Integrating Biodiversity into Environmental and Social Impact Assessment Processes

The Energy & Biodiversity Initiative

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EXECUTIVE SUMMARY

The principal purpose of this document is to offer appropriate guidance on the integration of biodiversity into an Environmental and Social Impact Assessment (ESIA). As such, it contains neither a general review of ESIAs, nor recommendations for the creation of a new type of ESIA process, focusing instead on the steps and actions necessary to accomplish the proper integration of biodiversity. Underpinning these steps and actions is the principle that, based on an appropriate risk assessment, biodiversity should be integrated into each relevant stage of the ESIA process by expanding the scope of analysis to include biodiversity characteristics, evaluating impacts holistically using a wider ecosystem approach as recommended in the Convention on Biological Diversity (CBD), and considering long-term and cumulative secondary impacts in addition to more immediate, primary impacts.

In some cases, the government rather than the company may set the type and extent of ESIA. This document is principally for use in situations where a company controls the ESIA. However, it may also be useful to companies providing input to a government-led ESIA and to governments seeking to better integrate biodiversity into their ESIA processes, particularly in those countries that do not have strong ESIA requirements, approval processes and mitigation standards.

Suggestions are made for the integration of biodiversity into seven key stages of the ESIA process:

- Identification of alternatives.
- Screening.
- Scoping.
- Baseline establishment.
- Evaluation (impact analysis).
- Development of mitigation options and implementation.
- Monitoring and adaptation.

Stakeholder engagement and the estimation of secondary and cumulative impacts are also considered, but as principles that underpin the ESIA process rather than as separate stages. There is a close relationship between social impacts and environmental/biodiversity impacts that must be accounted for when undertaking an ESIA.

Finally, the issue of divestiture is addressed: unless appropriately planned for, the termination of company operations may also result in a termination of valuable or necessary biodiversity conservation activities. This can have potentially significant adverse impacts on biodiversity, as well as on company reputation, long after termination of active oil and gas operations. Therefore, companies should consider addressing biodiversity issues at end point divestiture in their operational plans and through ESIA procedures.

1. USING THIS DOCUMENT

This document is primarily aimed at Health, Safety and Environment (HSE) personnel responsible for the integration of biodiversity into the ESIA process at one or more sites. The guidance presented covers the upstream oil and gas operation lifecycle from pre-bid to decommissioning (see Figure 1). Other stakeholders (e.g. local communities and conservation organizations) interested in understanding the environmental and social impacts of oil and gas operations, and industry's responses, might also be potential end-users. To assist the reader, uncommon words and phrases are defined in the Energy and Biodiversity Initiative's (EBI) glossary. Within this document the term "environment" is defined broadly to include "social," "cultural," and other human dimensions, and "impacts" is taken to include primary and secondary impacts unless noted otherwise. "Impact" is generally taken to mean a negative change, but may in some instances (as noted) refer to a positive change.

It is important to recognize that there are a number of factors that may affect how and when this document can be used to assist in the process of biodiversity integration:

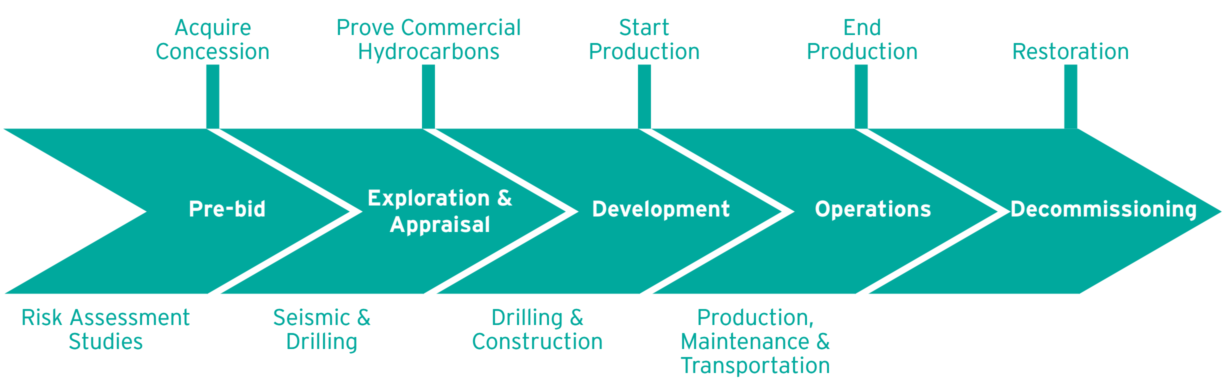
- In some cases, the government, rather than the company, will undertake the ESIA for a new oil and gas project. This is particularly the case in the United States, under the National Environmental Policy Act (NEPA). A company may have only limited ability to influence either the content or the process for a government-prepared ESIA.

- Where the government does not require an ESIA, a company may undertake it voluntarily.

- Any ESIA (voluntary or required) will need to address the existing set of applicable government standards and requirements relating to biodiversity or biological resources protection.

- How effectively government protects biodiversity depends on the combination of applicable standards, enforcement and ESIAs, rather than the ESIA process alone. In some cases, that combination will assure that impacts on biodiversity from a new oil and gas project will be reduced to an appropriate level. In other cases it will not. An ESIA is essentially a procedural standard and does not guarantee a high performance in regard to

FIGURE 1. THE LIFECYCLE OF UPSTREAM OIL AND GAS OPERATIONS[1]



[1] At the pre-bid stage, a company may choose not to proceed with investment and exit the project lifecycle, because of biodiversity or other concerns. For technical, economic or other reasons, a company may not continue activity after completion of exploration and appraisal. In addition, at any point in the project lifecycle after the pre-bid stage, a company may choose (or be required by the host government) to "exit" a project by divesting and transferring its legal interest to another operator. This possibility may raise a number of issues about the continuity of biodiversity-related philosophy, commitment and practice from one company to another, potentially jeopardizing sustainable biodiversity conservation and a company's ability to maintain the reputational value of its activities related to biodiversity conservation (see *Framework for Integrating Biodiversity into the Site Selection Process* and Section 3.11 in this document for further discussion of this issue).

the management of biodiversity issues. Furthermore, and more importantly, the fact that an ESIA carried out by a company or government is completed for a project does not mean that the level of impact will be acceptable and the recommendations of an ESIA should be open to challenge by all stakeholders, ideally through an independent judiciary.

Bearing these factors in mind, this document will primarily be useful for situations where a company can control the ESIA. It may also be useful to companies providing input to a government-led ESIA and to governments seeking to better integrate biodiversity into their ESIA processes, particularly in those countries that do not have strong ESIA requirements, approval processes, and mitigation standards. However, only in cases where there are significant biodiversity issues will many of the steps suggested in this document be necessary. There are a number of "check" and exit points to ensure that unnecessary work is not undertaken.

This document is designed as a standalone document. However, relevant information is also contained in other EBI products. High-level information from this document is also contained in *Integrating Biodiversity Conservation into Oil and Gas Development* (which contains a summary of the analysis and recommendations of the EBI and forms the overall context for this document). The EBI document *Integrating Biodiversity into Environmental Management Systems* describes where ESIAs fit into two key models for corporate and/or project Environmental Management Systems (ISO 14001) and integrated Health, Safety and Environmental Management Systems for oil and gas exploration and development activities (OGP).

The continued improvement of this document is dependent on the active participation of end-users and stakeholders. Therefore comments and suggestions relating to revisions and additions that will improve the usability, content and breadth and depth of application in the oil and gas sector are especially welcome. We are also actively seeking case studies relating to the integration of biodiversity into the ESIA process for inclusion in future updates.

PLEASE SEND COMMENTS, SUGGESTIONS AND QUESTIONS TO:

THE ENERGY & BIODIVERSITY INITIATIVE
c/o Dr. Assheton Stewart Carter
The Center for Environmental Leadership in Business
Conservation International
1919 M Street NW, Suite 600
Washington, DC 20036
USA
Tel: +1 202 912 1449
Fax: +1 202 912 1047
Email: a.carter@celb.org
Website: www.TheEBI.org

2. BACKGROUND

2.1 INTRODUCTION

Environmental Impact Assessments (EIAs) are commonly applied throughout the oil and gas industry to establish the potential impacts of company activities. Increasingly, there is a tendency to integrate the assessment of social impacts and benefits into EIAs to produce Environmental and Social Impact Assessment (ESIAs). In some cases, Social Impact Assessments (SIAs) may be prepared separately from the EIA where a more detailed analysis of social impacts than can be achieved within an ESIA is required. There is an enormous amount of readily available literature relating to ESIA and SIA processes. Therefore, the focus of this document is the integration of biodiversity issues into the processes rather than the processes themselves, using as a basis a number of key documents:

- International Association of Oil and Gas Producers (OGP) (formerly E&P Forum). 1997. *Principles for impact assessment: the environmental and social dimension*, Report No. 2.74/265.

- International Association of Oil and Gas Producers (OGP). 2002. *Key questions in managing social issues in oil & gas projects*, Report No. 2.85/332.

- Shell. 2002. *Integrated Impact Assessment: Environmental Impact Assessment Module*, EP 95-0370.

- United Nations Environment Programme. 2002. *UNEP Environmental Impact Assessment Training Resource Manual*, Second Edition, ISBN 92 807 2230 1.

- Emery, A.R. 2000. *Guidelines: integrating indigenous knowledge in project planning and implementation* (see http://www.kivu.com/wbbook/ikhomepage.html)

- Byron, H. 2000. *Biodiversity and Environmental Impact Assessment: A good practice guide for Road Schemes*. The RSPB, WWF-UK, English Nature and the Wildlife Trusts, Sandy.

- Atkinson, S., Bhatia, S., Schoolmaster, F.A. and Walker, W.T. 2000. Treatment of biodiversity impacts in a sample of UN environmental impacts statements, *Impact Assessment and Project Appraisal*, 18, pp.271-282.

- *Convention on Biological Diversity (CBD) COP 6 Decision VI-7-A*: Further development of guidelines for incorporating biodiversity-related issues into environmental impact assessment legislation or processes and in strategic impact assessment.

- European Commission. 2000. *Towards Sustainable Economic and Development Co-operation, Environmental Integration Manual: Good Practice in EIA/SEA - Biodiversity* (p.277-314).

- European Commission. 2000. *Towards Sustainable Economic and Development Co-operation, Environmental Integration Manual: Sustainable Environmental Management - Sensitive Environments* (p. 315-335).

- IAIA. 2001. *Proposed conceptual and procedural framework for the integration of biological diversity considerations with national systems for impact assessment.*

- Council on Environmental Quality. 1993. *National Environmental Policy Act Compliance Guide. Part III, CEQ Guidance Documents, III-10 — Incorporating Biodiversity Considerations in Environmental Impact Assessment under the National Environmental Policy Act.*

- Treweek, J., Zanewich, D. 2001. *Integrating Biodiversity into National Environmental Assessment Processes: A Summary of Country Reports and Case Studies*. Komex Europe Ltd, Bristol, UK prepared for UNEP.

- Treweek, J., Zanewich, D. 2001. *Integrating Biodiversity into National Environmental Assessment Processes*: Annotated Bibliography. Komex Europe Ltd, Bristol, UK prepared for UNEP.

2.2 "STANDARD" ESIAS AND BIODIVERSITY

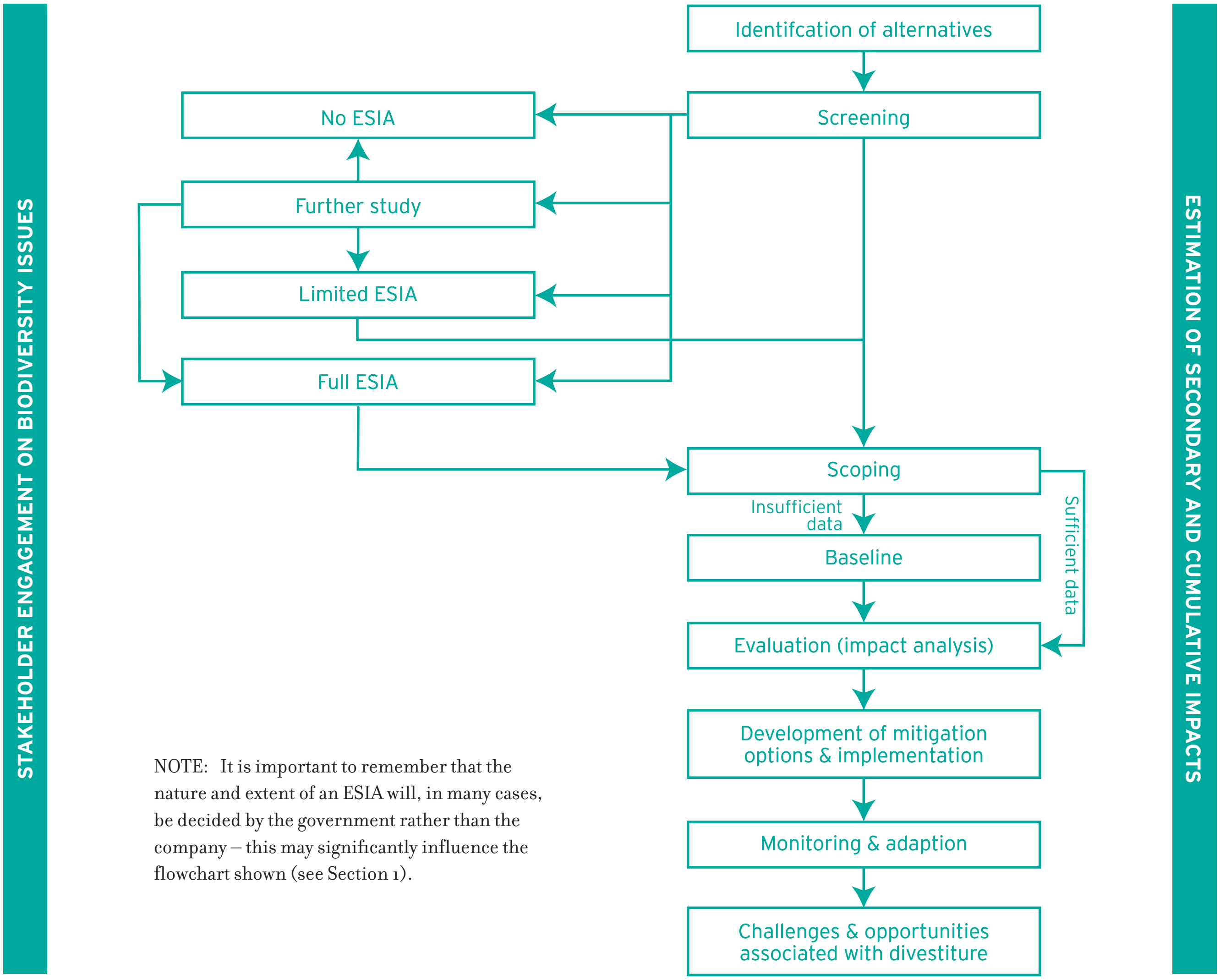
At its simplest, an ESIA is the process of identifying, estimating and evaluating the environmental and social consequences of current or proposed actions (see Figure 2 for an overview of the principal stages of an ESIA relevant to biodiversity). From a company's perspective, an ESIA with an appropriate biodiversity focus should not only satisfy regulatory requirements, but also contribute to the improvement of its internal project design, construction and implementation activities as a means of minimizing biodiversity impacts. Therefore, the ESIA process should be an integral component of corporate- and project-level environmental or integrated health, safety and environmental management systems (EMS and HSEMS, respectively).

See **Integrating Biodiversity into Environmental Management Systems.**

It might be argued that a standard ESIA already includes biodiversity issues, and some companies do indeed include biodiversity in the process. However, "best practice" now requires a more explicit and comprehensive integration of biodiversity based on a valid and transparent risk assessment. This contrasts, in general terms, with a standard approach that may fail to take full account of:

- The significance of seasonality and natural cycles/ variability for biodiversity measurement and monitoring (e.g. project timescales may not allow for long-term surveying of biodiversity).

FIGURE 2. OVERVIEW OF THE PRINCIPAL STAGES OF AN ESIA RELEVANT TO BIODIVERSITY



NOTE: It is important to remember that the nature and extent of an ESIA will, in many cases, be decided by the government rather than the company – this may significantly influence the flowchart shown (see Section 1).

TABLE 1. EXAMPLES OF POTENTIAL PRIMARY BIODIVERSITY IMPACTS[2]

PROJECT STAGE	PROJECT ACTIVITY	POTENTIAL BIODIVERSITY IMPACTS
Exploration: seismic, drilling, etc.	**Onshore** • Provision of access (airstrips, temporary roads) • Set up and operation of camps and fly camps • Use of resources (water, aggregate) • Storage of fuel • Cleaning of lines and layout geophones • Shot hole drilling • Use of explosives • Closure of shot holes, mud pits, camps and access infrastructure • Mobilization of drill rig • Drilling operations • Well testing/flaring	• Footprint impacts to habitats/flora • Disturbance of fauna • Noise impacts on animal populations • Physical disturbance of soils and watercourses • Contamination of soils, surface and groundwater • Landscape modification, visual impact
	Marine • Vessel mobilization and movement • Vessel emissions and discharges • Seismic operation • Anchor rig/lower legs • Use of chemicals • Mud and cuttings discharge • Fuelling and fuel handling • Blow-out risk	• Impact on fish • Disturbance of marine mammals • Disturbance of sediment and benthic populations • Contamination of sediment • Impact on seabirds, coastal habitats, etc. in event of oil spill
Construction	**Onshore** • Set-up and operation of construction camps • Provision of construction access • Resource use (water, timber, aggregate) • Import of heavy plant and machinery • Vehicle movements • Earthmoving, foundations, excavation • Storage/use of fuel and construction materials • Generation of construction wastes	• Temporary and permanent loss of habitat and component ecological populations due to temporary and permanent footprint • Soil erosion and reduction in productivity • Contamination of soils, surface and groundwater • Damage to cultural heritage
	Marine • Mobilization and movement of vessels • Vessel emissions and discharges • Anchoring, piling	• Disturbance to sediment, benthic fauna and other seabed flora and fauna • Loss of seabed habitat • Disturbance to marine mammals
Operation/ Production	**Onshore** • Footprint • Visible presence • Import and export of materials and products • Product handling, storage, use of chemicals and fuel • Solid wastes arising • Liquid effluent • Emissions to atmosphere • Noise • Light	• Long-term landtake effects on ecology • Effects on landscape and visual amenity • Soil and groundwater contamination • Effects on water quality, aquatic ecology and resource users • Effects on air quality, ecology and human health • Global warming
	Marine • Direct footprint • Chemicals storage, handling and use • Emissions to atmosphere • Operational noise, helicopter supply and standby vessel movement • Discharges to sea • Oil spill risk • Light	• Loss of seabed habitat • Interruption to fishing effort • Disturbance to seabirds and marine mammals • Effects on water quality and marine ecology • Effects on air quality and global warming • Risk to marine and coastal resources in event of spill

[2] Adapted from Shell's *Integrated Impact Assessment: Environmental Impact Assessment Module*, EP 95-0370, May 2002. Secondary impacts are covered in *Good Practice in the Prevention and Mitigation of Primary and Secondary Biodiversity Impacts* and the *EBI Good Practice Database* (forthcoming).

- Secondary impacts (i.e. those that do not result directly from project activities, but are triggered by the operations, may reach outside project or even concession boundaries and may begin before or endure beyond a project's lifecycle).

- Resource use to supply development and operational stages (e.g. water, timber and food requirements that can affect biodiversity away from the core activity area).

- Local, regional and national conservation priorities.

- Different stakeholder perspectives as to what biodiversity is of value.

- Sites that have not been designated for protection.

- Non-protected species.

- The significance of biodiversity for people's livelihoods and quality of life (see Box 1).

Examples of other primary biodiversity impacts that may need to be considered are summarized in Table 1. These, in turn, may cause primary and secondary environmental and social impacts as noted in Section 3.

BOX 1. WHY IS BIODIVERSITY IMPORTANT TO PEOPLE'S LIVELIHOODS

A significant proportion of the world's population is directly dependent on the surrounding environment for subsistence and livelihood support. The correlation between local environment and subsistence or livelihoods support is strongest for poor and rural populations, the same populations that have the least influence in key decision-making processes relating to their environments. This fact underlines the importance of stakeholder engagement to assimilate local knowledge and address community concerns regarding the integrity of subsistence and livelihood systems. Examples of the role of biodiversity in supporting subsistence and livelihoods include:

- Subsistence goods – Biodiversity supports and provides a vast array of products that can be hunted or gathered from natural, semi-natural or managed environments for subsistence use. Common examples include foods, building and clothing materials, medicines and foods for domesticated animals.

- Tradable goods – Examples supported or provided by biodiversity include foods, timber, wildlife, fish and genetic resources.

Biodiversity also provides less tangible indirect benefits – these cannot be traded, but underpin the natural production systems central to many people's livelihoods:

- Environmental services – Biodiversity is the medium through which air, water, gases and chemicals are moderated and exchanged to create environmental services, including watershed protection and carbon storage (large-scale examples) and nutrient recycling (small-scale example).

- Informational and evolutionary – Biodiversity comprises genetic diversity and associated information, used by people to create new crops or animal varieties and pharmaceuticals. Biodiversity also allows adaptation to take place through natural and artificial selection.

- Aesthetic – Unique species and special landscapes may be important sources of revenue through initiatives such as ecotourism.

Non-use benefits of biodiversity, such as the capacity to adapt to future changes, risks and uncertainties cannot be captured by individuals, but are "owned" by society at local, regional and global levels.

It is not always the case that such direct or indirect uses of biodiversity resources are sustainable, and in supporting livelihoods, biodiversity itself is often put at risk. There is a global trend toward more material-based cultures, which has focused demands on direct use and generation of private benefits from biodiversity resources, rather than on the maintenance of public biodiversity resources. There is, therefore, a growing need to better balance the support of livelihoods with the conservation of the very biodiversity resources that underpins that support.

With appropriate integration of biodiversity issues into the ESIA process, a company can:

- Identify early on the potential risks/impacts of the project on biodiversity.

- Maintain as far as possible the biodiversity of the area by avoiding or reducing impacts.

- Benefit the biodiversity of that particular environment by managing its land for biodiversity and properly decommissioning the area.

- Obtain support and recognition from the conservation community and other stakeholders for responsible performance and appropriate management of risks, thereby supporting its license to operate and safeguarding its reputation.

- Gain access to local knowledge (via local organizations and communities).

- Make the link between the ecological and social aspects of biodiversity in, for example, safeguarding livelihoods.

- Reduce potential future liability arising from damage to biodiversity resources.

3. INTEGRATION OF BIODIVERSITY INTO THE ESIA PROCESS[3]

3.1 INTRODUCTION

In April 2002, the Conference of the Parties (COP) to the CBD decided to endorse a set of draft guidelines for incorporating biodiversity-related issues into EIAs (COP 6 Decision VI/7-A) and by extension ESIAs. These guidelines were primarily based on the conceptual and procedural framework prepared by IAIA (2001). Although the COP decision is directed toward governments, the main substance of the decision and the draft guidelines are clearly relevant for the oil and gas industry as well.

The decision emphasizes that the definition of the term "environment" in national legislation and procedures should fully incorporate the concept of biodiversity as defined by the CBD, such that plants, animals and microorganisms are considered at the genetic, species/community and ecosystem/habitat levels, and also in terms of ecosystem structure and function. This recommendation is also applicable with respect to company policies and requirements, and should be the basis for environmental and social assessments in oil and gas projects.

Furthermore, the ecosystem approach, as described in decision V/6 of the COP, is referred to as an appropriate framework for the assessment of planned action and policies. In accordance with this approach, the proper temporal and spatial scales of the problems should be determined, as well as the functions of biodiversity and their tangible and intangible values for humans that could be affected by the proposed project or policy, the type of adaptive mitigation measures and the need for the participation of stakeholders in decision-making. The importance of focusing on key ecological processes and functions are emphasized, which implies that there is a need to consider the full range of ecosystems and habitats involved, as the ecological processes and functions may vary depending on the ecosystems and habitats affected.

Within the context noted above, and based on an appropriate risk assessment, biodiversity can be integrated into each stage of the ESIA process by:

- Adopting an ecosystem approach grounded in the CBD (see above).
- Ensuring secondary and/or cumulative impacts are fully accounted for (see Section 3.3).
- Analyzing and responding to the interaction between the environmental and social "worlds" (see Figure 3).
- Differentiating between different levels of impact (i.e. ecosystem, species and genetic) and responding with appropriate preventative and mitigative actions (see Section 3.8).

Therefore, considering the main objectives of the CBD (conservation, sustainable use and equitable sharing of benefits derived from biological diversity), the following biodiversity-related questions need to be answered in an ESIA:

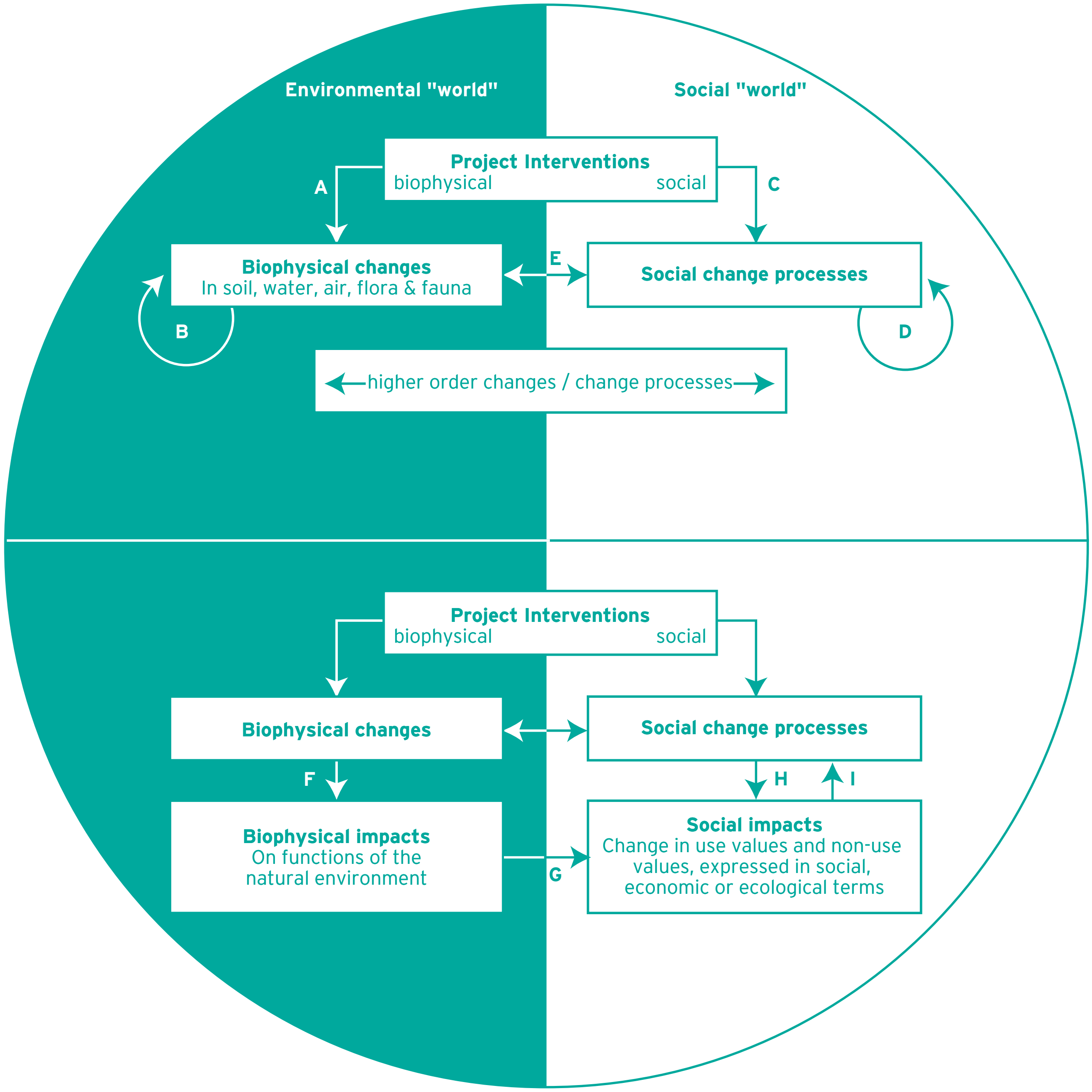
(a) Does the intended activity affect the physical environment in such a manner or cause such biological losses that it influences the chance of extinction of cultivars, varieties, populations of species, or the chance of loss of habitats or ecosystems?

(b) Does the intended activity surpass the maximal sustainable yield, the carrying capacity of a habitat/ecosystem or the maximum and minimum allowable disturbance level of a resource, population or ecosystem?

(c) Does the intended activity result in changes to the access to and rights over biological resources?

[3] As noted in Section 1, in some cases the government and national legislation will dictate the need for, and type of ESIA undertaken, rather than the company. It will not always be at the discretion of the company. It is important to remember this while reading the following sections, as the suggested approaches to integrating biodiversity may be superseded when the company has little control over the ESIA process.

FIGURE 3. INTERACTION BETWEEN THE ENVIRONMENTAL & SOCIAL "WORLDS"



- **A.** Activities lead to biophysical changes: Proposed projects or activities consist of biophysical as well as social interventions. Biophysical interventions lead to biophysical changes (defined as changes in the characteristics of the recipient media soil, water, air, flora and fauna).
- **B.** Each direct biophysical change can result in a chain of secondary biophysical changes.
- **C.** Activities lead to social change processes. Projects can also carry out social interventions that lead to social change processes (defined as changes in the characteristics of individuals, families, functional groups or a society as a whole); the nature of these characteristics can be demographic, economic, socio-cultural, institutional, land use, etc.
- **D.** Each direct social change process can lead to secondary social change processes.
- **E.** Social change processes lead to biophysical changes and *vice versa*.
- **F.** Biophysical changes lead to biophysical impacts. Impacts are defined as changes in the quality or quantity of the goods and services that are provided by the biophysical environment, in other words a change in the functions provided by the biophysical environment.
- **G.** Impacts lead to changed values for society (social impacts). A change in the functions that are provided by the natural environment will lead to a change in their value for human society as society puts a value on these functions. Biodiversity provides functions that provide use and non-use values to human society.
- **H.** Social change processes and social impacts. Under conditions, depending on the characteristics of the existing community, social change processes cause social impacts.
- **I.** As human beings or society as a whole are able to respond to impacts, the experience of social impacts in some cases leads to so-called invoked social changes processes.

In answering these questions it must be borne in mind that the objectives, level, scope and detail of the ESIA into which biodiversity may be integrated will vary according to the project lifecycle stage. The information available and circumstances will also vary through the lifecycle:

- Good practice dictates that an environmental and social risk assessment that considers potentially significant impacts of project activity be conducted before entering an area (e.g. in the *pre-bid* stage). During pre-bid, the data gathered will normally be based on existing information and surveys.

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For further information on identifying areas of high biodiversity or conservation values see **Framework for Integrating Biodiversity into the Site Selection Process.**

However, a lack of detailed biodiversity information, in parallel with the complexity of natural systems and the potential for irreversible impacts, may make the application of the precautionary principle appropriate (i.e. that the absence of scientific certainty does not justify avoiding/postponing actions to prevent biodiversity impacts). It is important to recognize that information gathered at this stage may be commercially sensitive, which in turn may influence how wider discussions with other stakeholders are conducted.

- During or before *exploration and appraisal*, there may be a need for a wider range of more detailed biodiversity information. Data may come from small-scale surveys, consultation with in-country conservation NGOs, careful extrapolation from desk studies or studies in areas that have similar geological/resource, physical and biological characteristics.

- During *development*, in cases where high biodiversity values have been previously confirmed, more detailed surveys may be required. These assessments provide the baseline for future monitoring, evaluation and further research to fill any gaps in knowledge identified previously.

- During *operations*, additional biodiversity impacts not initially predicted may be identified, and mitigation and monitoring actions will need to be identified. The outcome of monitoring will contribute to the refinement of processes and policy as necessary.

- During *decommissioning*, data will focus on ways to meet the final objectives of restoration and reclamation and, where appropriate, the longer-term aspects of aftercare.

The rest of this section presents a step-by-step assessment of where and how biodiversity can be integrated with the major stages of a typical ESIA. Information presented is for guidance only, and should be adapted to the specific design and implementation of individual ESIAs. Steps that do not specifically require consideration of biodiversity (relative to the standard approach taken for other environmental issues) are not included (e.g. preparation of an Environmental Impact Statement, review of ESIA quality, decision-making and reporting).

3.2 STAKEHOLDER ENGAGEMENT ON BIODIVERSITY ISSUES

Stakeholder engagement on biodiversity issues is central to the integration of biodiversity into the ESIA process. Therefore, it is not a discrete stage, but rather an activity that runs throughout the ESIA process (see Figure 2). There are extensive resources in the public literature to help organizations design and implement effective stakeholder engagement processes (e.g. *Doing Better Business Through Effective Public Consultation and Disclosure: A Good Practice Manual*, International Finance Corporation, 1998). This emphasizes the recognition of both primary and secondary effects in an environment over time. OGP and IPIECA have published principles for consultation during project planning and development (*Principles for Impact Assessment: Environmental and Social Dimension*, Report Number 2.76/265, August 1997, Oil Industry Exploration & Production Forum).

The need to consult and involve different stakeholders, and in particular to involve indigenous people, is strongly highlighted both in the COP 7 decision and in other documents. This is underlined by the close relationship between social impacts and environmental/biodiversity impacts. As information about biodiversity is rarely complete, stakeholder involvement may identify additional, unofficial resources and help ensure that all relevant biodiversity concerns are noted. This is especially relevant where biological resources have both functional and cultural importance for societal groups. In such areas, potential operations must fully understand the overall value of biodiversity resources accorded by those stakeholders.

Local communities can indicate which aspects of biodiversity are particularly important to them, and identify opportunities to make positive contributions (e.g. expertise and research that may fill gaps in conservation efforts and biodiversity knowledge). Local, national, or international conservation NGOs can serve as partners in bringing the various local, and at times national, stakeholders together into a consultative process. Many have substantial experience working with other local stakeholders, such as communities, and have extensive knowledge of both biodiversity and the measures necessary to conserve it. Governments can provide vital information about the regulatory requirements for the area, and financing institutions can provide information on their requirements and on what they consider "best practice" for the specific situation. In addition to understanding what can be obtained from stakeholders in terms of information, it is equally important to define their needs so that any data acquired can meet a demand and satisfy concerns.

Depending on the project, consultation at the local, regional and international level may be appropriate and may involve a diverse set of individuals and organizations. Identifying stakeholders with relevant information on, or interests in, biodiversity can present significant challenges. Demands to participate in the consultation process may come from those whose affected interests are unclear, appear insubstantial, or who do not appear to be directly associated with communities affected by a project. Conversely, it may be difficult to ensure adequate representation of some important stakeholder groups, due to cultural, religious, gender, economic or other factors. This is true of all consultation processes, but is particularly important when consulting with indigenous peoples with extensive traditional knowledge relating to biodiversity.

Local communities often have a fund of knowledge and expertise that is extremely valuable in project planning and implementation. It is important to recognize that local communities may be, but are not necessarily the same as, indigenous communities, which are often located in rural environments. If there are stakeholders/ethnic groups potentially affected by the project who would be considered indigenous, then intensive consultation requirements may be required if they are considered vulnerable or marginalized, particularly in countries that are parties to the International Labor Organization Convention No. 169 on Indigenous Peoples. Biodiversity impacts may play an important role in that consultation.

Equally, indigenous peoples may possess an immense knowledge of their environments, based on an understanding of the properties of plants and animals, the functioning of ecosystems and the techniques for using and managing them that is particular and often detailed. In rural communities in developing countries, locally occurring species are relied on for many – sometimes all – foods, medicines, fuel, building materials and other products.

Traditional knowledge has value and validity, but it is not possible to compare scientific and traditional knowledge as simple equivalents. The suggestion that traditional knowledge should be approached as "traditional science" diminishes its breadth and value, and may result in the consultation process not delivering its full benefits in terms of knowledge passed to the company. Traditional knowledge of the area can significantly reduce the effort to acquire this knowledge if it is included in the survey. The development of large-scale detailed maps, catalogs, and even Geographical Information Systems of traditional information by some indigenous associations will vastly speed the process of transfer of information. Local non-indigenous communities of long standing also have traditional knowledge of the local conditions, environment and wildlife. This knowledge may be as in-depth as indigenous traditional knowledge in certain areas, and therefore is of great importance to project planners.

A very useful reference document on this subject is *Integrating Indigenous Knowledge in Project Planning and Implementation*, (Emery, A.R. 2000. International Labor Organization, The World Bank, Canadian International Development Agency, and KIVU Nature Inc.).

See **Integrating Biodiversity Conservation into Oil and Gas Development**, Box 11.

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3.3 ESTIMATION OF SECONDARY AND CUMULATIVE IMPACTS

As with stakeholder engagement, consideration of secondary and cumulative impacts is an activity that underpins the entire ESIA process. The purpose of this activity is to identify secondary impacts and their incremental impacts when added to other past, present and foreseeable current activities. There are many factors that can affect the success of a project. Long-term cycles can be the critically important factors in determining ultimate effects of introduced stresses and changes. Gradual changes may have an accumulating effect. In cumulative effect, these small changes can ultimately be harmful. The people best equipped to discover these subtle potential changes are often the holders of traditional knowledge of the area. When traditional knowledge is used in its original context, and in partnership with other knowledge systems, the combination is often a powerful tool.

However, assessing cumulative effects in practice may require a Strategic Impact Assessment to:

- Assess impact over a larger area (i.e. by taking an ecosystem and regional approach as opposed to just looking at the direct footprint of the proposed project).
- Consider impact on receptors due to interactions with other projects and activities – not just the project under review.
- Evaluate significance in terms of different spatial and temporal scales.

3.4 IDENTIFICATION OF ALTERNATIVES

This stage (which may also take place during the scoping phase) assesses the proposed action and reasonable alternatives to it (including the "no action" or "no project" alternative). This can apply to the overall project and discrete elements within it. Project teams need to develop at the outset a system to document the process of analyzing alternatives for internal and external communications. It is important that emerging knowledge on biodiversity is fed into critical project decisions. For example, the biodiversity experts in the ESIA team may interact with engineers and others determining an optimum pipeline corridor or facility location, to take account of areas of sensitivity, weather windows for construction and restoration issues. Evaluating alternatives also benefits enormously from consultation with stakeholders, who can provide local context and indicate which aspects of biodiversity are particularly important to them. The permanency of the activity being considered may also influence the assessment of alternatives – the need for alternatives may be approached differently if the impact on biodiversity is temporary rather than permanent (e.g. a short-term dirt access road against a permanent tarmac road linking two or more communities).

3.5 SCREENING

Screening is a high-level review to determine whether a partial or complete ESIA is necessary for a project (where that choice can be made by the company). It establishes the basis for scoping, which in turn identifies the key impacts to be studied and establishes terms of reference for an ESIA. Several outcomes are possible from screening:

- No further ESIA is required.
- A full and comprehensive ESIA is required.
- A more limited ESIA is required (often called a preliminary or initial assessment).
- Further study is necessary to determine the level of ESIA required.
- The company makes a decision – based on available information – that it does not wish to proceed with the project (in the case of a new project or acquisition).

For all these outcomes, it is likely that biodiversity will be only one of several factors leading to a decision. Indeed, for many countries, some of the key screening criteria relate to the presence of land statutorily designated for its nature conservation interest, or the presence of protected species, rather than to biodiversity *per se*, the sites having been chosen in advance of subsequent biodiversity-specific legislation. For other countries, the first sieve may be assessing the need for an ESIA to explicitly address biodiversity if the area has protected status or is designated as a priority area for biodiversity conservation. Therefore, the integration of biodiversity at the screening stage may be country (or region) specific.

See **Framework for Integrating Biodiversity into the Site Selection Process** and **International Conventions.**

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3.6 SCOPING

Scoping refers to the early, open and interactive process of determining the major issues and impacts that, in effect, become the "terms of reference" for an ESIA (if required based on screening outcome). From a biodiversity perspective it is critical that longer-term temporal and wider spatial issues are considered, as well as immediate and proximal issues, as these impacts will often have the most enduring biodiversity impacts of a potential operation.

See **Negative Secondary Impacts from Oil and Gas Development.**

Scoping typically builds on existing information – some of which will have been acquired and considered in the earlier phases noted above. Ready access is required to information, including:

- Locations of protected areas.
- Locations of sensitive or important habitats or ecosystems.
- Distributions of protected species.
- Distributions of habitats used by protected species - including those that are non-resident in an area.
- Distributions of protected habitats.
- Experts in biodiversity, including taxonomic specialists.
- Uses of biodiversity resources (e.g. data, information, organizations, etc.).

The types of questions that may be asked to assist in the screening process are shown below in Section 3.8. Scoping should involve the correct expertise (i.e. ecologists and biologists), particularly if the project is located in or near a protected area or a sensitive environment. These experts will review the project and possible areas for development, and work out which ecological functions are important and likely to be affected. In some countries, there may be insufficient expertise and capacity available, and some capacity building might therefore be necessary.

Where scoping has identified gaps in biodiversity data, surveys may be required. According to resource and information needs, these may range from rapid assessments through to more thorough targeted studies and sampling. Whatever survey method is used, it is important to avoid underestimation of the overall value of an area due to factors such as seasonality, or the need for longer-term data. However, the collection of such additional supportive data may be precluded by tight bidding or exploration schedules. This emphasizes the need for the use of standard biological sampling techniques in assessments – recognizing the strengths and limitations of the survey data. It also underlines the need, wherever possible, to gather several sets of samples over a reasonable timeframe, in order to provide a firm baseline for ESIA assessment and evaluation.

See **Biodiversity Indicators for Monitoring Impacts and Conservation Actions.**

To include biodiversity considerations at this stage, it is important to focus on longer-term and wider spatial effects, as they will be among the most intense and enduring impacts on biodiversity. During scoping it is important to have access to quality information (e.g. protected, sensitive or important areas, species, ecosystems and habitats; distribution of species and habitats; and social issues that might affect biodiversity). In addition to identifying the issues that are likely to be of most importance during the ESIA process, scoping also eliminates those that are of little concern. In this way, scoping ensures that ESIA studies are focused on the significant effects, and time and money are not wasted on unnecessary investigations.

Scoping is a key step in management of social issues, since its purpose is to develop a basic understanding of a project's social setting, potential stakeholders, stakeholder issues and the range of probable social impacts and benefits to be addressed. Potential social impacts and benefits are identified that are likely to be interrelated with biodiversity issues, and likely mitigation measures and monitoring requirements are described. As a project develops, assessments are conducted to evaluate and update the initial scoping results. Several assessments might take place during the planning, development and operations phases of a project, and then be modified as new information is obtained.

The range of likely social impacts and benefits can be identified and prioritized using a variety of means, including discussion or interviews with potentially affected people. Public input helps to ensure that important issues are not overlooked when preparing the "terms of reference" for the subsequent ESIA process. As noted above, local/traditional knowledge about the presence, use and value of biodiversity resources should be incorporated where possible. Another potentially useful reference source on this subject is International Association of Oil and Gas Producers (OGP), 2002, *Key questions in managing social issues in oil & gas projects*, Report No. 2.85/332.

3.7 BASELINE ESTABLISHMENT

Prediction of impacts on biodiversity is difficult. Understanding how an ecosystem changes through time, even without an oil and/or gas project, is not simple. An important first stage in gaining an understanding of how the system might be changed by the proposed project is to take a "snap-shot" of the existing conditions – the baseline environment. Often the main difficulty associated with assessing biodiversity baselines is the limited time within the ESIA for a thorough assessment. This results in issues such as migratory patterns and seasonal variations not being addressed properly, making it still more difficult to develop an accurate assessment.

This is not to say, however, that baseline surveys within a standard ESIA should not be conducted, but it will be a case of professional judgment (either in-house or external) of how detailed they should be. Utilizing the skills of an expert within the ESIA team can expedite both the fieldwork and the interpretation of related findings. In addition, consultation with local stakeholders such as local communities (harnessing local knowledge such as ethno-botany), academics and local organizations will help to build a more accurate baseline.

The baseline survey provides the necessary information on the site-specific environmental setting of the project, and should include information about the components of biodiversity (ecosystems and species, in particular) that may be affected. If the project is in or near a protected area and/or sensitive environment, and it is not practicable to locate the project outside the area, then the baseline will likely entail more extensive work. Ideally, field surveys should be designed to yield information about ecosystem or species functioning, as well as recording the habitats and species that are present. This could include, for example, watershed dynamics, extent of habitat intactness, seasonality, migration and breeding patterns, and predator-prey relationships. Such elements will be important in developing an understanding of how the ecosystem and its component species will react to changes caused by the development. Appendix 1 summarizes some of the key information that might be assembled in preparation for fieldwork through the use of a Biodiversity Status Report Form.

Biodiversity field surveys will require sufficient time and resources. However, it should be recognized that mobilizing environmental survey teams into remote or difficult areas may be costly. An efficient way of undertaking some surveys may be to combine them with other project surveys (e.g. when conducting coastal bed topographic surveys it may be more cost-effective to include a benthic survey).

The results of the baseline surveys should be shared with stakeholders through the engagement process. This is an important step as it provides feedback on the work undertaken, and identifies the extent and nature of any further work required. Having established a biodiversity baseline and discussed it with stakeholders, it is then necessary to work systematically through the various activities and aspects of each development alternative to determine the likely effects of those activities on the baseline, making sure to:

- Take into account the nature of the impact (direct or indirect, long term or short term, effects from cumulative impacts, etc.).
- Identify the type of impact (positive – enhancing biodiversity; negative – causing biodiversity loss; or neutral – no net change).
- Determine the likely magnitude of the residual impact (x hectares/acres of an ecosystem or habitat, x number of individuals of a species, etc.).
- Take into account the effects that could be associated with emergency situations so as to consider such risks in the design of appropriate emergency response plans.

3.8 EVALUATION (IMPACT ANALYSIS)

3.8.1 Introduction

The ecosystem approach used by the CBD, which stresses the interrelatedness of potential issues, offers an effective model for understanding the interplay between the different components of an intended operation. It allows for the recognition and prediction of primary and secondary biodiversity impacts and their effects over time. The approach recognizes that changes need not be immediate, but can be either the result of single or cumulative impacts, typically when a threshold is exceeded. This reaffirms the need for consistent, quantified data as the basis for discussion, evaluation and potential subsequent action as part of the ESIA process.

See **Biodiversity Indicators for Monitoring Impacts and Conservation Actions.**

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In predicting impacts, it is necessary to take into account the:

- Ability of an ecosystem/habitat or species to recover.
- Local value and role of biodiversity.
- Temporary nature/cycles of some processes (e.g. flooding, migrations, etc.).
- Global, national or local significance (or importance) of the biodiversity component and other national values or ecological processes.

For the purposes of an ESIA, it is useful to place some sort of value (low, moderate, high) on the components that might potentially be affected. Although this is to some extent subjective, expert judgment (and stakeholder engagement) will ensure a reasonable degree of consensus on the intrinsic value of a resource. Expert judgment can also play an important role in designing a monitoring program that systematically assesses impacts against the baseline. This will assist in determining adaptive measures to enhance operations while limiting their negative impacts.

Once the potential biodiversity impacts are summarized and available data analyzed, the significance of any potential impacts can be assessed. It is important to also consider impacts on a wider temporal and geographic scale. Impact identification and prediction are undertaken against an environmental baseline, often delineated by selected indices and indicators, including ecological sensitivity and biodiversity. The collection of baseline information and the relevant biophysical and socio-economic conditions begins during screening and continues in scoping. Often, additional baseline data will need to be collected to establish reference points for impact identification and prediction. This allows the balanced assessment of the biodiversity and wider social impacts of the possible activity and their significance. Significance here relates both to direct biodiversity effects: e.g. the exceeding of survivability thresholds, the likelihood of unacceptable loss in terms of national/international objectives (such as agreed under the CBD), and social changes and impacts with their associated secondary biodiversity impacts. Significance will vary according to national standards, and may be enshrined in law.

In evaluating the overall significance of the impact, it is necessary to consider the importance or sensitivity of the biodiversity resource that is being affected, the magnitude of the impact and its use value (e.g. to local communities – see Box 1). Should there be limited site-specific biodiversity information available, it may be feasible to fine-tune the assessment using secondary data sources (e.g. remote sensing data, certain local stakeholders), which may hold information about the potential area where the project might be located. Data are more likely to exist if the area is under protection, or has been designated as a conservation priority area by a government agency or conservation organization.

See **Framework for Integration of Biodiversity into the Site Selection Process** for further information on significance.

The types of questions relevant to biodiversity during impact analysis may include:

- Are there any endemic species in the concession? What is the level of endemism? What percentage of the global/regional population is in the concession?
- Are there key ecosystem services/functions of critical importance in the concession (e.g. breeding and feeding areas for global and regional migratory species, migration corridor for terrestrial species)?
- Is the ecosystem particularly vulnerable to the introduction of new alien invasive species (e.g. is it an island)?
- Are there any non-designated areas of high biodiversity value (e.g. ancient woodlands, coastal habitats such as estuaries, dune systems or salt marshes, bogs, mires and fens, or mangrove areas) in the concession?
- Are there any ecosystems and habitats that are subject to national, regional or local Habitat Action Plans?
- Are there any ecosystems and habitats representative of unique biological processes (e.g. hydrology), as compared to other ecosystems/habitats in the area?
- Are there any species under protection (e.g. Convention on Migratory Species, the Birds or Habitat Directives etc)?

See **International Conventions.**

Within the wider context of such questions, when predicting and evaluating impacts on biodiversity resources, it is important to consider biodiversity at three levels: ecosystem/habitat, species and genetic. There is also a social change component to consider and it is therefore important to predict and assess impact on biodiversity in terms of both conservation and the sustainable use of biodiversity resources (see Box 1).

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See **Framework for Integration of Biodiversity into the Site Selection Process** (Question 6) for further information on impacts at ecosystem/habitat, species and genetic levels.

3.8.2 Impact levels

ECOSYSTEM/HABITAT

The conservation value of ecosystems and habitats is assessed according to widely accepted criteria, of which the most important are naturalness, fragility, extent, rarity and diversity. Naturalness and diversity can be strongly correlated, and re-created habitats tend to be more species poor and more sensitive to impacts than their natural or semi-natural equivalents. The fragility and sensitivity of the habitat/ecosystem and its ability to recover (either naturally or through proper management) from disturbance must be considered. This criterion is linked also to size, naturalness and rarity, but fragile sites are often highly fragmented, decreasing rapidly in extent and number and difficult to re-create.

In addition to the above-mentioned criteria, the impact on an ecosystem's ability to provide long-term services or functions must be assessed. For example, has the company assessed all the impacts to an ecosystem when locating a project in a watershed? The ability for that ecosystem to continue to provide services such as clean water, soil erosion defenses, and drainage needs to be assessed, as well as the potential impact these changes may have on local economic and production systems or on any local communities that might depend on such services.

Often the conservation and sustainable use importance of a habitat/ecosystem will be a function of the species and communities that it contains. In predicting and assessing biodiversity impacts, it is also important to consider impacts at the species level. Potential impacts to species are assessed according to accepted criteria such as population dynamics and the extent to which species/communities are rare or under threat.

SPECIES

As with ecosystems, it is also important to assess whether the project will affect the sustainable use of a local population of a species. It is important to note however, that the value given to certain species by stakeholders may not be recognized as very important internationally or nationally, but nevertheless may be significant locally.

GENETIC

Many species are comprised of numerous populations that have their own genetic distinctiveness. The loss of any genetically distinctive population therefore is likely to have a significant impact. The problem, however, is that it is extremely difficult to determine the potential loss of natural genetic diversity. This may mean, in practical terms, that the focus on impacts may need to be at species or ecosystem/habitat levels.

3.8.3 Potential impacts

Potential physical and biological impacts (adapted from Shell's *Integrated Impact Assessment: Environmental Impact Assessment Module*, EP 95-0370, May 2002) include:

HABITAT LOSS EFFECTS

- Permanent habitat loss on site.
- Temporary habitat loss on site (e.g. land taken up by construction equipment/temporary roads).
- Physical removal of soils and vegetation.

HABITAT FRAGMENTATION EFFECTS

- Reduced habitat connectivity in the landscape can disrupt the established relationships between different habitats or patches of the same habitat (e.g. migratory routes might be interrupted).
- Barrier effects on species (e.g. above-ground pipelines), can affect the movement of wildlife. Normal non-migratory movement patterns may be influenced by presence of oil and gas infrastructure.
- Increased mortality due to collisions with vehicles, for example.
- Edge effects – if vegetation is removed the new linear gap creates a new microclimate and a change in physical conditions that can extend varying distances from the edge. This newly created habitat may provide habitat for edge species and facilitate dispersal for some species.

- Reduced patch size – may reduce populations of key plant species, which in turn may affect the abundance of insects. These require a minimum area to sustain viable populations and may in turn affect other species such as predatory birds. Also small patch size may not be able to support the range of habitat structure needed to sustain a range of different species.

CHANGES TO NATURAL PROCESSES

- Groundwater regimes – changes in the groundwater regime may adversely affect habitats dependent on the water table (e.g. marsh, fen and bog). Depending on the geology, lowering the water table can impact habitats a considerable distance from the development (this may also affect downstream human communities).

- Stream/river flows – increases or reductions in natural rates of flow. Accumulation of construction spoil can alter flow, volume and composition of the water (e.g. increased solids increase turbidity, which can cause abrasion damage and gill blockage in fish and lead to the disappearance of filter feeding invertebrates).

- Soil leaching and changes in soil structure.

- Soil erosion patterns.

POLLUTION

- Water pollution from spillages – this may lead to adverse changes in aquatic biodiversity, as can changes in sediment and solid loads in watercourses.

- Emissions of pollutants to atmosphere (e.g. NO_x, SO_2, dust, etc.) can affect biodiversity either directly (e.g. dust can smother and suffocate plants) or via secondary impacts such as changes in soil and surface water chemistry following the washout of air-borne pollutants.

DISTURBANCE

- Fauna can be disturbed by noise, lighting and vibrations from either construction or operation activities.

- Introducing non-native invasive species can also cause significant and long-term disturbance to a habitat and other species. This can happen either intentionally (e.g. by planting non-native invasives in restoration), or unintentionally (e.g. by bringing non-native invasives onto a site on equipment used elsewhere).

Social changes induced by the project may result in long-term impacts on biodiversity that may be more significant than the actual footprint of the project itself. Secondary social impacts can take many forms, but the most common among them include:

- *Access to new areas*: Building roads or pipelines into areas that have previously been inaccessible for development can facilitate access for settlement, logging and hunting, increasing pressures on natural resources.

- *Immigration/new settlements*: A high demand for labor, the prospect of new economic opportunities, and new infrastructure often lead to a significant population increase in the area surrounding an oil or gas operation. This will in turn increase the pressure on land, water, wildlife and other natural resources, and the new settlements may remain in the area after oil or gas extraction has ceased.

3.8.4 Assessing impacts

It is essential that the criteria by which impact significance is judged be clearly defined and set out in the ESIA (unfortunately, this is often not done in ESIAs, due to the apparent difficulty in determining significance). Setting the criteria for what amounts to "high" (major), "medium" (moderate) or "low" (minor) magnitude impact for a particular project involves deciding what amount of change is acceptable in that case (sometimes referred to as the "limits of acceptable change"). Ideally, these criteria will be derived from appropriate objectives/targets for individual habitats and species (e.g. targets set in national, regional or local Biodiversity Strategies and Action Plans [BSAPs]) and/or from stakeholder engagement. "Off-the-shelf" criteria definitions should not be encouraged.

Where there are no appropriate targets/nature conservation objectives, specific criteria will need to be developed on a case-by-case basis, based on expert opinions. The following examples of criteria used to assess significance are based on habitats and species:

ASSESSING IMPACTS TO HABITAT

- *Major negative impact*: the proposal (either on its own or together with other proposals) may adversely affect the integrity of an area/region, by substantially changing in the long term its ecological features, structures and functions, across its whole area, that enable it to sustain the habitat, complex of habitats and/or population levels of species that makes it important.

The whole area can irreversibly change into a different landscape.

- *Moderate negative impact*: the area/region's integrity will not be adversely affected in the long term, but the effect on the site is likely to be significant in the short to medium term to some, but not all, of its ecological features, structures and functions. The area/region may be able to recover – through natural regeneration and restoration – to its state at the time of the baseline study.

- *Minor negative impact*: neither of the above applies, but some minor impacts of limited extent, or to some elements of the area, are evident but easy to recover through natural regeneration.

- *Positive impact*: examples include a mitigation package where previously fragmented areas were united through habitat creation work (the concept of connectivity), or the appropriate use of design features such as ditches, hedges, scrub, linear woodland, grassland, large wetlands or small ponds to create microhabitats. Many such improvements, while being very useful, will not provide a significant gain to the biodiversity interest within the natural area – these should be assessed as minor positive. However, where a significant net gain is evident (determined through stakeholder engagement), the features should be assessed as either intermediate positive or major positive (if, for example, the net gain is of national importance). It should be noted that, if not properly designed, what appears to be a positive impact in the short term can lead to longer-term impacts that may be more damaging.

ASSESSING IMPACTS TO SPECIES

- A *high magnitude impact* on a species affects an entire population or species in sufficient magnitude to cause a decline in abundance and /or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations, or when there is no possibility of recovery. A major impact may also affect a subsistence or commercial resource use to the degree that the well-being of the user is affected over the long term.

- A *moderate magnitude impact* on a species affects a portion of a population and may bring about a decline in abundance and/or a reduction in the distribution over one or more generations, but does not threaten the long-term integrity of that population or any population dependent on it. The size, and cumulative character, of the consequence is also important. A Moderate Impact multiplied over a wide area would be regarded as a Major Impact. A short-term effect upon the well-being of resource users may also constitute a moderate impact.

- A *low magnitude impact* on a species affects a specific group of localized individuals within a population over a short time period (one generation or less), but does not affect other levels or the population itself.

It is also important to look at a holistic level to assess whether the project will affect the achievement of the aims of any BSAPs (which could be at an international, national or local level and cover a species or an ecosystem/habitat). Such an assessment may also identify opportunities for the project team to contribute in a positive manner to the achievement of the aims.

Engagement with key stakeholders is vital in determining significance, as many of the ecological functions that make an ecosystem or species important are related to the environmental, economic or cultural values and services of that ecosystem or species. Thus, involving stakeholders in determining significance can help ensure the mitigation measures address those impacts that are important to people, as well as those that are important for the environment.

It should be noted that a moderate or low-magnitude impact to a species may be regarded as a high-magnitude impact on a genetic level, if a distinct or isolated subspecies, population or geographical variant is significantly affected by a project.

3.9 DEVELOPMENT OF MITIGATION OPTIONS AND IMPLEMENTATION

Based on a thorough impact evaluation, the hierarchy of *avoid – reduce – remedy – compensate* provides the framework for developing a checklist of mitigation options. The purpose of mitigation is to identify measures that safeguard the environment and the community affected by the proposal. Mitigation is both a creative and practical phase of the ESIA process. It seeks to find the best ways and means of avoiding, minimizing and remedying impacts. Mitigation measures must be translated into action in the correct way and at the right time if they are to be successful. This process is referred to as impact management and takes place during project implementation. A written plan should be prepared for this purpose, and includes a schedule of agreed actions.

The objectives of mitigation are to:

- Find better ways of doing things.

- Facilitate the environmental and social benefits of a proposal.

- Avoid, reduce or remedy adverse impacts.

- Ensure that residual adverse impacts are acceptable.

Examples of how these objectives may be achieved include:

- *Avoid at source or reduce at source:* Avoid locating facilities in sensitive environments; reduce land-take to minimum practicable. Source materials that have been sustainably harvested. Maintain intact habitat.

- *Abate on site:* Develop and implement actions within the facility EMS to manage the site for biodiversity (create habitats, identify species of interest and minimize disturbance during construction and maintenance, etc.). Treat waste to ensure it is of a standard that will not adversely affect biodiversity.

- *Repair or remedy:* Restore impacted areas using native species and in ways that are compatible with local ecology.

- *Compensate in kind or compensate through other means:* Offset impacts by creating or managing habitat for impacted areas. Note that offsets should ideally be agreed with stakeholders and created before a habitat is initially impacted upon. In some countries, the law requires this approach.

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Further information on avoiding or minimizing impacts can be found in **Good Practice in the Prevention and Mitigation of Primary and Secondary Biodiversity Impacts**. Further information on types of measures that might also be considered for use as compensatory measures can be found in **Opportunities for Benefiting Biodiversity Conservation.**

In terms of the project lifecycle, biodiversity mitigation issues may come up repeatedly. As they are in effect a trade-off between pre-existing and amended conditions, they will often be subject to formal or informal assessment monitoring as part of license or other conditions for mitigation. Here, as elsewhere in the ESIA process, biodiversity considerations on the ground may be dealt with through the use of contractors. Therefore, it is important that legal agreements with contractors, and other parties in joint ventures, specify the expectations and standards to be attached to biodiversity-based mitigation.

Several choices of mitigation measures exist for most effects. Almost any effect can be mitigated and will require the participation of one or more entities. Because such choices exist, selection of actual measures should consider the present and future equity of impacts, and who benefits from the measure. For example, a mitigation measure might be implemented that will benefit a local community in the short term, but have potential long-term adverse effects on future generations. Social mitigation measures may be viewed as a social investment. Such investment may lead to increased cooperation between stakeholders and project proponents, in addition to potentially reducing risks. However, as with any mitigation measure, government and regulatory agency concurrence may be important, especially in cases when one of the project partners is a government and a stakeholder in the long-term success of the measure. It is desirable to have full company management support of mitigation measures. Management support facilitates integration of mitigation efforts as part of daily management expectations. It also provides the support for funding and implementation programs and encourages active assessment and change as appropriate. Use of public relations to publicize and/or promote the measures may also benefit the project proponent by raising awareness of the positive effects of the measure.

Secondary biodiversity impacts may be difficult to address. Early and active involvement of stakeholders is key and companies may wish to consider promoting or participating in a regional planning exercise or strategic impact assessment within which biodiversity issues are explicitly integrated. Such exercises may be led by government or the project but should engage and involve all levels of stakeholders. Regional plans can promote conservation and address issues of infrastructure, access, immigration and resulting exploitation of resources in ways that an ESIA for the project alone cannot.

3.10 MONITORING AND ADAPTATION

Although continuous monitoring may not be required, it is necessary to monitor impacts on biodiversity at relevant stages throughout the life of a project. By systematically comparing and assessing changes to biodiversity against baseline data, companies can evaluate their level of impact and adapt their behavior accordingly. Monitoring also allows companies to check on the implementation of the terms and conditions of approval during the construction and operation phases; to monitor the impacts of the project and the effectiveness of mitigation measures; to take any actions necessary to ameliorate problems; and, as required, to undertake audit and evaluation to strengthen future ESIA applications.

Historically, standard ESIAs have paid relatively little attention to the impacts that end up actually occurring during project construction and operation, after the ESIA analysis is completed. Without appropriate implementation and follow-up to decision-making, ESIA becomes a paper exercise to secure an approval, rather than a practical exercise to achieve environmental and biodiversity benefits (see Section 3.9).

The purpose of ESIA implementation and follow-up is to ensure that the conditions attached to project approval are carried out and function effectively, and to gain information that can be used to improve ESIA practice in the future. By itself, this process cannot turn around an environmentally unsound project. However, it is critical to maximize the returns from the preparation of the ESIA report and its consideration in decision-making. ESIA implementation and follow up allow the measures and conditions attached to project approval to be fine tuned in the light of new information. When used systematically, they facilitate impact management; build continuity into the ESIA process and help to optimize environmental benefits at each stage of project development.

Biodiversity monitoring programs enable the accuracy of the impact predictions and the degree of success of mitigation measures to be evaluated. This is particularly important where uncertainty exists (e.g. in the prediction of impacts and availability of baseline data). Monitoring also allows post-development problems to be identified and rectified. It is important that the monitoring program is well-structured and includes monitoring at each of the project stages. Standard techniques/methods of data collection and quality control mechanisms should be used so that the data can be used for comparative purposes, both over time for the project at hand and with other projects elsewhere as appropriate. In accordance with "best practice," the biodiversity data collected for the ESIA and any subsequent monitoring should be made publicly available to provide opportunities to link into the national planning and nature conservation management processes.

The range of monitoring options available for assessing biodiversity change varies among different species, habitats and groups, with many methodologies tailored to particular circumstances. Common to all is the recurrent use of indicators, which are typically used to summarize trends in particular habitats or species, and act as warning lights of adverse as well as positive trends. They are key to undertaking adaptive management.

Further information on indicators and monitoring can be found in **Biodiversity Indicators for Monitoring Impacts and Conservation Actions.**

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As noted earlier, throughout the ESIA process and the project lifecycle, there are clear needs for consultation and the use of outside skills and resources. Monitoring provides one of the best opportunities for involvement with other stakeholders, and in particular the development of partnerships. Much of the reference and contextual data needed for biodiversity assessment is gathered and held by voluntary and statutory bodies. These provide much-needed sources of expertise and advice, suitable for incorporation into decision-making. Also, they offer the chance to work in the wider biodiversity sphere, including possible options beyond the standard confines of the mitigation process.

3.11 CHALLENGES AND OPPORTUNITIES ASSOCIATED WITH DIVESTITURE

Unless appropriately planned for, the termination of company operations may result in a termination of valuable or necessary biodiversity conservation activities. This can have potentially significant adverse impacts on biodiversity, as well as on company reputation, long after termination of active oil and gas operations. Therefore, companies should consider addressing biodiversity issues at end point divestiture in their operational plans and through ESIA procedures. The different ways in which operating interests can be transferred, depending on the specifics of the project and legal agreements, mean that the company divesting may have considerable flexibility to encourage or even mandate conditions or commitments to be maintained by its legal successor – or none at all. It may be possible to put into place mechanisms to sustain biodiversity conservation efforts that are self-funding or funded by other organizations after the company has left. Ideally, this approach should also be considered as an option from the outset, not only on departure. Longer-term sharing of objectives and outcomes may enhance the entire process. Ideally, company planning for such mechanisms will begin well before exit.

Companies that expect to and do make significant commitments to biodiversity conservation during the tenure of their operating role are encouraged to pursue creative options to encourage continuity and maintenance of those commitments and investments after their departure. Some possibilities that companies might consider would include:

- Negotiating relevant language as part of the underlying host government agreements that would encourage/commit government to maintain implementation of environmental protection activities, including biodiversity conservation, after any transfer of operatorship.

- Negotiating relevant language directly with other partner companies in the joint venture (if any) and/or with the company that is acquiring the assets/interest being divested.

- Implementing biodiversity conservation measures through financial and legal mechanisms (such as inter-governmental agreements, trust funds, etc.) that will be self-sufficient and self-financing and not subject to impairment as a result of a change in operatorship.

- Provision of baseline and subsequent biodiversity monitoring data and methodologies to follow-on companies, to help provide continuity in biodiversity assessment and decision-making post divestiture.

APPENDIX 1. BIODIVERSITY STATUS REPORT FORM

This form lists possible considerations for establishing a preliminary baseline assessment of one or more sites potentially impacted by existing or planned operations. However, it is not a replacement for a more formal biodiversity survey, which may be warranted if impacts appear to be significant and of high magnitude. At the corporate level, a general status report summarizing biodiversity challenges in areas where the company operates may be useful, both for making priorities at the corporate level and for reporting purposes

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Further information on the need for baseline surveys can be found in Section 4.4 of **Biodiversity Indicators for Monitoring Impacts and Conservation Actions.**

Site description:
Location, map – if possible annotate with known biodiverse areas, urban areas, other industrial operations as appropriate.

Land/water possession relations:
Define land/waters owned by company, private land/waters with sub-surface installations such as pipelines and public land/waters.

Activities/installations:
Refinery, pipelines, drilling site, access roads, traffic, noise, emissions, production site – where appropriate for planned or existing operations note possible alternative sites.

History and future plans:
Installation period: When was the operation built – consider the implications for biodiversity?
Operation since-to: Define period of potential operational impacts.
Decommissioning: Planned or executed already – how has biodiversity been affected?

Access:
Closed, open for the public – are there other temporary, transient or permanent non-company sources of impacts present on the site or in the concession area?

Does any land-use restriction apply:
Description, reference to legislation – note if this is considered likely to change.

See **International Conventions** and **Framework for Integrating Biodiversity into the Site Selection Process.**

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EIA performed for the activities on the site/not performed:
Refer to documents, note main findings and conclusions.

Environmental Management Plan does/does not exist:
Refer to document, note key elements, justify any absence of an EMP.

Does the activity influence any protected areas:
Type of protection, legislation, responsible authority, management practices.

Occurrence of habitats with high biodiversity potential/sensitive habitats or biotopes:
Description; wetlands, estuaries, deltas, rainforest, coastal areas, mangroves, etc.

See **International Conventions.**

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Occurrence of red-listed/endemic/vulnerable species:
Species, status, legislation, when and how the species "use" the area.

See **International Conventions.**

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Have any baseline biodiversity surveys been performed:
Type of surveys, year, refer to documentation, responsible person/organization, main findings.

See **Biodiversity Indicators for Monitoring Impacts and Conservation Actions.**

Have the local authorities/NGOs, local biodiversity action plans been consulted:
Who, when, what are the major outcomes of consultations.

Are the biodiversity values in the area well known/ are additional data needed?
Identify any potential gaps in data and assess how these might be filled.

Have the activities affected/destroyed any sensitive habitats:
Description, map.

Do the activities disturb the wildlife/flora:
Noise, dust, traffic, increased human activity in the area, erosion, changed land-use, permanent/seasonal influence, influence area.

Does the activity pose any risk by introduction of new species:
Discharge of ballast water, transfer of soil from off-site, etc.

See **Good Practice in the Prevention and Mitigation of Primary and Secondary Biodiversity Impacts.**

Does the activity pose any risk of pollution/ discharge that might affect biodiversity:
Description, duration of activity, degradability of pollutant.

See **Good Practice in the Prevention and Mitigation of Primary and Secondary Biodiversity Impacts.**

Can any damaged areas be restored/ reconstructed elsewhere, have mitigating or compensating measures been evaluated or implemented:
Description.

See **Opportunities for Benefiting Biodiversity Conservation.**

At decommissioning: can the site be restored leaving the property in a condition suitable for its next intended use (e.g. industrial residential, recreational, conservation):
Description of plan and obstacles that may need to be overcome.

Monitoring:
Purpose, description, refer to ongoing programs, plans for future monitoring surveys.

See **Biodiversity Indicators for Monitoring Impacts and Conservation Actions.**

Have other efforts that could have additional benefits for biodiversity been made/evaluated:
Purpose, description.

See **Opportunities for Benefiting Biodiversity Conservation.**

Biodiversity targets for the area:
Description, refer to management system, management plans.