste disposal
- Workshops

Main Impacts of Thermal Power Station Operations on the natural environment

- Direct loss of habitat and species in the area
- Road collisions with animals and birds
- Impact of heated effluent discharge to receiving waters on aquatic fauna and flora
- Indirect loss of habitat through water utilisation (for cooling), pollution, dust smothering, acid rain, air pollution (CO₂, SO_x, NO_x), reduction in river flows, soil contamination, effects of greenhouse gas emissions on climate change etc
- Habitat fragmentation
- Interruption and/or loss of migration corridors and source-sink relationships
- Indirect impact on food web functioning through bioaccumulation of metals, loss of diversity, lower species resilience
- Alien species invasion into disturbed, areas

Main Decommissioning and Closure Activities

- Removal of all structures and waste
- Water pollution control measures
- Rehabilitation of all waste dumps

Main Impacts of Power Station Closure on the natural environment

- Re-colonisation of disturbed areas by fauna and flora
- Creation of new/different habitats
- Potential for invasive species

**Note: Activities and impacts associated with mining, oil and gas production, water supply and roads are addressed in the respective sector guidelines.*

Offshore oil and gas

Main Exploration, Planning and Design Activities

- Choice of development solutions (e.g. oil or gas well locations)
- Pipeline route selection
- Seismic surveys

Main Impacts of Exploration, Planning and Design on the natural environment

The following impacts on the natural environment need to be taken into consideration during the exploration, planning and design stage:

- Noise and sound waves from seismic surveys
- Disturbance of marine mammals and seabirds from increased vessel and helicopter activities
- Waste and effluent disposal from exploration vessels
- Disturbance of the seafloor and coral reefs by anchors
- Risks of accidental oil spillage
- Risk of blow-out
- Drilling waste disposal



Main Construction Activities*

- Well drilling and logging from drilling rig or semi-submersible unit
- Well testing and flaring (if necessary)
- Pipeline laying
- Construction of pipeline landfall facilities
- Supply base/port facilities
- Land-based contractor's camp, yard and workshops
- Helicopter operations
- Service vessel activity
- Waste management
- Disposal of produced water

Main Impacts of Construction on the natural environment

- Impacts on benthic fauna from the discharge of drilling mud and drill cuttings
- Impacts on fish and fisheries due to the discharge of produced water, sewage, galley wastes, ship/rig runoff etc**
- Impacts on seabirds and marine life (especially crustaceans) from accidental oil spills
- Disturbance of marine mammals and seabirds due to increased vessel and helicopter activity
- Temporary and locally permanent loss of habitat for near shore and beach organisms during the construction of

- pipeline land fall structures
- Possible introduction of alien species through discharge of ballast water and vessel hulls
- Emission of CO₂, NO_x, SO_x, VOCs from flares, exhaust emissions with indirect impacts on the natural environment as a result of climate change, acid rain and nitrogen fall-out
- Illegal disposal of hazardous and industrial waste at sea resulting in pollution and ingestion by marine fauna leading to chronic and acute effects and mortalities
- Fishing exclusion zones around well development facilities could place pressure on other fishing areas
- Bioaccumulation of heavy metals in seabirds, mammals, fish and crustaceans with impacts on species physiology, food chain functioning and possible toxic health effects in humans

Main Operational Activities (platforms or sub-sea manifolds)

- Presence of a production platform, with:
 - Flare gas and recovery systems
 - Power generation plant
 - Flow lines and return lines
 - Accommodation for platform staff
 - Waste management system
 - Sewage plant
 - Helicopter operations
 - Service and supply vessels
 - Disposal of produced water and other process chemicals
 - CO₂ injection and storage

OR

- Remote operation of sub-sea manifolds, with:
 - Flow lines, umbilicals control lines, gas/oil pipeline, corrosion inhibitor pipelines
 - Pipeline landfall structures
 - Land-based gas conditioning plant
 - Effluent and waste disposal

Main Impacts of Offshore Oil and Gas Production on the natural environment

- Impacts on fish and fisheries due to the discharge of produced water, sewage, galley wastes, ship/platform runoff etc**
- Impacts on seabirds and marine life (especially crustaceans) from accidental oil spills, blow outs
- Disturbance of marine mammals and seabirds due to helicopter activity
- Emission of CO₂, NO_x, SO_x, VOCs from flares, exhaust emissions with indirect impacts on the natural environment as a result of climate change, acid rain and nitrogen fall-out etc
- Illegal disposal of hazardous and industrial waste at sea resulting in pollution and ingestion by marine fauna leading to chronic and acute effects and mortalities
- Fishing exclusion zones around well development facilities and platforms could place pressure on other fishing

areas Bioaccumulation of heavy metals in seabirds, mammals, fish and crustaceans with impacts on species physiology, food chain functioning and possible toxic health effects in humans

Main Decommissioning Activities

- Abandonment/removal of all sub-sea structures
- Removal of platform
- Decommissioning of wells
- Demolition and removal of land-based structures

Main Impacts of Oil and Gas Decommissioning on the natural environment

- Return of species to area
- Return of fishing boats to area
- Improvement in water quality
- Risk of oil and other contamination during rig stripping, well closure and rig removal

**all activities associated with oil and gas field development up to the point of delivery to a refinery, LNG plant or ship or power station.*

*** the main pollutants are: BTEX, naphthalene, poly-aromatic hydrocarbons (PAHs), phenols, aliphatic hydrocarbons, heavy metals, process chemicals e.g. flocculants, corrosion and hydrate inhibitors and organic pollutants, etc.*

Roads and bridges



Main Planning and Design Activities

- Route selection
- Gradient design
- Surface design and geometry
- Bridge site selection

Main Impacts of Planning and Design on the natural environment

The following impacts on the natural environment need to be taken into consideration during the planning and design stage in order to try to avoid or minimise many of the impacts during later project stages:

- Proximity to proclaimed and future conservation areas;
- Impact on sensitive ecosystems, especially areas of high botanical importance, wetlands, rivers, coastal zones, estuaries and any area identified in the country's National Biodiversity Strategy and Action Plan (NBSAP);
- Avoiding habitat fragmentation;
- Minimising the need for cut and fill;
- Minimising the number of river crossings;
- Impact on country's ability to meet international obligations pertaining to environmental protection;
- Fatal flaws relating to permanent loss of species or habitat.

Main Construction Activities*

- Vegetation clearance along the route
- Topsoil removal and storage
- Development of borrow pits and quarries

Main Impacts of Construction on the natural environment

- Temporary and permanent loss of vegetation

- Blasting of cuttings
- Fill operations
- Excess spoil disposal
- Grading, earthmoving, laying of base course and sub-base layers
- Construction of river crossings including river diversion works, earthworks, brick and concrete work, etc
- Installation of culverts and construction of stormwater drains
- Establishment of temporary access roads and tracks
- Site establishment including construction of contractor's camp, yard and workshop areas, fencing, establishment of water supply
- Waste disposal (hazardous and non-hazardous)
- Temporary ablution facilities
- Creosoting yard
- Asphalt plant and application of wearing course
- Diesel tanks and refuelling point
- Concrete batch plant
- Aggregate stockpiles
- Toll plaza construction (if a toll road)
- Labour force
- Dust smothering of vegetation
- Erosion of stream- and river banks
- Alteration of drainage lines and perturbation of wetlands
- Erosion of hillsides during cut and fill activities
- Poaching and firewood collection by construction workforce and itinerant job seekers
- Local and temporary disturbance of species due to the presence of people and vehicles and blasting activities
- Possible introduction of alien species and scavengers
- Contamination of water courses from sediment, bitumen waste, general waste and litter, hydrocarbon spills from vehicles and equipment
- Soil contamination from hydrocarbon spills
- Soil compaction
- Temporary or permanent disruption of ecological corridors and migration routes
- Increase in road kills due to construction traffic

Main Operational Activities

- Occasional maintenance
- Traffic flow
- Secondary developments
- Toll gate operation (if a toll road)

Main Impacts of Roads and Bridges on the natural environment

- Indirect effects on the natural environment and ecosystem services due to increased access to remote areas along new roads and subsequent land use impacts including settlements, agriculture, tourism
- Noise disturbance
- Secondary development along road
- Animal and bird collisions
- Permanent disruption of ecological corridors and migration routes linking different ecosystems or across altitudinal gradients
- Possible introduction of alien invasive species

Main Decommissioning Activities

- Removal of all construction facilities
- Ripping, grading and contouring
- Landscaping, topsoil replacement and rehabilitation

Main Impacts of Road and Bridge Decommissioning on the natural environment

- Re-colonisation of disturbed areas by fauna and flora
- Potential for invasive species

** Activities relating to the development of borrow pits and quarries are covered under Mining. Secondary impacts resulting from road construction e.g. agriculture, tourism are addressed under the relevant sectors.*

Agriculture and forestry

Irrigation, dry land arable, animal production, grazing, plantations, orchards, vineyards

Main Planning Activities

- Decision regarding use of GMOs
- Crop/animal type selection
- Choice of irrigation system (if required)
- Source of suitable quantity and quality of water for irrigation
- Location of market and transportation options
- Climate and soil investigations



Main Impacts of Planning on the natural environment

The following impacts on the natural environment need to be taken into consideration during the planning and design stage in order to try to avoid or minimise many of the impacts during later project stages:

- Proximity to proclaimed and future conservation areas;
- Impact on sensitive ecosystems, especially areas of high botanical importance, wetlands, rivers and any priority area identified in the country's NBSAP;
- Avoid habitat fragmentation;
- Unknown impacts of GMOs on local species diversity
- Impact on country's ability to meet international obligations pertaining to environmental protection;
- Fatal flaws relating to permanent loss of species or habitat;
- Unsustainable water use could compromise downstream environments and other users.



Main Construction Activities

- Clearance of vegetation
- Establishment of irrigation system (pumps, pipes etc) if required
- Construction of tunnels, hothouses, if required
- Fencing
- Construction of farm buildings, sheds, packing areas, storage, animal production facilities etc
- Construction of access roads and tracks

Main Impacts of Construction on the natural environment

- Permanent loss of vegetation
- Habitat fragmentation
- Interruption of ecological corridors and migration paths
- Erosion and stream sedimentation
- Draining of wetlands

Main Operational Activities

- Tilling of soil (if required)
- Sowing or planting
- Fertilisation and soil conditioning
- Application of pesticides, herbicides and fungicides
- Irrigation (if necessary)
- Cropping or harvesting
- Processing and packing
- Transportation of products
- Disposal of animal wastes
- Disposal of agri-chemical wastes

Main Impacts of Agriculture and Forestry on the natural environment

- Monoculture leads to loss of species diversity
- Population explosions (e.g. rodents, graminivores) and ecosystem perturbation
- Introduction of persistent organic pollutants in soils and water bodies resulting in acute and chronic effects in animals through direct and indirect uptake and bioaccumulation
- Return flows from irrigated fields can lead to increased salinity of receiving water bodies leading to ecosystem changes and loss of species diversity
- Increased eutrophication of water bodies from elevated nitrogen and phosphate loads in runoff and seepage water, resulting in the growth of algae and invasive water plants with a concomitant change in benthic species as well as physico-chemical characteristics of the water.
- Potential for faecal contamination of drinking water from feedlots and stock watering points
- Reduction in downstream flows due to irrigation quotas and forest uptake
- Erosion and increased sediment yield from fields, overgrazed areas and clear-felling
- Over-cropping may lead to soil nutrient depletion and compaction
- Potential for genetically modified,

invasive and alien species to displace native species

- Loss of, or interruption of ecological corridors linking different ecosystems or across altitudinal gradients
- Conflicts with wildlife (e.g. elephants) which may be attracted to crops

Main Decommissioning Activities

- Cease agricultural activities, remove all fences and structures

Main Impacts of Decommissioning on the natural environment

- Slow return of the natural environment
-

Water resources development

Dams, reservoirs, pipelines, canals, inter-basin transfers

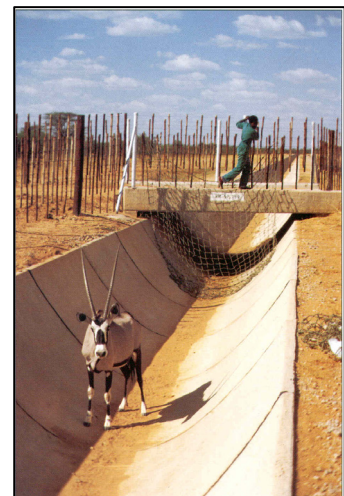
Main Planning and Design Activities

- Site and route selection
- Choice of design
- Selection of alternative schemes

Main Impacts of Planning and Design on the natural environment

The following impacts on the natural environment need to be taken into consideration during the planning and design stage in order to try to avoid or minimise many of the impacts during later project stages:

- The conservation status of the river and dam basin
- The presence of important downstream conservation areas or priority areas identified in the country's NBSAP
- Fish migration patterns and fisheries
- The importance of riverine vegetation for habitat, erosion control, ecosystem functioning and provision of goods and services
- The flood regime and the importance of wetlands in regulating floods
- Sediment movement
- Water flow characteristics
- Water quality and the importance of potential wetland loss on downstream water quality
- Impact on the country's ability to meet international obligations with regard to environmental protection.



Main Construction Activities*

- Vegetation clearance
- Topsoil stripping
- Trench excavation for pipes and canals
- Blasting and tunnelling (if required)
- Quarrying for fill materials
- Water diversion works and coffer dams
- Access roads and tracks
- Fence construction
- Contractor's camp, yard and workshops
- Waste disposal
- Bulk earthworks
- Building and plant construction
- Concrete batch plant
- Installation of temporary and permanent services (water, sewage, power, telecoms)
- Reservoir construction
- Dam filling
- Traffic
- Labour force

Main Impacts of Construction on the natural environment

- Temporary and permanent loss of habitat
- Road collisions with animals, birds
- Dust smothering of vegetation
- Alteration of downstream sediment dynamics in streams, rivers, wetlands
- Poaching and firewood collection by workforce and itinerant job seekers
- Habitat fragmentation
- Local loss of species
- Introduction of aquatic alien species
- Providing access to remote areas and indirectly increasing pressure on ecological goods and services
- Loss of access to ecological goods and services by local communities with resultant impacts on livelihoods
- Indirect impacts on the natural environment due to resettlement of local communities

Main Operational Activities*

- Impoundment of water
- Controlled release of water to suit operational requirements
- Drawdown of water level in impoundments
- Dredging and disposal of silt from dams
- Water transfer
- Canal operation

Main Impacts of Water Projects on the natural environment

- Direct loss of habitat and species
- Change in habitat from flowing river to an impoundment
- Indirect loss of downstream habitat and species through perturbation in river flows and flood regime, altered physical and chemical characteristics of water
- Altered patterns of erosion and silt deposition downstream
- Habitat fragmentation
- Interruption and/or loss of migration corridors especially for fish
- Canals can act as death traps for all species or barriers to movement
- Changes in predator-prey relationships
- Alien species invasion (terrestrial and aquatic weeds)
- Possible transfer of species between catchments.

Main Decommissioning and Closure Activities

- Removal of all structures

Main Impacts of Closure on the natural environment

- Re-colonisation of disturbed areas by fauna and flora
- Creation of new/different habitats
- Potential for invasive species

**Note: Activities and impacts associated with quarries, roads and water-based recreation are addressed in the respective sector guidelines.*

Water-based infrastructure and related activities

Ports, harbours, marinas, jetties, shipping, water-based recreation

Main Planning and Design Activities

- Site selection
- Choice of design and layout
- Alternative schemes

Main Impacts of Planning and Design on the natural environment

The following impacts on the natural environment need to be taken into consideration during the planning and design stage in order to try to avoid or minimise many of the impacts during later project stages:

- The conservation status of the marine/lake/river environment
- The importance of river banks and shores for habitat, erosion protection, ecosystem functioning and provision of goods and services
- The flood and tidal regimes
- Water and sediment movement and obstruction
- Water quality



Main Construction Activities*

- Shoreline vegetation clearance
- Water diversion works
- Dredging and disposal of dredge spoil
- Blasting (in some cases)
- Bulk earthworks
- Piling and concrete work including batch plant
- Construction of groynes, breakwaters and other protection works
- Landside construction of buildings and related infrastructure
- Access roads and tracks
- Contractor's camp, yard and workshop
- Waste disposal
- Construction traffic
- Labour force

Main Impacts of Construction on the natural environment

- Direct loss of coastal/shore/bank vegetation and faunal habitat
- Temporary or permanent interruption of ecological corridors
- Possible release of toxic substances during dredging and dredge spoil disposal activities
- Smothering of benthic fauna due to dredge spoil disposal
- Increased turbidity due to dredging, spoil disposal, re-suspension of fines and other construction activities will affect light penetration and ecosystem functioning
- Accidental hydrocarbon spills will have acute, chronic and lethal effects on

- marine and shoreline organisms
- Introduction of alien organisms and plants from construction equipment and machinery
- Effects of blasting on marine mammals, seabirds, fish and fisheries

Main Operational Activities*

- Arrival and departure of vessels
- Loading and offloading of vessels
- Boat launching
- Handling, storage, conveyance and transfer of cargo including containers, break bulk cargoes, diesel and oil, liquid products and bulk materials
- Marine services including boat cleaning, painting, repairing, welding etc
- Ongoing dredging of channels
- Commercial fishing operations and processing facilities
- Solid waste disposal from wharf operations and vessels
- Effluent and runoff disposal from wharf and wharf-side factories, processing plants and stockpiles
- Motorised water sports including: yachting, boating, water-skiing, jet skis
- Re-fuelling and provisioning of boats
- Discharge of ballast water

Main Impacts of water-based infrastructure and related activities on the natural environment

- Introduction of alien species from boats and discharge of ballast water
- Erosion of banks and shorelines by boat wakes leads to loss of breeding sites for birds and other organisms
- Impact of oil spills on seabirds, marine, inter-tidal and shore organisms (acute and chronic effects, mortality)
- Depletion of fish stocks due to over-fishing
- Indiscriminate fishing methods, quota exceedance and illegal catch sizes affect species diversity and population sizes
- Impacts of litter and waste on fish, marine mammals and shoreline fauna
- Direct and indirect effects on sensitive ecosystems e.g. coral reefs, mangrove swamps, estuaries etc due to perturbations in wave, current and sediment transport regimes resulting in shoreline accretion and/or erosion
- Noise and disturbance from boat-based recreation on bird breeding and feeding sites
- Impacts on water quality due to erosive effects of wind and water on loose material stockpiles e.g. coal, iron ore, manganese, titanium etc
- Impacts on water quality and marine organisms from runoff and effluent disposal from shore-based activities e.g. fish processing factories
- Toxic effects of anti-fouling paints on aquatic/marine organisms resulting in growth and development defects
- Impact of ship movements on marine

mammals e.g. dugongs, whales and other cetaceans, as well as large fish (such as whale sharks)

- Bioaccumulation of toxins in edible marine organisms e.g. mussels, crabs, lobsters with indirect effects on human health
- Loss of subsistence fisheries and marine harvesting areas

Main Decommissioning and Closure Activities

- Removal of all structures

Main Impacts of Closure on the natural environment

- Re-colonisation of disturbed areas by fauna and flora
- Creation of new/different habitats
- Potential for invasive species

**Note: Activities and impacts associated with water supply and roads are addressed in the respective sector guidelines.*

Peri-urban and urban fringe developments

Housing, golf courses, water treatment works, landfills, commercial

Main Planning and Design Activities

- Zoning applications
- Land purchase
- Design and layout alternatives
- Provision for bulk services (water, power)
- Infrastructure requirements (roads)
- Site selection processes
- Market demand studies



Main Impacts of Planning and Design on the natural environment

The following impacts on the natural environment need to be taken into consideration during the planning and design stage in order to try to avoid or minimise many of the impacts during later project stages:

- Extension of urban edge into ‘greenfields’ sites and green belt areas;
- High demand for limited water resources places stress on existing schemes and requires possible development of new schemes with all the related impacts on the natural environment;
- Unsustainable water use could compromise downstream environments and other users;
- Proximity to proclaimed and future conservation areas;
- Impact on sensitive ecosystems, especially areas of high botanical importance, wetlands, rivers, ridges and any priority area identified in the country’s NBSAP;
- Habitat fragmentation;
- Impact on country’s ability to meet international obligations pertaining to environmental protection;
- Fatal flaws relating to permanent loss of species or habitat.



Main Construction Activities*

- Vegetation clearance
- Topsoil stripping
- Construction and/or upgrading of roads
- Fence and wall construction
- Contractor’s camp, yards and workshops
- Concrete batch plant
- Waste disposal

Main Impacts of Construction on the natural environment

- Temporary and permanent loss of habitat
- Road collisions with animals, birds
- Dust smothering of vegetation
- Sedimentation of streams, rivers
- Poaching and firewood collection by workforce and itinerant job seekers

- Bulk earthworks
- Installation of bulk services (water, sewerage, power, telecoms)
- Site development and building construction
- Transportation of all raw materials to site
- Construction traffic
- Labour force
- Habitat fragmentation
- Local loss of species
- Loss of ecological corridors
- Introduction of alien species, especially plants and animals (pets)
- Loss of access to ecological goods and services by local communities with resultant impacts on livelihoods
- Indirect impacts on the natural environment due to resettlement of local communities

Main Operational Activities*

- High water consumption
- Increased stormwater runoff, sewage volumes and return flows
- Application of fertilisers, pesticides, herbicides and fungicides in gardens, parks, golf courses etc
- Groundwater abstraction
- Greater energy requirements
- Increased traffic and noise
- Landscaping with alien species and irrigation
- Increased waste production

Main Impacts of Urban Fringe Developments on the natural environment

- Direct loss of habitat and/or habitat transformation
- Habitat fragmentation
- Direct loss of species in the area due to loss of habitat, road and powerline collisions
- Indirect loss of habitat through water pollution, dust smothering, air pollution, reduction in river flows, soil contamination
- Interruption and/or loss of migration corridors and perturbation of source-sink relationships
- Indirect impact on food web functioning through bioaccumulation of metals, loss of diversity, lower species resilience
- Alteration in predator-prey relationships
- Reduction in river flows resulting in impacts on fish migration and breeding and other aquatic organisms
- Lowering of the groundwater table will impact on rooting depths of plants, especially trees
- Alien species invasion (plants, birds, pets, pests, vermin, water weeds)

**Note: Activities and impacts associated with water supply, energy generation, provision of construction materials and roads are addressed in the respective sector guidelines.*

Ecotourism

Lodges, trails, safaris, fly fishing, canoeing, rafting, game viewing, bird watching, camping, conservation areas, diving, snorkelling

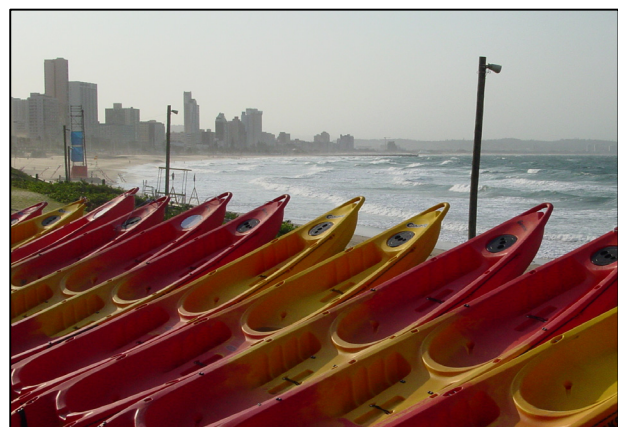
Main Planning and Design Activities

- Zoning applications
- Land purchase
- Site and route selection
- Alternatives assessment
- Opportunities and constraints analysis
- Layout and design options

Main Impacts of Planning and Design on the natural environment

The following impacts on the natural environment need to be taken into consideration during the planning and design stage in order to try to avoid or minimise many of the impacts during later project stages:

- Proximity to proclaimed conservation areas;
- Proximity to, or effect on priority ecosystems identified in the country's NBSAP;
- Impact on country's ability to meet international obligations pertaining to environmental protection;
- Fatal flaws relating to permanent loss of species or habitat.
- Increased demand for limited water resources places stress on existing schemes and requires possible development of new schemes with all the related impacts on the natural environment;
- Unsustainable water use could compromise downstream environments and other users.



Main Construction Activities*

- Vegetation clearance
- Topsoil stripping
- Construction and/or upgrading of roads
- Fence and wall construction
- Contractor's camp, yards and workshops
- Concrete batch plant
- Waste disposal
- Bulk earthworks
- Installation of bulk services (water, sewerage, power, telecoms)
- Site development and building construction
- Transportation of all raw materials to site
- Construction traffic
- Labour force

Main Impacts of Construction on the natural environment

- Temporary and permanent loss of habitat
- Road collisions with animals, birds
- Dust smothering of vegetation
- Sedimentation of streams, rivers
- Poaching and firewood collection by workforce and itinerant job seekers
- Habitat fragmentation
- Local loss of species
- Loss of ecological corridors
- Introduction of alien species
- Indirect impacts on the natural environment due to resettlement of local communities

Main Operational Activities*

- Water consumption
- Increased stormwater runoff, sewage volumes and return flows
- Application of fertilisers, pesticides, herbicides and fungicides in gardens, landscaped areas etc
- Groundwater abstraction
- Energy needs
- Increased traffic
- Landscaping with alien species and irrigation
- Increased waste production

Main Impacts of Ecotourism Developments on the natural environment

- Direct loss of habitat and/or habitat transformation
- Habitat fragmentation
- Direct loss of species in the area due to loss of habitat, road and powerline collisions
- Indirect loss of habitat through water pollution, dust smothering, air pollution, reduction in river flows, soil contamination, boat wake erosion, trampling etc
- Interruption and/or loss of migration corridors and source-sink relationships due to fence construction
- Water abstraction could result in a reduction in river flows resulting in impacts on fish migration and breeding and other aquatic organisms
- Lowering of the groundwater table will impact on rooting depths of plants, especially trees
- Introduction of alien species e.g. trout will affect native species and predator-prey relationships
- Improved conservation of species and habitats

- Need for game management to control population
- Improved awareness of the natural environment conservation issues by the public through exposure to the environment
- Re-introduction of locally extinct species
- Re-instatement of natural vegetation and removal of alien plants
- Loss of access to ecological goods and services by local communities with resultant impacts on livelihoods

**Note: Activities and impacts associated with water supply, water-based infrastructure development and roads are addressed in the respective sector guidelines.*

Part G: Template for Reviewing an EIA report

The following review system was developed by the Southern African Institute for Environmental Assessment (SAIEA), and has been found to be suitable for reviewing EIAs of various sizes and for all sectors. Reviewers may add or delete question prompts depending on their country circumstances or the nature of the project. However, it is important to use roughly the same review system in all Nairobi Convention countries of the WIO Region so that there is consistency in quality control. By using this template, the reviewer follows a methodical approach and the review is likely to be subjective and comprehensive.

EXTERNAL REVIEW OF THE ENVIRONMENTAL ASSESSMENT REPORT FOR THE PROPOSED PROJECT

This review form provides a structure that helps the reviewer to assess the EIA's various components in a scientific way. However, the reviewer must try at the same time to maintain a perspective of the "bigger picture" so that the reviewer can advise the client on whether the EIA report makes sense as a whole and if the process was conducive for planning.

This review form is divided into the following sections:

- | | |
|---|--|
| 1. Methodology utilized in compiling the EIA report | 5. Description of impacts |
| 2. Description of the project | 6. Consideration of measures to mitigate impacts |
| 3. Assessment of alternatives to the project | 7. Non-technical summary |
| 4. Description of the environment | 8. General approach |

Review methodology:

1. For each question, the reviewer considers whether the information is relevant to the project. If not, the question is ignored and the reviewer proceeds to the following question.
2. If the information is relevant, that section of the EIA report is read to establish whether the information provided is:
 - **Complete (C)**: all information required for decision-making is available. No additional information is required even though more information might exist.
 - **Acceptable (A)**: the information presented is incomplete, but the omissions do not prevent the decision-making process from proceeding
 - **Inadequate (I)**: the information presented contains major omissions. Additional information is necessary before the decision-making process can proceed.

Name of the project	
Country where the project is to be located	
Name of company which compiled the EIA report	
Name of reviewer	
Date of review	
Narrative report (reviewers general opinion of the EIA report):	
Introduction	
Summary opinion	
Methodology for the review	
Stakeholder engagement and assessment of impacts	
Conclusion	

Summary appraisal of the EIA report

	Judgment (C/A/I)	Comments
Methodology utilized in compiling the EIA report		
Description of the project		
Assessment of alternatives to the project		
Description of the environment		
Description of impacts		
Consideration of measures to mitigate impacts		
Non-technical summary		
General approach		

The overall report is graded as follows: (tick one box)

- Excellent:** The EIA report contains everything required for decision-making on the project. There are no gaps.
- Good:** The EIA report contains most of the information required as far as it is relevant in the particular circumstances of the project; any gaps are relatively minor.
- Satisfactory:** The information presented is not complete; there are significant omissions but in the context of the proposed project, these are not so great as to prevent a decision being made on whether the project should be allowed to proceed.
- Inadequate:** Some of the information has been provided, but there are major omissions; in the context of the proposed project these must be addressed before a decision on whether the project should be allowed to proceed can be taken.

Poor: The information required has not been provided or is far from complete and, in the context of the proposed project, the omissions must be addressed before a decision on whether the project should be allowed to proceed can be taken.

In your opinion:

	Yes	Don't know	No
• Did the EA process include genuine public participation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Were the consultants unduly influenced by the proponent/ Authorities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Did the EA report focus on the 5 most important issues?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Is the EA report of acceptable quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Will the EA report help to make a more informed decision?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1. METHODOLOGY		Relevant? Yes/No	Judgment (C/A/I)	Comments
1.1	Does the report clearly explain the methodology used and how these helped to reach the conclusions of the study?			
1.2	Does the report indicate what data are inadequate or absent?			
1.3	Did the EA process include genuine stakeholder consultation?			
1.4	If so, were the general public and/or affected communities included in the consultation?			
1.5	Have the views of stakeholders been meaningfully incorporated into the findings of the EIA?			
<i>Land requirements</i>		Relevant? Yes/No	Judgment (C/A/I)	
2.1	Has the land required for the project and any associated services, been described and clearly shown on a scaled map?			
2.2	For a linear project, has the land corridor and need for earthworks been described and shown on a scaled map?			
2.3	Has the re-instatement after use of temporary land take been described?			
<i>Waste and emissions</i>				
2.4	Have the types and quantities of waste generated during construction and operation been estimated?			
2.5	Have the ways in which these wastes will be handled or treated prior to			

	disposal been explained?			
2.6	Has the receiving environment where such waste will be disposed, been identified and described?			
<i>Project inputs</i>				
2.7	Are the nature and quantities of materials needed during construction and operation, clearly indicated?			
2.8	Are the sites where these materials will be sourced from, identified and assessed in terms of impacts, in the EA report?			
2.9	Have the impacts of workers and visitors entering the project site during construction and operation been assessed?			
2.10	Have the means of transporting materials, products, workers and visitors to and from the site during construction and operation, been explained?			

3. ALTERNATIVES	Relevant? Yes/No	Judgment (C/A/I)	Comments
<i>Alternatives</i>			
3.1	Were alternatives to the project (including the “no-project” alternative) considered in the EA?		
3.2	If alternatives were considered, are the reasons for selecting the proposed project adequately described?		
3.3	Does the EIA assess various “within-project” alternatives (e.g. design, location)		

4. DESCRIPTION OF THE ENVIRONMENT	Relevant? Yes/No	Judgment (C/A/I)	Comments
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4.1	Have the areas expected to be significantly affected by the various aspects of the project been indicated with the aid of suitable maps?			
4.2	Have the land uses on the project site(s) and in the surrounding areas been described and their use and non-use values adequately assessed?			
4.3	Have the biophysical components of the environment likely to be affected by the project been identified and described sufficiently for the prediction of impacts?			
4.4	Have the social components (including archaeological and historical) of the environment likely to be affected by the project been identified and described sufficiently for the prediction of impacts?			
4.5	Has the EA adequately consulted the latest literature and/or unpublished reports and/or data relevant to the study?			
4.6	Have local, regional and national plans and policies been reviewed in order to place the project into context?			

5. DESCRIPTION OF IMPACTS	Relevant? Yes/No	Judgment (C/A/I)	Comments
<i>Impact Identification</i>			
5.1 Have direct and indirect/secondary impacts of constructing, operating and, where relevant, after use or decommissioning of the project been clearly			

	explained (including both positive and negative effects)?			
5.2	Is the investigation of each type of impact appropriate to its importance for the decision, avoiding unnecessary information and concentrating mainly on the 5 key issues?			
5.3	Are cumulative impacts considered?			
5.4	Are transboundary impacts considered?			
5.5	Has consideration been given to impacts which might arise from non-standard operating conditions, (i.e. equipment failure or unusual environmental conditions such as flooding), accidents and emergencies? (i.e. risk assessment)			
<i>Magnitude and significance of Impacts</i>				
5.6	Has the timescale over which the effects will occur been predicted such that it is clear whether impacts are short, medium or long term, temporary or permanent, reversible or irreversible?			
5.7	Does the EA give a clear indication of which impacts may be significant and which may not?			
5.8	Have the magnitude, location and duration of the impact been discussed in the context of the value, sensitivity and rarity of the resource or environment?			

6. MITIGATION			
<i>Description of mitigation measures</i>			
6.1	Has the mitigation of negative impacts been considered and, where feasible, have specific measures been proposed to address each impact?		
6.2	Is it clear to what extent the mitigation methods are likely to be effective?		
6.3	Has the EA report clearly explained what the costs of mitigation are likely to be, and compared these to the benefits (including the costs of non-mitigation)?		
6.4	Have details of how the mitigation will be implemented and function over the time span for which they are necessary, been presented?		
<i>Monitoring Proposals</i>			
6.5	Has the EA proposed practical monitoring arrangements to check the environmental impacts resulting from the implementation of the project and their conformity with the predictions made?		
6.6	Has the EA proposed Limits of Acceptable Change that the developer can use to track impacts and trigger management intervention?		
<i>Environmental Effects of Mitigation</i>			
	Have any adverse environmental effects of mitigation measures been investigated and described?		

7. NON-TECHNICAL SUMMARY	Relevant? Yes/No	Judgment (C/A/I)	Comments
7.1 Does the EIA contain a brief but concise non-technical summary that clearly explains the project and the environment, the main issues and mitigation measures to be undertaken, and any remaining or residual impacts?			
7.2 Does the summary include a brief explanation of the overall approach to the assessment?			
7.3 Does the summary provide an indication of the confidence which can be placed in the results?			
7.4 Does the summary indicate whether the project is or is not environmentally acceptable			

8. GENERAL APPROACH	Relevant? Yes/No	Judgment (C/A/I)	Comments
<i>Organisation of the information</i>			
8.1 Is the information logically arranged in sections?			
8.2 Is the location of the information identified in an index or table of contents?			
8.3 When information from external sources has been introduced, has a full reference to the source been included?			
<i>Presentation of the information</i>			
8.4 Has information and analysis been offered to support all conclusions drawn?			
8.5 Has information and analysis been presented so as to be comprehensible to the non-specialist, using maps, tables and graphical			

	material as appropriate?			
8.6	Has superfluous information (i.e. information not needed for the decision) been avoided?			
8.7	Have prominence and emphasis been given to severe adverse impacts, to substantial environmental benefits, and to controversial issues?			
8.8	Is the information objective?			

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