A REVIEW OF BIODIVERSITY CONSERVATION PERFORMANCE MEASURES

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November 2005

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FOREWORD

This report, '**A Review of Biodiversity Conservation Performance Measures'**, is offered to the CBD Secretariat in response to their request to submit information on initiatives that develop and consolidate indicators on sustainable use of biodiversity for consideration by the Conference of Parties 8th meeting in Brazil, March 2006 (CBD ref: SCBD/SEL/ML/MR/52093).

The report arose from the recognition that when the business risks associated with impacts on biodiversity are taken into account, there are business benefits. It also acknowledges the growing awareness that conservation organisations need to become more accountable for their conservation outcomes to funding bodies, other stakeholders and society in general. In response to these developments Earthwatch Institute and Rio Tinto established a project to identify and develop performance measures to evaluate the outcomes and impacts of conservation efforts for the sustainable management of biodiversity – particular within the context of Earthwatch's and Rio Tinto's site related activities. This, the resulting report, summarises and reviews the key considerations in biodiversity conservation performance measurement, describes the principal systems that have been proposed, the advantages and disadvantages of these and identifies further actions that could be taken by businesses and conservation organisations to develop biodiversity conservation performance monitoring systems.

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January 2006

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ACKNOWLEDGEMENTS

This report was prepared under contract by Graham Tucker (Ecological Solutions), commissioned by Earthwatch Institute (Europe) and funded by Rio Tinto. The project was managed by Jo Zaremba and Roger Mitchell and the analysis of current corporate reporting was carried out by Helen Ferguson and Joanna Watkins – all of Earthwatch Institute (Europe).

The report author (Graham Tucker) and the Earthwatch Institute (Europe) wish to acknowledge the input to the preparation of this report by a number of people who attended workshops or provided information and comments during the drafting stages:-

Stuart Anstee, Sarah Basden, Tom Burke, Dominique Cagnetta, John Hall, Pete Ladman, Mick Lovelly, Dave Richards and Tatiana Faroukhians (Rio Tinto).

Rob Brett and Annelisa Grigg (FFI)

Leon Bennun, Jonathan Ekstrom, Jonathan Stacey and Alison Stattersfield (Bird Life International)

Ken Norris (Centre for Agri-environment Research, Reading University)

Marielle Canter and Bambi Semroc (Conservation International)

Jonathan Bailey (Institute of Zoology, UK)

Sharon Laws and Neil Brummitt (Royal Botanic Gardens, Kew UK)

Ian Dutton (The Nature Conservancy)

Val Kapos (UNEP-WCMC and Cambridge Conservation Forum)

Mike King, Steve Hill and Liz Hawkin (The Environment Council, UK)

Chris Sheldon (Green Inck)

Paul Jepson (Environmental Change Institute, Oxford University).

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EXECUTIVE SUMMARY

Biodiversity is of immense cultural and socio-economic value, but is being widely lost and degraded at record rates as a result of human activities. Various conservation initiatives have been established to reduce these impacts but with limited success to date. Consequently it is being realised that the conservation of biodiversity is the responsibility of all sectors of society, and not just environmental groups. At the same time there is an increasing recognition that there are business benefits when corporations take into account business risks associated with impacts on biodiversity, minimise these impacts and provide reliable and transparent reports on these impacts. For example, the mining company Rio Tinto has stated that "*it recognises the importance of the conservation and management of biological diversity as a business and societal issue and aims to have a net positive impact on biodiversity".*

There is also growing awareness that conservation organisations need to become more accountable to funders, other stakeholders and society in general, and strive to increase the efficiency of their conservation actions.

In response to these developments Earthwatch and Rio Tinto established a project to identify and develop performance measures to evaluate the outcomes and impacts of conservation efforts on biodiversity – particular within the context of Earthwatch's and Rio Tinto's site related activities. This, the resulting report, summarises and reviews the key considerations in biodiversity conservation performance measurement, describes the principal systems that have been proposed, the advantages and disadvantages of these and identifies further actions that could be taken by businesses and conservation organisations to develop biodiversity conservation performance monitoring systems.

The key considerations in developing a biodiversity conservation performance measurements system are what to measure and why, where, when, to and by whom.

Knowing what to measure is of particular importance and is not always straightforward as biodiversity comprises the variability among living organisms which makes it impossible to measure directly. Thus knowing what biodiversity components to measure is very difficult unless performance can be linked to pre-selected and SMART (Specific, Measurable, Achievable, Realistic and Time-specific) objectives.

Ideally measures of conservation measures should asses the impacts of actions in relation to the state of certain biodiversity features. A feature could, for example, include the population size of a threatened species. Only by measuring these can the true impact of actions be assessed. However, performance evaluations should also include an integrated assessment of responses to biodiversity conservations needs (i.e. the quantity and quality of actions and processes) and their impacts on pressures on biodiversity (i.e. threats). This enables an assessment of the efficiency of the conservation project or programme and facilitates adaptive management.

State, pressure and response indicators are often used in performance measurements in an attempt to simplify, quantify and communicate information. However, care needs to be taken in their application, especially where biodiversity performance measures are based on indictors that are selected from generic lists.

Measurements of impacts need to take into account the whole zone of project impact. Where feasible, measures of conservation project performance should also assess impacts on control sites (i.e. representative areas outside the influence of the conservation activities) to assess additionality and displacement effects. Measurements should at the very least start

at the beginning of a project and extend over its entire lifetime. However, ideally measurements should include a pre-project period to establish baseline trends in biodiversity and pressures, and extend to long-term monitoring of the entire period that the project may influence.

Finally it is important to consider who should set the conservation objectives to be monitored, who will undertake the measurements and how these will be independently verified. Where possible all stakeholders should be involved in these processes to encourage trust and widespread ownership of results.

The study has found that corporate performance measurement systems developed so far are of limited direct relevance to corporate needs. This is primarily because of the difficulties associated with measuring biodiversity. Most systems that have been developed or recommended for biodiversity conservation performance measurements have focussed on indirect indicators that measure inputs, activities, processes or outputs, rather than impacts. Those that do suggest direct indicators of the state of biodiversity are very broad and ill-defined, and need to be refined and focussed on relevant project-specific issues.

Similarly most conservation performance measurement systems either tend to focus on processes or indirect measures of performance. Some approaches focus on the monitoring of project-specific objectives and can provide clear SMART objectives against which projects can be assessed. However, in practice, these tend to be expressed in terms of outputs rather than impacts.

Another important limitation of current performance measurements systems is that most tend to be internal self-assessments. Additional independent verification and audit systems may therefore be needed to ensure credibility with all stakeholders.

With regard to the conservation performance systems reviewed and evaluated here it should be possible to adapt and develop some appropriate existing systems for corporate and conservation NGO reporting by following some of the best practice principles of project design and monitoring identified in the study.

For example, businesses could quantify significant biodiversity impacts by developing a system based on an expanded and best practice Environmental Impact Assessment approach linked to Environmental Management Systems.

For NGO projects, a conservation performance measurement system can be developed, integrated and standardised with its existing reporting systems. Here the principal step would be to ensure that SMART objectives are set for each project according to the pressure, state, response framework.

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1 INTRODUCTION

1.1 AIMS AND OBJECTIVES OF THE STUDY

1.1.1 Overall goal of the project and objectives

The Earthwatch Institute and Rio Tinto have established a project to identify and develop performance measures for evaluating the outcomes and impacts[1] of conservation efforts (both successes and failures) on biodiversity in the context of, specifically, Earthwatch field research projects and management interventions on Rio Tinto sites.

This, the resulting report:-

- Summarises the key considerations in biodiversity conservation performance measurements, including the scope of performance measurements (e.g. impacts to be addressed, on-site and off-site, and downstream and upstream), objective setting (and selection of baselines and SMART targets), the use of direct and indirect indicators, indictor properties, indicator frameworks, and the measurement of additionality and displacement effects.
- Describes the principal systems that have been proposed for the measurement of corporate biodiversity performance and conservation project performance, including their monitoring principles, proposed indicators, monitoring methods and geographical scope.
- Examines, by desk research and interviews, a number of case studies where biodiversity conservation performance measurements systems have been implemented. Report on the extent to which they were able to objectively measure performance and summarise their strengths and weaknesses.
- Concludes with a summary of the advantages and disadvantages of the performance measures that have been proposed and used.
- Identifies further actions that could be taken to develop biodiversity conservation performance monitoring systems for businesses and conservation organisations as generic example approaches.

The report does not attempt to describe the detailed technical issues associated with establishing a biodiversity monitoring programme, such as selection of measurements methods, sampling strategies and data analysis. This is beyond the scope of this study and is well documented in several recent manuals (Elzinga *et al.* 2001; Goldsmith 1991; Hill *et al.* 2005; Sutherland 1996; Tucker *et al.* 2005). Nor does the report attempt to provide detailed practical recommendations for biodiversity conservation performance measurement systems for different types of organisations. This will be the subject of the next part of the study and will be informed by this report.

The report focuses on direct and indirect measures of biodiversity status, and therefore does not review the extensive literature on the wider aspects of sustainability and environmental performance reporting etc. It also focuses on project related actions and therefore does not attempt to thoroughly review broader scale regional, national and international initiatives for

[1] In this context outcomes and impacts are synonymous and refer to the net effects of activities on the state (or condition) of specific target biodiversity components.

monitoring biodiversity status, although some (e.g. CBD 2010 target indicators) are briefly discussed where relevant to specific issues.

1.1.2 Structure of this report

This report is for a broad audience, including business and conservation professionals. Therefore, to provide a common understanding of the key issues that underpin the need for this study, this report firstly provides a background summary of the importance of biodiversity and its current status, business risks associated with biodiversity, approaches for minimising these risks and impacts on biodiversity, and finally the need for objective measurements of the impacts of biodiversity conservation measures.

Chapter 2 then reviews the key issues that need to be considered in developing a biodiversity conservation performance evaluation system. Key questions include what to measure and why, where and when.

Existing guidelines and proposed approaches for measuring biodiversity conservation performance are reviewed in Chapter 3 in relation to relevant key issues identified in the previous chapter. Some approaches that have been put into practice are illustrated with selected case studies.

Chapter 4 presents provides the key conclusions from the foregoing analysis, including a summary of the strengths and weakness of the performance measures that have been proposed and used. It also provides some broad generic recommendations for developing biodiversity performance systems, and suggests specific performance measures and reporting frameworks.

1.2 BACKGROUND

1.2.1 The need for biodiversity conservation across all sectors

What is biodiversity and why is it valuable?

Biological diversity (or biodiversity for short) has been defined as "*the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems*." (Convention on Biological Diversity, Rio, 1992). Thus biodiversity resource diverse and complex, which can lead to confusion regarding its measurement and value (see Box 1.1).

Although often overlooked and underestimated, biodiversity is of immense value to society, and therefore companies, as it forms the basis of a wide range of ecosystem services that are essential to humankind (see Box 1.2). The total global value of such services has been estimated to be $33 trillion per annum, which equates to 1.3 times the global GDP (Costanza *et al.* 1997). However, it is important to recognise that biodiversity benefit people through more than just its contribution to material welfare and livelihoods; it also contributes to security, resiliency, social relations, health, and freedom of choices and actions.

Box 1.1 Biodiversity and its loss – avoiding conceptual pitfalls

Source: Adapted from MEA (2005)

Different interpretations of several important attributes of the concept of biodiversity can lead to confusion in understanding both scientific findings and their policy implications. Specifically, the value of the diversity of genes, species, or ecosystems per se is often confused with the value of a particular component of that diversity. Species diversity in and of itself, for example, is valuable because the presence of a variety of species helps to increase the resilience of an ecosystem in the face of a changing environment. At the same time, an individual component of that diversity, such as a particular food plant species, may be valuable as a biological resource. The consequences of changes in biodiversity for people can stem both from a change in the diversity *per se* and a change in a particular component of biodiversity. Each of these aspects of biodiversity deserves its own attention from decision-makers, and each often requires its own management goals and policies.

Second, because biodiversity refers to diversity at multiple scales of biological organization (genes, populations, species and ecosystems) and can be considered at any geographic scale (local, regional or global), it is generally important to specify the specific level of organization and scale of concern. For example, the introduction of widespread weedy species to a continent such as Africa will increase the species diversity of Africa (more species present) while decreasing ecosystem diversity globally (since the ecosystems in Africa then become more similar in species composition to ecosystems elsewhere due to the presence of the cosmopolitan species). Because of the multiple levels of organization and multiple geographic scales involved, any single indicator, such as species diversity, is generally a poor indicator for many aspects of biodiversity that may be of concern for policy-makers.

The global biodiversity crisis

Despite the moral, cultural and economic reasons for conserving biodiversity and its ecosystem services, biodiversity is being lost and degraded at an unprecedented rate as a result of human activities. The state of the world's ecosystems have recently been assessed in detail by an international team of experts under the Millennium Ecosystem Assessment – MEA (2005), who concluded that "*Human actions are fundamentally, and to a significant extent irreversibly, changing the diversity of life on Earth, and most of these changes represent a loss of biodiversity. Changes in important components of biological diversity were more rapid in the past 50 years than at any time in human history*". For example, the assessment found that:

- Virtually all of Earth's ecosystems have now been dramatically transformed through human actions. Although globally, the net rate of conversion of some ecosystems has begun to slow, in some instances this is because little habitat remains for further conversion.
- Across a range of taxonomic groups, the population size or range (or both) of the majority of species is declining.
- Over the past few hundred years, humans have increased species extinction rates by as much as 1,000 times background rates that were typical over Earth's history.
- The distribution of species on Earth is becoming more homogenous (through regional losses of taxa and alien introductions).
- Between 10% and 50% of well-studied higher taxonomic groups (mammals, birds, amphibians, conifers, and cycads) are currently threatened with extinction, based on IUCN –World Conservation Union criteria for threats of extinction.
- Genetic diversity has declined globally, particularly among domesticated species.

Box 1.2 Biodiversity values for humankind

Source: Adapted from MEA (2005)

* Indicates services that are degraded

Provisioning Services

- Food
    a. Crops
    b. Livestock
    c. Capture fisheries*
    d. Aquaculture
    e. Wild plant and animal products*
- Genetic resources*
- Biochemical, natural medicines, and pharmaceuticals*
- Fresh water*

Regulating services

- Air quality regulation*
- Climate regulation
- Water regulation
- Erosion regulation*
- Water purification*
- Disease regulation
- Pest regulation*
- Pollination*
- Natural hazard regulation*

Cultural services

- Cultural diversity
- Spiritual and religious values*
- Knowledge systems
- Educational values
- Inspiration
- Aesthetic values*
- Social relations
- Sense of place
- Cultural heritage values
- Recreation and tourism

Supporting Services

- Soil formation
- Primary production
- Nutrient cycling
- Water cycling

Although biodiversity and ecosystem changes occur as a result of natural causes, current global changes are dominated by five key indirect anthropogenic drivers: demographic, economic, socio-political, cultural and religious, and scientific and technological. In particular, growing consumption of ecosystem services (as well as the growing use of fossil fuels), which results from growing populations and growing per capita consumption, leads to increased pressure on ecosystems and biodiversity. Global economic activity increased nearly sevenfold between 1950 and 2000. These drivers have in turn led to direct pressures on biodiversity, the most important of which have been habitat change (such as land use changes, physical modification of rivers or water withdrawal from rivers, loss of coral reefs, and damage to sea floors due to trawling), climate change, invasive alien species, overexploitation and pollution.

The biodiversity impacts have substantial social and economic consequences because they result in the degradation of ecological services. The MEA found that of the 24 ecosystem services assessed, 15 (or 60%), are being degraded (see Box 1.2). These changes will also be exacerbated by the loss of genetic diversity, which will affect the ability of ecological communities to resist or recover from disturbances and environmental change, including long-term climatic change. Furthermore, the MEA projections and scenarios indicate that these drivers and pressures on biodiversity are likely to continue and as a result rates of biodiversity loss are likely to continue, or accelerate, in the future.

As a result, "*The M[E]A finds that it is likely that the degradation of ecosystems and their services could grow significantly worse during the next 50 years and present a significant barrier to the achievement of the Millennium Development Goals, particularly Goal 1 which focuses on poverty and hunger. Most of the driving forces causing the degradation of ecosystems are either staying constant or growing in intensity, and two - climate change and excessive nutrient loading - will become major drivers of change in the next 50 years*" (Walter Reid, Director of the Millennium Ecosystem Assessment, May 18, 2005, United Nations, New York, USA).

Responses to the global biodiversity crisis

A number of conservation initiatives have arisen as a result of longstanding concerns over environmental degradation and observed losses in biodiversity, including the Ramsar Convention in 1971, World Heritage Convention in 1972, Convention on Migratory Species (Bonn Convention) in 1979, the Convention on Biological Diversity (CBD) in 1992, and a wide range of regional instruments and national legislation. However, these actions appear to have had a limited impact, and therefore in 2002 the world's leaders at the World Summit on Sustainable Development in Johannesburg agreed to further stimulate efforts on biodiversity conservation by setting a target for "*a significant reduction in the current rate of loss of biodiversity*" by the year 2010. This endorsed a previous decision by the Sixth Conference of Parties of the CBD (Strategic Plan, decision VI/26), restated in the Hague Ministerial Declaration of April 14th 2002.

For the purposes of assessing progress towards the 2010 target the 7th CBD Conference of Parties (COP 7) defined biodiversity loss as "*the long-term or permanent qualitative or quantitative reduction in components of biodiversity and their potential to provide goods and services, to be measured at global, regional and national levels*" (CBD Decision VII/30). COP 7 also agreed a framework for evaluating progress towards the target and a list of indicators (see Section 2.3.3 for background on indicators) for immediate testing and possible indicators for development by the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) or Working Groups (see Appendix 1). Subsequently further work has gone into refining these indicators, most recently at the 10th CBD SBSTTA meeting in February 2005 (see Appendix 1). The indicators recommended immediate testing and use will be presented and interpreted in the second Global Biodiversity Outlook, currently scheduled for publication in 2006.

The role of business

As the MEA (2005) notes, such biodiversity targets and the UN Millennium Development Goals will only be achieved if the conservation and sustainable use of biodiversity becomes an integral component of sectoral economic development (e.g., agriculture, forestry, coastal zone management). Consequently it is now becoming more widely recognised that the conservation of biodiversity is the responsibility of all sectors of society, and action is required and expected from businesses as well as governments, conservation organisations and wider society.

There are now some legal requirements for businesses to take biodiversity into account in their operations. For example, under the EU Environmental Liability Directive companies may be liable for biodiversity loss as a result of pollution or other environmental damage. In the UK public bodies, such as water companies, are now leally required to take positive measures to conserve biodiversity on their land holdings under the Crow Act 2004.

Companies are also increasingly engaging in wider Corporate Responsibility (CR) issues and biodiversity impacts and other environmental considerations are important components of this. It is also being recognised that biodiversity issues can pose substantive risks to business (Box 1.3). Consequently a good environmental record provides a number of significant competitive benefits, which contribute to business sustainability, profitability and shareholder value, albeit unquantified.

Box 1.3 Seven key biodiversity risks

Source: (ISIS Asset Management 2004b)

Access to land

Example: Access to new sites is affected by a company's track record on protecting/restoring biodiversity and water resources.

- **Reputation**

Example: A biodiversity-related campaign over an issue such as Genetically Modified Organisms or dolphin-friendly tuna, reduces consumer confidence in a brand or company, resulting in lower sales.

- **Access to capital**

Example: Environmental credit risk is assessed as high due to a company's poor biodiversity track record or management plans, and cost of capital increases.

- **Access to markets**

Example: Inability to meet specifications from substantial buyers - such as government departments and agencies for sustainably-sourced raw materials like timber, restricts access to a major market[2].

- **Security of supply**

Example: Reduction in the quality and availability of essential materials such as fish.

- **Relations with regulators**

Example: Concerns about a company's track record on biodiversity management, or lack of confidence in the quality of its biodiversity survey and management plans, leads to permit delays or fines.

- **Liabilities**

Example: Unforeseen impacts of activities on biodiversity lead to financial liability even though a company's regulatory licenses have not been exceeded.

[2] There is increasing interest in this from the finance sector e.g. HSBC mining sector investment guidance, IFC performance standards, equator principle banks.

ISIS Assessment Management (ISIS Asset Management 2004b) carried out a simple assessment of the exposure of various business sectors to biodiversity risks. The level of risk facing a sector was considered to be the result of the interaction between two dimensions of risk:

1. the proportion of companies in the sector likely to be exposed to biodiversity risks; and

2. the significance of the risks likely to be faced by individual companies in a sector.

Using a panel of 29 relevant professionals, they assigned each FTSE Sector to one of three groups:

- **Red-zone sectors**, where:
  - most companies are likely to be exposed to biodiversity risks; and
  - the risks are likely to be significant.
- **Amber-zone sectors**, where:
  - some companies are likely to be exposed to biodiversity risks; and
  - the risks may be significant.
- **Green-zone sectors**, where
  - fewer companies are likely to be exposed to biodiversity risk; and
  - it is harder to identify how, if at all, biodiversity risks may significantly affect the companies in these sectors.

Sectors considered to be in the Red zone (i.e. at highest risk) were construction and building materials, electricity, food and drug retailers, food producers and processors, forestry and paper, leisure and hotels, mining, oil and gas, and utilities. However, some extractive industry companies, including AngloAmerican, BG Group, BP, Rio Tinto, Shell and Statoil, are doing well in terms of their policy, management and reporting on biodiversity, and are amongst the best in any sector in doing so (ISIS Asset Management 2004a).

Amber zone sectors were beverages, chemicals, financial services, general retailers, household goods and textiles, personal care and household products, pharmaceuticals and biotech, support services, tobacco and transport.

The ISIS Investment Management study (ISIS Asset Management 2004b) also noted a number of important issues concerning the relationship between companies and biodiversity, namely:

- Companies have a two-way relationship with biodiversity, encompassing both the impact of companies on biodiversity, and the impact of biodiversity on companies.
- Companies can have both direct and indirect impacts on biodiversity.
- Some companies are dependent on biodiversity, in the form of natural products or ecosystem services. This makes them potentially vulnerable to the mismanagement of biodiversity by others.
- Each of these factors can lead to risks to business.
- Entire sectors may be categorised as high risk due to the nature of their business, but individual companies can mitigate this risk.

As with all business impacts, company exposure to biodiversity risks can be mitigated: firstly, by the extent to which the risks are recognised, and secondly, by the extent to which they are properly managed.

Thus companies can play a particularly important role in biodiversity conservation by adopting appropriate policy, management and reporting measures. For example, ISIS (ISIS Asset Management 2004a) recommendations for extractive companies are:

- **Policy:** companies should have a specific public statement on biodiversity; this statement should explicitly state the company's position on protected areas.
- **Management:** companies should integrate biodiversity within their environmental management systems but at the same time should publish specific information about how biodiversity risks are relevant to their business and how these are being managed.
- **Reporting:** companies should identify their progress on biodiversity within their public reporting, and support this through reporting progress through targets.
- **Long-term risks:** companies should work with industry-wide initiatives on biodiversity to identify and mitigate long-term risks for the sector; in particular, companies should assess and report on their exposure to protected areas including IUCN categories I-IV (IUCN 1994).

Business project impacts

It is now widely recognised that biodiversity impacts from development projects should be mitigated or compensated for. Furthermore, this should occur whether within or outside protected areas; though the mitigation requirements may be more stringent within a protected area and in practice may preclude certain uses of such areas. Mitigation may be achieved by reducing:

- Direct mortality of species.
- Direct habitat loss conversion / degradation (i.e. changes that reduce a habitat's ability to support critical biodiversity, e.g. clearance before mining).
- Indirect impacts (e.g. impacts of soil runoff on aquatic fauna).
- Secondary impacts (i.e. impacts that arise as a result of the project but are not an intrinsic part of the project, e.g. an increase in hunting due to the use of a logging road by hunters)[3].
- Upstream impacts (e.g. from energy use, the materials used at a site and transport to a development site).
- Downstream impacts (e.g. transport of materials off-site to customers, packing waste).

Examples of typical biodiversity impacts arising from mining activities are listed in Table 1.1. The magnitude and significance of such impacts will vary amongst projects; key factors being their size and location with respect to important habitats and species.

[3] Note that the term "secondary impacts" is not synonymous with "indirect impacts" in this report.

Table 1.1. Examples of potential biodiversity impacts from mining operations

Source: Partly based on Table 3.1 ICMM (2005)

Impact category / source	Location	Impact period	Reversibility
Direct (i.e. directly attributable to project actions)			
Habitat loss from extraction operations and supporting infrastructure (e.g. access roads, buildings, power supplies)	On-site and access land	Long-term	Not usually feasible
Hydrological degradation of habitats (e.g. from site drainage or impoundments)	On-site and off-site	Long-term	Partly
Plant mortality from dust deposition	On-site and off-site	Operation period	Usually occurs naturally
Mortality of animals from operations	On-site	Operation period	Population recovery may occur
Emigration as a result of disturbance (e.g. by noise, vibrations and lights)	On site and off-site	Operation period	Population recovery may occur
Mortality of river fauna from toxic effluents in site run-off	Usually off-site	Variable – depending on persistence of toxins	Sometimes
Loss of river macrophytes due to increased turbidity caused by silty site run-off	Usually off-site	Operation and recovery period	Normally difficult if it doesn’t occur naturally
Indirect (i.e. resulting from other impacts that are directly attributable to project actions)			
Loss of river fauna resulting from die-off of macrophytes (resulting from turbidity)	Usually off-site	Operation and recovery period	Normally difficult if it doesn’t occur naturally
Loss of predators as a result of reduced prey resources (e.g. due to habitat degradation or disturbance)	Usually off-site	Operation and recovery period	Feasible
Increased vegetation browsing due to increases in herbivores resulting from reduction in predation rates (e.g. due to emigration of sensitive predators)	On-site and off-site	Operation and recovery period	Feasible
Loss of large animals species as a result of habitat fragmentation	Off-site	Operation and recovery period	Sometimes
Reduced viability of small populations of species due to reduced emigration resulting from habitat fragmentation	Off-site and on-site	Operation and recovery period	Sometimes

Secondary impacts (i.e. resulting from actions that are not an intrinsic part of the project)			
Increased hunting of animals by mining company staff and families	Off-site	Operation period	Sometimes
Increased logging and forest loss as a result of improved access via news roads and human migration for job prospecting.	Off-site	Long-term	Not usually feasible
Cumulative impacts (i.e. impacts that arise in combination with other projects)			
Loss of species requiring large territories (e.g. top-level predators) as a result of combined effects of habitat loss and fragmentation	Off-site	Long-term	Feasible, but difficult

It is generally considered that biodiversity impact mitigation[4] should be a hierarchical process incorporating a range of measures at appropriate times in the project cycle (ICMM 2005). Projects should firstly be planned to ***avoid*** impacts (e.g. through sensitive project location), then ***minimisation*** (or reduction) measures should be incorporated to manage risks (e.g. measures to reduce site runoff). Impacted areas and ecological processes that are significantly impacted may be ***restored*** (or rehabilitated) to avoid long-term impacts. However, many activities (such as mining) inevitably result in some unavoidable residual impacts. These may be ***offset***[5] (or compensated for) by, for example, the protection, creation, restoration or enhancement of other areas of habitat outside the impacted area. In general, offsets are conservation activities that take place outside the geographic boundaries of a development site in order to compensate for unavoidable harm, in addition to any mitigation or rehabilitation that may take place on that site (ten Kate *et al.* 2004). However, some developers own large plots of land and in some circumstances, biodiversity offsets are undertaken on land that would not otherwise be managed for conservation, as a way of offsetting development activity on another part of the plot.

In some cases translocations of species or plant communities may be undertaken, which could be considered to be measures for avoiding or minimising impacts, but these should be regarded as a form of offset.

Cost-effectiveness does, however, need to be taken into account as impact mitigation measures typically follow a law of diminishing returns. Thus decisions need to be made on the levels of residual impact that are acceptable on the basis of legislative requirements, cost, business risk and stakeholder views etc. In some case it may be more cost-effective, in terms of biodiversity benefits, to implement offset measures instead of all feasible mitigation measures.

Some examples of approaches for avoiding, minimizing and offsetting mining project impacts are outlined in Table 1.2.

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[4] In this report mitigation means measures which are an integral part of a project that are taken to avoid or minimise the risks or severity of harmful impacts, it does not include offsets or compensation.

[5] The term offset is defined here as "conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure no net loss of biodiversity" (ten Kate *et al.* 2004), and is broadly equivalent to compensation, although the latter may include financial compensation rather than direct actions.

Table 1.2. Examples of potential measures for avoiding, minimizing, or offsetting biodiversity impacts from mining operations

Impact category / source	**Avoidance measures**	**Minimisation measures**	**Example offset measures ***
Direct (i.e. directly attributable to project actions)			
Habitat loss from extraction operations and supporting infrastructure (e.g. access roads, buildings, power supplies)	Avoid important areas	Take measures to minimise footprint (e.g. avoid opencast mining). Habitat rehabilitation	Habitat, creation, restoration or enhancement
Hydrological degradation of habitats (e.g. from site drainage or impoundments)	Design project to avoid needs for site drainage	Sensitive drainage system design	Habitat creation, restoration or enhancement
Plant mortality from dust deposition	Use machinery that collect dust	Plant tall screening vegetation to intercept dust	Habitat creation, restoration or enhancement
Mortality of animals from operations	Avoid use of certain machinery / operations	Encourage animals to leave area operations	Translocation, and / or habitat creation, restoration or enhancement
Emigration as a result of disturbance (e.g. by noise, vibrations and lights)	Avoid use of lights at night	Use efficient quiet machines	Habitat enhancement for impacted species
Mortality of river fauna from toxic effluents in site run-off	Avoid use of toxic chemicals	Use procedures to minimise spillages	Habitat restoration or enhancement
Loss of river macrophytes due to increased turbidity caused by silty site run-off	Use traps to intercept sediments	Use vegetation to stabilise worked ground	Habitat restoration or enhancement
Indirect (i.e. resulting from other impacts that are directly attributable to project actions)			
Loss of river fauna resulting from die-off of macrophytes (resulting from turbidity)	Use traps to intercept sediments	Use vegetation to stabilise worked ground	Habitat restoration or enhancement
Loss of predators as a result of reduced prey resources (e.g. due to habitat degradation or disturbance)	See disturbance measures above	Management actions to boost prey resources	Habitat creation, restoration or enhancement
Increased vegetation browsing due to increases in herbivores resulting from reduction in predation rates (e.g. due to emigration of sensitive predators)	See disturbance measures	See disturbance measures	Habitat creation, restoration or enhancement

Loss of large animal species as a result of habitat fragmentation	Avoid sensitive areas	Use existing access routes	Habitat restoration to link isolated habitat blocks
Reduced viability of small populations of species due to reduced immigration resulting from habitat fragmentation	Avoid sensitive areas	Management measures to increase viability of populations	Habitat restoration to link isolated habitat blocks
Secondary impacts (i.e. resulting from actions that are not an intrinsic part of the project)			
Increased hunting of animals by mining company staff and families	Enforce strict hunting ban	Regulate hunting	Create new hunting reserves
Increased logging and forest loss as a result of improved access via news roads	Avoid use of new roads	Protect habitats	Habitat creation, restoration or enhancement
Cumulative impacts (i.e. impacts that arise in combination with other projects)			
Loss of species requiring large territories (e.g. top-level predators) as a result of combined effects of habitat loss and fragmentation	See habitat loss and fragmentation measures	See habitat loss and fragmentation measures	Habitat creation, restoration or enhancement

Notes: * In addition to protection of equivalent habitats elsewhere. Usually off-site

Conservation projects

Many businesses also undertake or fund positive biodiversity conservation or restoration measures that are not directly associated with specific project impacts as described above. Some businesses have the opportunity to manage parts of their holdings in ways that benefit biodiversity (e.g. buffer zones to mining sites or catchments owned by water companies) or undertake or fund research that can help manage biodiversity more effectively. For example, Northumbrian Water and the UK Highways Agency have produced Biodiversity Action Plans (BAPs) for all their landholdings. Such actions are often undertaken in partnership with conservation organisations.

Conservation organisations (including governmental agencies, academic institutions and NGOs) provide an important role in encouraging and guiding conservation actions (e.g. by businesses, government departments, other landowners and the public) by:

- Monitoring biodiversity and setting protection and action priorities for species, e.g. IUCN Red Data lists (IUCN 2001) and regional threatened species lists (BirdLife International 2004; Tucker & Heath 1994), habitats (e.g. Tucker & Evans 1997) and sites, e.g. BirdLife's Important Bird Areas (Evans 1994; Fishpool & Evans 2001; Heath & Evans 2000).
- Conducting ecological research on species and habitats, to identify the causes of species declines and necessary corrective measures, such as habitat management needs or regulation of species exploitation.
- Planning for conservation e.g. BAPs and site biodiversity conservation management plans (CCW 1996; Hirons *et al.* 1995; Ramsar Bureau 2002; Thomas & Middleton 2003).

- Raising capacity for conservation actions through fundraising, staff training and equipment purchase.
- Awareness raising amongst governments and other decision makers, businesses, landowners and the general public etc.
- Representing public opinion and holding governments and companies to account.

1.2.2 The need for biodiversity accounting and conservation performance measurements

Benefits for business

For businesses the transparent and objective measurement of biodiversity impacts and the performance of mitigation measures, offsets and biodiversity conservation projects is an essential requirement for establishing success in biodiversity management and it provides a number of significant benefits, including:

- An incentive for implementation of actions for biodiversity (a well-known business adage is that "if it doesn't get measured it doesn't get done").
- Demonstrating compliance with legal requirements (e.g. actions required as part of planning permission for a development), or as part of wider corporate responsibility (e.g. for public bodies in the UK, which have a responsibility for encouraging conservation and management of biodiversity on their holdings).
- Demonstrating success with respect to CR reporting (e.g. with respect to GRI) and compliance with public statements on biodiversity, e.g. Rio Tinto's intention to have a net biodiversity benefit. Thereby proving that an organisation does what it says – leading to enhanced public relations and the benefits listed in Box 1.3.
- Establishing if actions (e.g. a biodiversity offset) lead to desired outcomes, thereby allowing for learning and adaptive management (Holling 1978; Salafsky *et al.* 2001).

An examination of corporate environmental reporting amongst the EarthWatch Corporate Environmental Responsibility Group members and those listed in the top 100 of the Companies that Count 2005 DTI list shows that 20 report on biodiversity performance to some extent (Appendix 2). However, few appear to report quantitative measures that can be used to demonstrate a net biodiversity impact. Similarly biodiversity impacts did not appear to be specifically mentioned in KPMG's "*International Survey of Environmental Reporting" (KMPG 1999)*. Of particular relevance to this study, ISIS Assessment Management found that 65% of 20 surveyed global extractive companies did not have reportable targets for biodiversity.

There is therefore an obvious requirement for a standard system that can report a net biodiversity impact objectively, transparently, understandably and cost-effectively. In other words, the ultimate goal is to develop a system that can provide the biodiversity equivalent of audited accounts. Although ambitious this kind of reporting on ecosystem health will become more natural and second nature as society comes to cost environmental externalities (e.g. carbon, water and health benefits) that have traditionally not been included in accounting sheets.

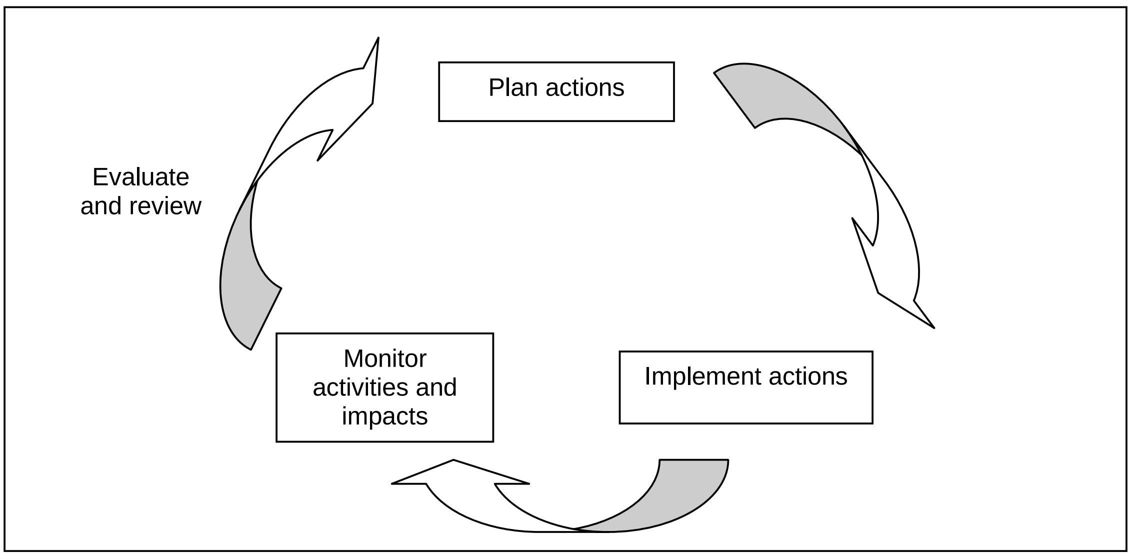
Benefits for environmental organisations

Many environmental organisations carry out monitoring of the state of various biodiversity components (e.g. species populations at site, national and global levels) and it is widely recognised that good conservation management involves the monitoring and assessment of activities and impacts (Hockings 2000; Margoluis & Salafsky 1998; Stem *et al.* 2005; Woodhill 2000). Despite this, as The Nature Conservancy (TNC) notes, conservation organisations are generally not as well prepared as the business to articulate, credibly, their successes and failures (http://www.nature.org/tncscience/strategies/mat.html, accessed

2005). They are often reluctant to objectively assess their progress towards their mission and objectives or to publicly report on these, and what they have learned. There are likely to be two principal reasons for this. Firstly, conservation progress is difficult to measure because of the lag between management action and the slow response of biological systems. Secondly, organisational cultures often stigmatize mistakes, so the lessons learned from risk taking are not properly valued and shared (which can discourage decision-makers from exploring innovative conservation solutions).

However, biodiversity conservation management performance is becoming an increasingly important issue for conservation organisations. This is in part to implement best practice management systems (e.g. see Figure 1.1) and the increasing recognition of the importance of adaptive management (Holling 1978; Salafsky *et al.* 2001). Adaptive management extends the well known plan-do-check-act (e.g. under ISO14001) management system by recognising that our knowledge of ecological relationships is incomplete and, therefore, the management of natural resources is always experimental. It therefore aims to improve our management effectiveness by studying the impacts of implemented activities and learning from these. Thus conservation programmes and projects need to include a stepwise process with multiple milestones and many opportunities for incorporating feedback (Margoluis & Salafsky 1998).

Figure 1.1. A simplified management and monitoring cycle



However, another driver of increased performance measurement is the increasing attention being given to NGO governance and accountability. Jepson (in press) considers that NGOs look and act increasingly like a morph between trans-national corporations and government development agencies, and as a result accountability is becoming as important an issue to them as other primary sectors in society. Furthermore, according to Jepson, concern has arisen over accountability and governance in the NGO sector as a result of a number of issues. Of particular relevance to biodiversity management performance measurement is the growing recognition that, despite numerous conservation initiatives and massive investments in conservation actions over the last 20 years, progress in conservation on the ground has been slow and erratic (Salafsky *et al.* 2002). As a result some major donors are pressuring NGOs for evidence on how they spend their money, how they learn and how well they have been achieving their aims (Christensen 2003; Randerson 2003). In the statutory sector there is also an increasing demand for evidence that good value for money has been achieved when public funds have been used for projects.

Jepson concludes that, ideally each sector of society should be characterised by a distinct accountability regime, but faced with calls for greater accountability, there is a risk that NGOs might apply accountability regimes uncritically from the business or private sector. Instead NGOs, and the NGO sector in general, need to develop and debate a distinct and credible accountability regime that strengthens and defines their role in society.

Such issues have resulted in a number of studies of measures of conservation success initiated by conservation organisations. For example the Conservation Measures Partnership (CMP www.conservationmeasures.org) is a partnership of conservation organizations that are collaborating to develop and promote common standards and tools for designing, implementing, and measuring the impact of conservation actions. Core members include the African Wildlife Foundation, Conservation International, The Nature Conservancy, Wildlife Conservation Society, and World Wide Fund for Nature/World Wildlife Fund. Foundations of Success (FOS www.fosonline.org) currently serves as the coordinator for this partnership. Further details of CMP outputs are provided in Sections 3.2.5 and 3.3.5.

In addition, a related project is being undertaken in the UK by the Cambridge Conservation Forum (CCF www.cambridgeconservationforum.org), which is an informal affiliation of conservation organisations in the Cambridge area. The project, funded by the MacArthur Foundation, deals with harmonising measures of conservation success. The ultimate goal of the project is to improve conservation practice by identifying successful approaches and factors that contribute to their success. It has the following specific objectives:

- Develop CCF's own harmonised approaches to measuring conservation success.
- Interact with the CMP in the USA to test and further develop their measures and compare them with those of CCF.
- Develop a longer term research plan to use these harmonised tools to assess what factors best predict the relative success or failure of conservation projects.

It is being carried out in partnership with the members of CCF through a series of iterative steps, including:

- Compilation of a catalogue of CCF members' existing approaches to monitoring and evaluation of conservation projects.
- Analysis of similarities, differences and gaps among approaches used for particular types of activities.
- Development of draft harmonised measures for each activity type.
- Evaluation of measures using information on specific projects from CCF members, and revision in the light of experience.
- Comparison of measures with those developed by CMP and comparative testing of both sets on new sets of projects from both CCF and CMP members.
- Refinement of proposed measures.
- Development of research questions and a plan of analysis based on the harmonised tools developed.

To date a number of workshops and working group meetings have been held, which have defined the issues to be tackled, developed a typology of conservation projects and activities and started examining possible common approaches for performance assessment for each conservation activity type.

The project is therefore of considerable relevance to this study, and although it is not due to report until 2006, informal briefings on findings so far have been provided by the CCF Project Coordinator (Val Kapos). The author of this report is also a member of the project working group on protected areas.

Information needs

There will be many similarities between biodiversity conservation performance measurement requirements between corporations and conservation organisations. Nevertheless, it is important to realise that performance measurement needs will also vary according to the actions being assessed, and the scale of measurement and reporting. The needs will also vary considerably depending on the audience which may include:

- Directors and senior management
- Project managers
- Project staff (including volunteers)
- Shareholders (private and institutional)
- Conservation project funders / donors
- Government departments / agencies (national and local)
- Customers
- Local communities/ NGOs
- The wider general public

Thus an organisation may need to employ a variety of performance measures and systems at a range of scales. Some examples of performance measurement requirements according to organisation, scale and audience are given in Table 1.3. Specific information needs will vary amongst:

Table 1.3. Examples of different needs for conservation performance measurements

Assessment purpose	**Organisation**	**Key audiences**
Net global impacts of global conservation measures and other initiatives in relation to pressures from human activities and natural changes	CBD, IUCN	Governments, global public, NGOs
Actions, outcomes and impacts of a national Biodiversity Action Plan (BAP)	Biodiversity Action Plan Partnership	National Governments, NGOs and other BAP Partners
The net impacts of a protected area programme (e.g. legislation and management measures)	Statutory conservation agency	National Governments, conservation agencies managers and site staff, NGOs,
Overall corporate (or business unit) performance in relation to CR commitments and national legislation	Corporations	Directors, managers, other staff, shareholders, customers and potential customers
Site-specific assessment of compliance with mitigation requirements according to planning control conditions	Corporations	Project managers, conservation agencies, local authorities, NGOs
Assessment of the outcomes and impacts of a specific conservation activity (e.g. a campaign)	NGO	Project manager, funders, stakeholders
Assessment of the impacts of a conservation programme	NGO	Directors, managers, staff, funders, media and public

2 KEY CONSIDERATIONS IN BIODIVERSITY CONSERVATION PERFORMANCE MEASUREMENT

2.1 INTRODUCTION

Some of the key issues to consider when developing a system for evaluating the performance of biodiversity conservation measures are discussed below. These are mostly generic issues that apply equally well to biodiversity management measures by corporations or conservation projects run by NGOs or governmental agencies. Furthermore, there is increasing overlap between corporate biodiversity actions and projects undertaken by conservation organisations. For example, a conservation project might be to place an area of important habitat under management to enhance its biodiversity value by restoring degraded areas of habitat and regulating unsustainable use of its biodiversity resources. Such actions could equally be taken as offset measures by a company or as part of a protected area management programme run by a governmental agency or NGO. Corporations are also increasingly developing and implementing Biodiversity Action Plans (BAPs) which cover all their landholdings and address wider biodiversity management opportunities than those associated with specific project impacts. Many such BAPs and other conservation activities are carried out in partnership with local or national NGOs and statutory conservation agencies.

2.2 WHY DO WE NEED TO MEASURE BIODIVERSITY CONSERVATION PERFORMANCE?

Perhaps the most important step in developing a conservation performance measurement system is the setting of clear objectives for the system. In other words it is necessary to consider and define what performance attributes need to be measured, why and who for. As discussed in Section 1.2.2 needs will vary according to, amongst other things, the activities being assessed, the scale of the assessment and the audience. If these factors can be clearly defined then other considerations will be much easier.

If performance assessments are to establish and if objectives have been reached then this comprises monitoring. Monitoring is often thought to be a programme of repeated surveys in which qualitative or quantitative observations are made, usually by means of a standardised procedure. However, this is merely surveillance as there is no preconception of what the findings ought to be. It is more appropriate for conservation performance needs, to define monitoring more rigorously as *“the collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective” (Elzinga et al. 2001)*.

It is better to think of monitoring in this more precise way, because it helps to ensure that monitoring programmes and their methods are focused on conservation objectives, and therefore efficient and fit for their purpose. Unfortunately, monitoring is often planned backwards such that a wide range of data are collected that might be useful and questions are thought of later. This often results in data being collected that are not useful. More importantly, it may be found that it is not possible to answer key questions because the necessary data were not collected. Thus, such monitoring is often efficient and ineffective. To avoid this, a biodiversity conservation performance monitoring programme should have a specific purpose, tied to conservation objectives that have already been defined.

In its simplest form monitoring comprises gathering the information necessary to answer the simple qualitative question, “was the objective achieved”. However, it is normally preferable to assess achievements at least semi-quantitatively so that one can deduce if performance is improving (i.e. moving towards the objective) and ideally how far one is away from the objective.

2.3 WHAT IS TO BE MEASURED?

2.3.1 Biodiversity objectives

Knowing what to measure for biodiversity conservation performance assessments is not straightforward – as has been shown by the difficulty the CBD has had with developing measures of achievement of its 2010 target (see Appendix 1). This is because biodiversity comprises the variability among living organisms, and is therefore impossible to measure directly. Even if one were to disregard genetic and other forms in intra-specific variation, then the measurement of biodiversity according to species remains in practice impossible. There are simply too many species in any one place, in all, but the most extreme, environments. Furthermore because biodiversity has a spatial and numerical dimension, species based biodiversity assessments require more than an inventory of species present in any one place; they also require estimates of spatial variation in abundance in each species (see Box 2.1). One could feasibly measure performance in terms of the number of extinctions of well surveyed taxa groups (such as birds) per unit time, but this would only assess the most extreme changes, which may well be unrepresentative of changes to more widespread species (which may be of great value in terms of ecosystems functions).

Biodiversity is also becoming increasingly described and valued in terms of ecosystem services, but these are particularly difficult to define and measure.

Box 2.1 Measuring and estimating biodiversity: more than species richness

Source: (Millennium Ecosystem Assessment 2005)

Measurements of biodiversity seldom capture all its dimensions, and the most common measure -— species richness, is no exception. While this can serve as a valuable surrogate measure for other dimensions that are difficult to quantify, there are several limitations associated with an emphasis on species. First, what constitutes a species is not often well defined. Second, although native species richness and ecosystem functioning correlate well, there is considerable variability surrounding this relationship. Third, species may be taxonomically similar (in the same genus) but ecologically quite distinct. Fourth, species vary extraordinarily in abundance; for most biological communities, only a few are dominant, while many are rare. Simply counting the number of species in an ecosystem does not take into consideration how variable each species might be or its contribution to ecosystem properties. For every species, several properties other than its taxonomy are more valuable for assessment and monitoring. These properties include measures of genetic and ecological variability, distribution and its role in ecosystem processes, dynamics, trophic position, and functional traits. In practice, however, variability, dynamics, trophic position, and functional attributes of many species are poorly known. Thus it is both necessary and useful to use surrogate, proxy, or indicator measures based on the taxonomy or genetic information. Important attributes missed by species or taxon-based measures of diversity include:

- Abundance — how much there is of any one type. For many provisioning services abundance matters more than the presence of a range of genetic varieties, species, or ecosystem types.
- Variation — the number of different types over space and time. For understanding population persistence, the number of different varieties, or races in a species, or variation in genetic composition, among individuals in a population provide more insight than species richness.
- Distribution — where quantity or variation in biodiversity occurs. For many purposes, distribution and quantity are closely related and are therefore generally treated together under the heading of quantity. However, quantity may not always be sufficient for services: the location, and in particular its availability to the people that need it will frequently be more critical than the absolute volume or biomass of a component of biodiversity. Finally, the importance of variability and quantity varies, depending on the level of biodiversity measured, if genetic, populations or species.

Thus knowing what biodiversity components to measure is very difficult unless performance can be linked to biodiversity conservation objectives. The definition of such biodiversity conservation objectives firstly requires the identification of the ***key features*** to be conserved and monitored (Box 2.2). Features can consist of e.g. key components, features of exceptional value (Thomas & Middleton 2003), focal conservation targets (TNC 2003, 2005) or Valued Ecosystem Components (Treweek 1999)) For a company the selected features will need to include those associated with business risks (e.g. biodiversity components that may influence the granting of licenses to operate). For conservation organisations, key features are likely to include threatened, endemic or other ecologically important habitats and species. However, features should be identified in consultation with all stakeholders (e.g. local communities), and take into account the social-economic values of biodiversity, and not just scientific issues and notions of intrinsic value. Such features should therefore include biodiversity components that fulfil important ecosystem functions (Box 1.2) as well as threatened habitats and species etc (see Box 2.2 for examples).

The ***attributes*** of each key feature that define their condition (e.g. area, numbers, structure and reproductive success) then need to be identified and measurable ***targets*** set for each of them, again in consultation with stakeholders. Such targets should where possible be SMART – i.e.:

- **Specific**: objectives must be clear and precise so that all stakeholders have a consistent understanding of what is planned. For example, an objective such as "to conserve threatened wildlife" would mean many different things to different people". Thus objectives must be difficult to misinterpret. It is easier to identify and plan required actions and assess their achievement if objectives are specific.
- **Measurable**: It is vital to be able to clearly determine whether or not an objective has been reached. This can be done if measurable units are used to define the objective. It may be relatively straightforward to set measurable objectives for habitat quantity or individual species (e.g. by stipulating population size), but it is difficult to measure some objectives, such as those relating to habitat quality. Biodiversity indicators may therefore be selected to enable measurable targets to be set (see below).
- **Achievable**: It must be possible to achieve the objectives. For example, it would not normally be possible within the scope of a project to ensure the maintenance of a declining migratory bird population (as it might be declining due to impacts outside the scope of influence). But it would be appropriate to set an objective for its conservation within the areas covered by the project (e.g. in relation to improvement of breeding success).
- **Realistic**: Objectives should not be aspirational, such as to reverse all previous forest loss within a region. This might be a suitable long-term vision, but a more suitable objective for a project might be to reverse 20% of previous loss over the 10 year period in a number of selected protected areas.
- **Time-specific**: It is important to set a time period for reaching the objective, to help prioritise and plan actions.

Box 2.2 Examples of key biodiversity features that may be the focus of conservation activities

- Globally threatened species (i.e. on IUCN Red Lists)
- Significant populations of rare or otherwise nationally or regionally threatened species
- Endemic species or other species that have very high proportions of their biogeographic or global populations within an area
- Rare or threatened habitats (globally, regionally or nationally)
- Particularly good examples (e.g. large and highly natural) of characteristic habitats
- Features with important ecological functions (e.g. key prey species)
- Features of high socio-economic importance (e.g. forest products, grazing lands or species and habitats that attract tourists)
- Features of high cultural importance (e.g. sacred areas or species) or intrinsic appeal

If further data are required to reliably set appropriate quantitative targets, then preliminary relative targets can be set (e.g. maintain populations of species X within 10% of current levels) until the necessary baseline data have been collected. It may not however, always be appropriate to set targets with respect to baseline levels. Levels may instead need to be set in relation to historic levels or requirements for particular ecosystem services, which are best deduced by consultation with stakeholders.

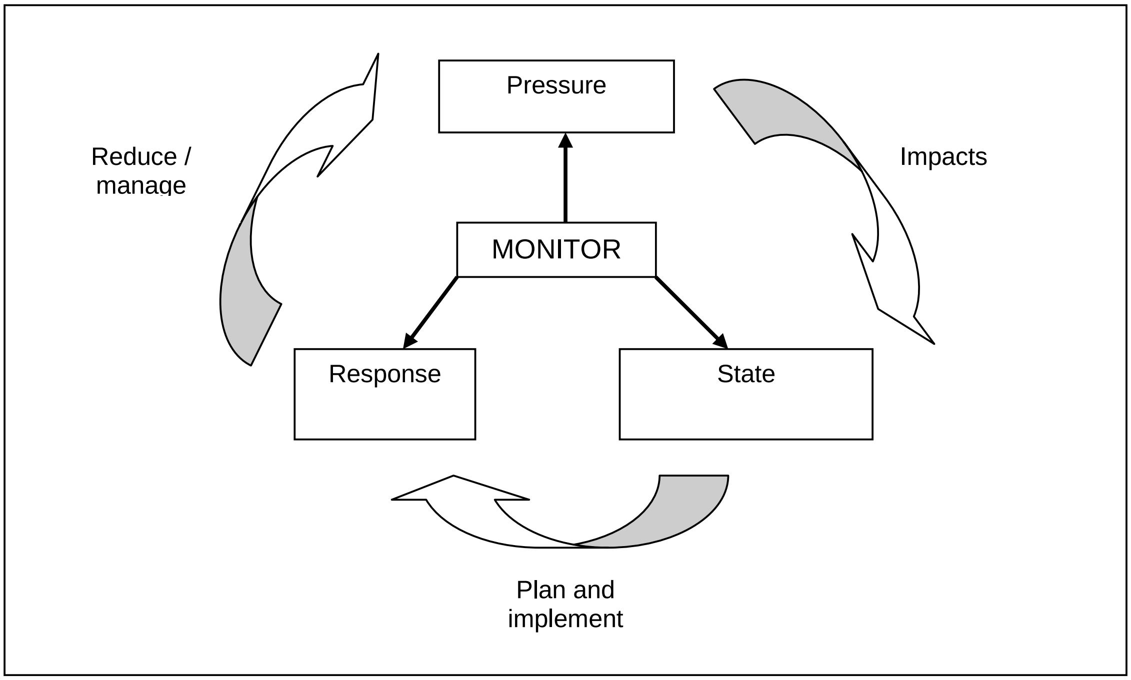
Target setting needs to be done carefully as poorly set targets may deflect actions from broader priorities or lead to perverse and unintended actions to meet targets. For example, some performance measurement systems (see Section 3.2) use the number of BAPs as an indirect measure of achievement. This is a fairly simple and low-cost measure of conservation planning effort. However, the setting of an objective based on this (such as the establishment of BAPs for all land holdings), might deflect conservation performance away from more practical priority actions which may in turn lead to detrimental biodiversity impacts. Targets also need to be flexible and reviewed at appropriate intervals to ensure that they are always appropriate to existing needs.

2.3.2 Indirect and direct biodiversity measures

Ideally measures of conservation performance should relate to direct measures of the ***state*** of biodiversity (e.g. habitat area, tree species diversity, species population size or index, breeding productivity, survival rate, carbon sequestration rate). Such measures enable direct quantitative biodiversity audits to be carried out, of for example the impacts of a project, programme or entire organisations activities.

However, monitoring the state of biodiversity is often difficult, costly and time consuming, and not surprisingly many conservation performance systems therefore focus on indirect measures of achievement (see Chapter 3 below). Furthermore, it is also useful to assess performance in a broader conceptual framework that takes into account the factors that influence the state of biodiversity. A widely used conceptual framework which is particularly useful for conservation performance evaluations is the Pressure-State-Response (PSR) framework (Figure 2.1). This was developed by the Organisation for Economic Cooperation and Development (OECD 1993) to aid analysis of the causes of change in the natural environment and the response measures of human society to these changes. Subsequently a variety of variations of this framework have been developed including the now widely used Driving Force – Pressure – State – Impact – Response (DPSIR) framework (Rigby *et al.* 2000).

Figure 2.1. The Pressure – State – Response framework



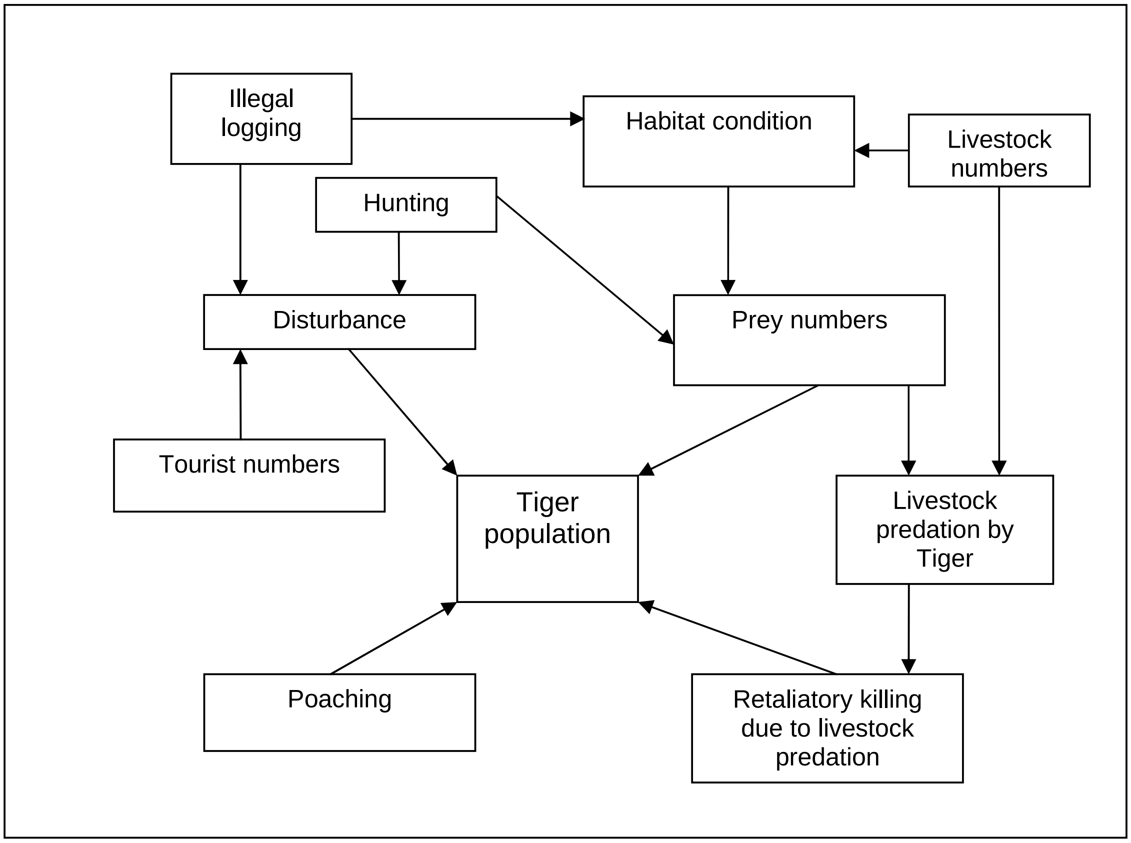
The ***Pressure*** component is an assessment of what factors may potentially impact on the biodiversity feature that influences its state. Examples of such pressures on the state of important forest habitats could be deforestation for firewood and timber, pollution, or hunting.

The identification of pressures that may threaten biodiversity is particularly important, and should aim to comprehensively identify, and where possible quantify all pressures on the key features of biodiversity importance. This should incorporate risk assessments for key features, which take into account both the probability of impacts and the likely magnitude of those impacts. Pressures may then be identified by developing a simple model of the interrelations between important biodiversity features and their influencing factors. This sort of situation analysis helps us to understand what management actions need to be taken, and therefore monitored. For example Figure 2.2 summarises the key pressures influencing a Tiger population within an area subject to conservation actions. Further examples and guidance on situation analysis (also known as context analysis) can be found at http://www.iucn.org/themes/eval/methods.htm

The ***Response*** component is an assessment of the policies, laws and activities that have been implemented to manage and conserve the biodiversity feature and alleviate or regulate the pressures on it. Designation as a protected area is one such response, whilst others could be tree planting programmes, awareness activities and hunting regulations.

Detailed examination of responses enables an evaluation of performance to be carried out, which assesses success in terms of goal achievement in relation to past decisions and quality of performance, and then disseminates findings and recommendations to managers and other stakeholders. Thus evaluations should go beyond the monitoring of substantive criteria for success and should consider the processes used, to assess the efficiency of the conservation project or programme (Kleiman *et al.* 2000; Stem *et al.* 2005). As Kleiman *et al.* point out, a project may meet its scientific goals, but do so inefficiently or with negative secondary effects, such as loss of local support, inter-organisational conflict, or negative effects on non-target biodiversity components.

Figure 2.2. A hypothetical example of a Pressure-State model for a Tiger population



In some environmental monitoring frameworks (e.g. DPSIR) ***Driving Forces*** are also identified as factors that affect the magnitude and direction of pressures. They are usually broad socio-economic factors that are beyond the influence of conservation management actions, such as population level or demand for specific resources. Thus they do not normally fall within the scope of conservation performance measurements systems, but the collation of data on such factors can help place assessments in context of wider environmental and societal changes. In other words, although it may not be possible to influence such broad changes, it is useful to understand them.

A similar conservation model has been proposed by (Margoluis & Salafsky 1998) (1998) in which actors (individuals, organisations, and alliances and networks) take actions (protection and management, laws and policy, education and awareness, and incentive changes) that influence threats (indirect, external direct and internal direct) that impact on biodiversity conservation targets. Using these terms they define conservation success not only in terms of a biological target, but also the absence of current and future threats and the presence of actors that can take actions (i.e. have the capacity) to effectively counter potential threats.

In practice, even measurement of pressures/threats on key biodiversity features is difficult and costly. Furthermore, it is often impossible to attribute the impact of conservation actions on pressures as the actions will be one of a number of interacting influences that may lead to cumulative or synergistic impacts. For this reason, many schemes for measuring conservation performance have focused, often exclusively, on monitoring conservation responses, i.e. processes and actions (i.e. implementation performance indicators) rather than biodiversity outcomes (i.e. performance impact indicators).

Such response measures can be subdivided into:

- Inputs (principally money and time)
- Activities (e.g. number of biodiversity conservation awareness workshops held)
- Processes (e.g. the quality of the awareness workshop)
- Outputs (e.g. number of senior governmental staff now aware of the importance of biodiversity conservation as a result of the workshops)
- Impacts or outcomes (e.g. the improvement in the status of biodiversity as a result of the influence of the workshop trained government staff – which is normally impossible to measure).

2.3.3 Indicators

As previously discussed, the monitoring of biodiversity is extremely difficult as there is no simple and accepted currency for measuring biodiversity. Biodiversity indicators are therefore often used in biodiversity objective setting and performance measurements. Biodiversity indicators are quantified information on biotic or abiotic features that reflect to some degree the state of an ecosystem, habitat or other components of biodiversity. Such indicators aim to fulfil three basic functions:

- Simplification;
- Quantification; and
- Communication.

The objective is to use a limited number of indicators, so that key conclusions are apparent. The challenge is to strike a balance - the number of indicators should be as small as possible to minimise data collection requirements and costs and so that the main messages are clear but at the same time the issues must not be oversimplified or unreliable. Using the terminology of Rowell (1994), they may act as:

- **Ecological indicators**, where the presence of one or more species provides information about the environment. The basic logic is that the environment determines the distribution and abundance of organisms, so that the patterns and size of populations can provide information about the environment. For example, macro-invertebrates are widely used to monitor water quality, e.g. by the Environment Agency in the UK (Hellawell 1986).
- **Evaluative indicators**, e.g. where indicators are used to estimate the conservation value of a site, or habitat quality because they are considered to be correlated with factors perceived to be of value.
- **Performance indicators** are used as a means of describing and where possible quantifying in measurable terms the objectives of strategies, action plans and projects. It is intended that they provide the means to judge performance in achieving the aims of a strategy or plan (e.g. CBD 2010 target – see Appendix 1)

Some important properties of effective indicators are listed in Box 2.3.

Box 2.3 Criteria for effective indicators

Source: (Millennium Ecosystem Assessment 2005)

An effective ecological indicator should:

- Provide information about changes in important processes.
- Be sensitive enough to detect important changes but not so sensitive that signals are masked by natural variability.
- Be able to detect changes at the appropriate temporal and spatial scale without being overwhelmed by variability.
- Be based on well-understood and generally accepted conceptual models of the system to which it is applied.
- Be based on reliable data that are available to assess trends and are collected in a relatively straightforward process.
- Be based on data for which monitoring systems are in place.
- Be easily understood by policy-makers.

However, there are a number of limitations that often result in their inappropriate application. This is especially the case where biodiversity performance measures are based on indictors that are selected from lists that may not be appropriate. In a review of nature indicators (i.e. biotic and abiotic factors that measure the state of biodiversity and the quality of ecosystems) NERI (1995) identified a number of limitations on their use (Box 2.4).

One of the most important considerations with the use of indicators is that they should follow from conservation objectives, and should not take-over or drive objectives. For example, a conservation objective might be to maintain habitat quality in an area of forest. But the definition and measurement of quality is difficult. Therefore, it might be agreed that an appropriate ecological indicator of habitat quality is macro-moth diversity. However, one should not then focus conservation actions on measures that conserve moths. Instead one should aim to take actions that maintain all valued attributes of the forest (e.g. dominance by native species, tree diversity, structural diversity, presence of dead wood, intact soils, nutrient cycling) and only measure the overall impacts of conservation activities via the moth indicator.

Box 2.4 Limitations in the use of nature indicators

Source (NERI 1995)

1. **Quality of the data**: the data relating to the nature indicators have to be of high quality, e.g. data must be collected using standard methods. These methods have to be independent of the observer and factors such as seasonal variation, weather etc. when sampled under conditions specified in the methodology.
2. **Selection and evaluation**: the relationship between the condition of the ecosystem and their effects upon selected nature indicators have only rarely been demonstrated or tested in the past (Furness *et al.* 1993; Rowell 1994). As a result the selection, prioritization, and evaluation process must incorporate an objective quality test to prove that the selected nature indicator unambiguously reflects the specific changes in the ecosystem for which ii was chosen as an indicator. Many nature indicators already in use may prove to have limitations, when evaluated by further research.
3. **Optimal condition**: nature indicators should theoretically be related to a pre-defined ‘natural’ or a subjective state which the ecosystem should be managed towards. Such is the extent to which Man has modified many natural systems that the assessment of the pristine condition of ecosystems depends on, for example interpretations of pollen diagrams and subfossils and is usually poorly known. Optimal conditions of ecosystems dependent on human activities or interference may be easier to assess. However, as nature is dynamic the question of assessing the ‘natural’ condition is highly complicated, as the changes in pristine ecosystem condition in time and space has to be taken into consideration as well as the likeliness of attaining the ‘optimal state' in a Man-managed environment- These considerations have also been taken into account in the Dutch AMOEBA-approach (ten Brink *et al.* 1991).
4. **Scale**: Like any monitoring activity, monitoring of nature indicators need to be long-term if the period of monitoring time is short, the observed trends may not be significant, although they would become clearer in the long run. Similarly, some nature indicator data need to be collected over a wide geographical range and on a very large scale to give reliable information. The question of scale is very much dependent on the indicator in consideration. Some indicators may have limited value, if large scale field-work is needed to obtain reliable data and, thus, is not cost-effective.

2.4 WHERE ARE MEASUREMENTS TO TAKE PLACE?

Measurements will normally need to take place within the areas (or population of people) that are affected by the conservation activities in question. This typically involves some form of survey (whether by census or sampling). However, where conservation performance measurements are being carried out with respect to impacts of mining or development project etc, then measurements need to take into account the whole zone of project impact (which may be many miles from the site itself) in accordance with best practice Environmental Impact Assessments (EIAs). This is to enable benefits from biodiversity conservation actions to be compared with detrimental impacts from the mining or development operations.

Control sites (i.e. representative areas outside the influence of the conservation activities) should also ideally be monitored to assess additionality and displacement effects. Additionality is the extent to which the conservation activity provides a benefit beyond what would have occurred in the absence of the project (i.e. a counter-factual assessment). For example the designation of protected areas often has low additionality because many of them are purposefully placed in areas that are remote, inaccessible (e.g. steep mountains sides) or of low economic value. Such areas are at a relatively low risk of development and therefore protection provides relatively little benefit.

Conservation actions may sometimes merely displace harmful activities to other areas. For example, it has often been claimed that fishing and hunting reserves do not result in decreases in fishing or hunting pressure because, the fishers and hunters simply move to other areas and exploit these more intensively, thus resulting in no net benefit. However, the issue is complex because the spatial variation in exploitation can be a significant factor influencing biodiversity impacts. In some cases the establishment of fishing reserves has been shown to be successful despite no overall decline in fishing effort, because the reserves have provided safe havens where fish populations can recover and spawn more successfully, leading to higher recruitment levels and emigration that that help to restock the fished areas. On the other hand, there are scenarios where displacement of hunters and fishers may increase exploitation to unsustainable levels.

Despite the importance of measuring conservation additionality and possible displacement impacts, monitoring of control sites / populations is rarely carried out in practice. This is primarily due to the practical difficulties and extra time and cost of measuring control sites. It is also often very difficult to find appropriate control populations. For example, many conservation actions focus on the last remaining areas of high quality habitat. Thus it is not possible to find analogous areas of high quality habitat that are not subject to conservation actions. Nevertheless in many cases controls could be set up to assess conservation performance, and there absence may be because there is little incentive for organisations to monitor this aspect of their performance.

2.5 WHEN ARE MEASUREMENTS TO TAKE PLACE?

At the very least performance measurements should start at the beginning of the project (i.e. before project activities have any significant influence on the state of biodiversity or pressure affecting it) and continue over the project lifetime (irrespective of land ownership and management responsibilities etc). This enables the establishment of a biodiversity baseline against which performance may be judged. However, as ICMM (2005) recommends, it is advantageous to have earlier assessments of pressures and the state of biodiversity within impacted areas (both conservation project impacted and development project impacted). Such Before-After Control-Impact (BACI) designs enable assessments of performance against a no-project scenario to be made. For example, a project to conserve fish populations may find that after 5 years of conservation actions populations have declined by 10% compared to baseline levels. This might imply a project failure if the objective was to maintain populations levels. However, prior baseline monitoring might have revealed trends that indicated that over fishing were likely to have driven the fish to extinction within 5 years. Compared to this the project has been a partial success. For further information on BACI and related monitoring designs see Underwood (1993) and Smith (2000).

Another important consideration is the length of time that monitoring should extend beyond the end of project activities. Ideally this should include the time span over which the project may be expected to have an influence on biodiversity. In most cases projects would at least be aiming for long-terms impacts and ideally indefinite impacts (through capacity building and establishment of sustainability). Unfortunately though, most projects cease monitoring outcomes and biodiversity impacts at the end of the project or at best a few years later.

2.6 HOW ARE MEASUREMENTS TO BE MADE AND BY WHOM?

In most situations conservation performance assessments are made or paid for by those responsible for the conservation actions. This reinforces the need to involve project staff and mangers in the design of performance monitoring and evaluation systems, including the setting of objectives, selection of indicators and measurement methods etc. However, this can lead to potential conflicts of interest, and hence problems of accountability, especially when conservation outcomes have significant financial or credibility impacts on the organisation involved. For example further NGO donor funding may depend on achieving clear conservation benefits from conservation projects, governments are expected to achieve high levels of cost-effectiveness and companies may be at risk of project delays or fines if mitigation or offset measures fail to deliver agreed objectives.

To avoid such conflicts of interest, many governmental conservation programmes are monitored and assessed by independent consultants. For example in the UK Agri-environment Schemes have been monitored by teams headed by the Centre for Ecology and Hydrology (CEH) and the Agricultural Development Advisory Service (ADAS). Environmental and nature conservation projects under the EU LIFE Programme, worth over 70 billion Euros since 1992, have been evaluated by a team of independent consultants who advise the European Commission staff on each project's performance with respect to their stated objectives. To address the increasing NGO accountability issues raised by Jepson (in press) discussed previously, it is likely that NGOs will increasingly need to ensure that performance assessments are carried out or audited by independent bodies.

Under the EU's EMAS participating companies have to have their environmental statements verified every three years by external verifiers.

EIAs of development projects are now routinely carried out by consultants according to national EIA legislation (now in most countries) and international guidelines, such as the CBD guidelines (see http://www.biodiv.org/doc/meetings/sbstta/sbstta-09/information/sbstta-09-inf-18-en.pdf). Project EIA typically involves the steps as outlined in Box 2.5. These fairly standard procedures, which should involve stakeholder consultations and public scrutiny, help to ensure that impacts are now adequately identified and quantified. The success of mitigation measures and offsets is then often assessed by the appropriate authorities (often via consultants), though in many situations the developer's consultants are given the responsibility of assessing performance. Some mitigation requirements may also be directly monitored by the developer (e.g. discharges) as a part of their Environmental Management System (EMS).

Box 2.5. An outline of the important steps in an environmental impact assessment

Source: (based on Glasson *et al.* 1999).

NB. Although this implies a linear process, EIA in practice is iterative, with feedback and interaction amongst the various stages. EIA is also more effective if it includes frequent public consultations and participation with key stakeholders throughout (not just at the end).

	Stage	Function
1.	Project screening	Identifies projects that may have significant environmental impacts and therefore require an EIA. Usually guided by EIA regulations identifying categories of project requiring EIAs.
2.	Scoping	Identifies likely significant issues based on proposal's possible impacts and characteristics of the affected environment. Sets out proposed methodology and timeframe.
3.	Consideration of alternatives	Ensures that the proponent has considered other feasible approaches, including alternative project locations, scales, processes, layouts, operating conditions and the 'no project' option.
4.	Description of the project	Clarification of the purpose and rationale of the project, and an understanding of its various characteristics - including stages of development, location and processes.

5.	Description of the environmental baseline	Establishes the present state of the environment and predicts the future state in the absence of the project taking into account likely changes from natural events and human activities.
6.	Identification of main impacts	Identifies (based on the previous steps) all potentially significant beneficial and detrimental environmental impacts.
7.	Prediction of impacts	Predicts the environmental changes resulting from the project: specifies their type, magnitude, duration and extent with respect to the baseline environment without the project.
8.	Evaluation and assessment of impact significance	Assesses the relative significance of predicted impacts to allow focus on main adverse impacts. Carried out iteratively taking into account mitigation measures in Stage 9 to identify residual impacts.
9.	Recommendations for mitigation	Introduces measures to avoid, reduce, remedy or compensate for any significant adverse impacts identified in Stage 8.
10.	Public consultation and participation	Aims to ensure the quality, comprehensiveness and effectiveness of the EIA, and that the public's views are adequately taken into consideration in the decision making process.
11.	Environmental Impact Statement (EIS)	Presents the results of the EIA.
12.	Review of the EIS	A systematic appraisal of the quality of the EIS, as a contribution to the decision making process.
13.	Decision making	Consideration of the EIS (including consultation responses) and other material considerations by the relevant authorities.
14.	Post-decision monitoring	Monitoring of aspects of the environment after a decision to proceed: contributes to effective project management.
15.	Auditing and follow-up	Comparison of actual outcomes with predicted outcomes. Used to assess the quality of predictions and the effectiveness of mitigation. A vital step in the EIA learning process.

For such reasons conservation performance management systems should involve some form of fully independent audit, whether they are carried out by NGOs, governments or corporations departments. Some conservation project and programme audit criteria and systems have recently been developed for such purposes, e.g. by the Conservation Measures Partnership (CMP), although the results of these have not been publicised.

A further important issue is who should monitor secondary impacts? Secondary development impacts (e.g. increases in hunting pressure following improved access) may not be monitored by developers or others (and become 'orphans') if not identified in advance and included in monitoring programmes and EMS.

3 APPROACHES, GUIDELINES AND PROPOSED INDICATORS

3.1 INTRODUCTION

A range of approaches have been proposed for biodiversity conservation performance measurement, and some guidelines and indicators have been developed by various organisations that attempt to standardise CR reporting on biodiversity and performance measurement. A selection of those that are most relevant to this study are summarised in Table 3.1 and some are further described below, grouped according to whether they are primarily based on generic pressure, state, response indicators, conservation process (response) indicators or objective-specific monitoring. In some cases, where the guidelines and systems have been put into operation, examples of their application are provided in the appendices.

A more comprehensive list of publications relating to the monitoring and evaluation of conservation programmes and projects can be obtained from the Foundations of Success M&E database at http://fosonline.org/Site_Page.cfm?PageID=19. The database includes an assessment of each publication's utility for conservation practitioners, quality of concepts and quality of tools with respect to monitoring and evaluation (M&E) purposes. Stem *et al.* (2005) also provide a review of many of the M&E related publications held in the database.

Further information on sustainability indicators can be found in the International Institute for Sustainable Development (IIED) *Compendium of Sustainable Development Indicator Initiatives* available at http://www.iisd.org/measure/compendium/. However, most of the publications and environmental indicators discussed there relate to broad and high-level issues that are not directly relevant to this review.

Table 3.1. Summary of approaches for biodiversity conservation performance measurement

Key: PSR: Pressure, State, Response measurements addressed by system.

Approaches marked in bold are described further below.

Type / title	PSR	Description	Advantages	Disadvantages
The *Sustainability Reporting Guidelines* (GRI 2002)	PSR	Corporate sustainability reporting framework, with principles for reporting, and list of recommended generic indicators (including biodiversity).	Standardised global system, allows some comparison between companies.	Indicators are poorly defined and mostly indirect measures of impact. Many likely to be of little practical value.
ICMM *Good Practice Guidance for Mining and Biodiversity* (ICMM 2005)	PSR	Includes guidelines on reporting, use of indicators and need to set site specific objectives, but linkage between indicators and objectives is not clear. Includes a list of potential indicators.	Mining specific advice, including useful advice on importance of setting site specific objectives.	Overall guidance is rather vague and might encourage the selection of a broad range of inappropriate indictors.
Montreal Process indicators for temperate and boreal forests	PS	An international comprehensive framework of criteria and indicators forest for use by governmental policy-makers. Includes a standard set of biodiversity indicators.	Standardised international criteria.	Most indicators are poorly defined and would be difficult to standardise and use in practice.
Conservation International's outcome indicators	S	Six quantitative indicators focussing on extinctions avoided, areas protected and ecological corridors created / maintained.	Simple system focused on key biodiversity conservation issues.	Simplistic and overlooks many important aspects of biodiversity and habitat quality. Measurements may be difficult.
Strategic Indicators Selection System (StratISS)	PSR	A computer-based tool, being developed by FOS, to help conservation managers select the most appropriate indicators to measure the impact of conservation interventions.	Uncertain as under development	Uncertain as under development
The Environment Index of Corporate Environmental Engagement	R	Checklists are used in a simple four stage framework for performance measurement and reporting relating to the typical stages of company business management, covering strategic review, planning, control and measurement of core processes, and public reporting of business performance.	Simple self-assessment that encourages good practice	Does not measure actual outcomes / impacts
The Insight Investment Biodiversity Benchmark	R	Provides a framework for the analysis of companies' performance against a set of criteria that aim to determine standards of practice across the four elements	Simple self-assessment that encourages good practice	Does not measure actual outcomes / impacts

Type / title	PSR	Description	Advantages	Disadvantages
		of governance structures, policy and strategy, management and implementation and assurance.		
The Biodiversity Benchmark (The Wildlife Trusts)	R	The Benchmark is a certification process that assesses performance according to a two-stage process: a self-assessment against performance 10 sets of criteria, and an independent assessment.	Simple self-assessment that encourages good practice, followed up by independent assessment	Does not measure actual outcomes / impacts
The Australian Benchmarking Biodiversity Conservation Framework	R	Measures the performance of councils, in relation to 5 benchmarks. Requires the development of a Biodiversity Conservation Strategy or Local BAP the identification of performance indicators, for eight standard biodiversity management outcomes (i.e. response – process indicators).	Simple self-assessment that encourages good practice and has a requirement for establishing performance measurements.	Does not measure actual outcomes / impacts
The Nature Conservancy scorecards	R	Subjective assessments of the implementation and quality of conservation activities, can be used to assess performance at a moment in time, or over time. Staff categorically rank different elements associated with systems, stresses, sources, strategies and success.	Simple standardised system.	Subjective assessments, lack of linkage between actions and impacts, loss of information on composite or averaged scores.
World Bank / WWF scorecard for assessing management effectiveness of protected areas	R	A simple site-level tracking tool to facilitate reporting on management effectiveness in Marine Protected Areas.	The simple self-assessment tools helps managers identify where they are succeeding and where they need to address gaps.	Subjective assessments, lack of linkage between actions and impacts, loss of information on composite or averaged scores, problems with comparing actions of differing importance.
Elephant conservation scorecard system Jepson elephant score card (Jepson & Canney 2003)	R	Scorecard assessment of conservation systems for national Asian Elephant conservation programmes (will, legal frameworks, resources and implementation bodies) and specific projects (vision and strategy, organisational systems, team and skill, track-record and wider impact).	Focuses on quality of fundamental processes and allows comparison of projects, independent of type, size, budget and age.	Does not measure impacts. Not clear if system is a good predictor of programme / project success.
Conservation Measures Partnership audits	R	An independent review of the process of conservation based on a set of predetermined standards based on the CMP Open Standards (see 3.3.5).	Provides a useful mechanism for improving conservation actions and learning.	Not designed to measure actual impacts; audit results are not publicised.
Logical Framework	PSR	An analytical, presentational and management tool for	Its key advantages are that it helps to	Can be time consuming, mechanistic

Type / title	PSR	Description	Advantages	Disadvantages
Approach		project planners and managers, which involves problem analysis, stakeholder analysis, developing a hierarchy of objectives and selecting an implementation strategy. Logframe summarises what the project intends to do and how, what the key assumptions are, and how outputs and outcomes will be monitored and evaluated.	provide a standardised summary of the project and its logic, and, if carried out correctly defines clear objectives and performance indicators against which project success can be objectively assessed.	and rigid (leading to making simplistic and overly rigid objectives), may downgrade qualitative objectives, ignore unintended effects and disagreements and tends to be a top-down approach.
Energy and Biodiversity Initiative (EBI a,b)	PSR	A risk assessment based methodology for the oil and gas industries for identifying site-level and company-level indicators of biodiversity impacts.	Simple, logical and practical system that helps in indicator selection.	Linkage between indicators and objectives are not clear. Example indicators are not well defined or likely to be useful.
WCPA Framework for assessing the management of protected areas (Hockings *et al.* 2000a)	R (PS)	Assesses management effectiveness in relation to design of individual protected areas and systems; appropriateness of management and responses to challenges; and delivery of stated aims and objectives of the protected area. Based on 6 key components: context, planning, input, process, outputs and outcomes. Three levels of evaluation from simple subjective assessment of processes to measurements of outputs and outcomes.	Carefully designed generic system that can be applied at varying levels. Higher level monitoring emphasises the need for well defined objectives. Field tested and support materials available.	Tendency probably to use simplest monitoring system, which focuses on processes.
World Bank M&E guidelines (World Bank 1998)	PSR	General guidance on M&E principles and identification of appropriate biodiversity M&E indicators in different thematic areas, with examples of possible indicators.	Good general advice that makes the link between indicators and objectives.	Further information required putting it into practice, and many suggested indicators are not well defined.
The Nature Conservancy Conservation Action Planning (CAP) system (updated 5-S Framework)	PSR	Prescribes 10 key actions that focus on project definition, development of strategies and measures, project implementation and the use of results to adapt and improve. The actions include the identification of focal conservation targets, key ecological attributes and indicators of each target the setting of specific conservation objectives for each target.	Logical, objective and comprehensive system for project / programme specific planning, objective setting and impact assessment.	Few, though approach is relatively complicated and time consuming.
The [US] National Environmental Performance Track	P	A voluntary partnership program for public or private U.S. industrial facilities that works in conjunction with a EMS. It monitors broad aspects of environmental performance (e.g. energy use and discharges). Members must usually have made improvements in at least two aspects and commit to future improvements in at least four aspects. Performance is measured against objectives set for selected indicators from a standard Environmental	Simple objective based standardised system, with US EPA backing; integrated with EMS.	Broad indicators of environmental performance which are not able to predict biodiversity impacts. Selective monitoring of chosen indicators by facility does not provide a comprehensive assessment of impacts.

Type / title	PSR	Description	Advantages	Disadvantages
		Performance Table.		
Conservation Measures Partnership Open Standards (CMP 2004)		Standards that aim to provide the steps, principles, tasks, and guidance necessary for the successful implementation of conservation projects. The main components of the open standards – principles, tasks, and guidance – are organised according to seven generic steps. Focuses on objective setting in action planning and recommends that M&E concentrates on these.	A logical, practical and easy-to follow summary of objective-focussed principles of conservation project design, monitoring and evaluation.	The guidance does not suggest that specific objectives are set for the key biodiversity themselves.
UK Statutory Common Standards Monitoring (JNCC 2003)		A detailed standardised framework for monitoring the condition of habitats and species at sites. Condition is assessed with respect to site-specific Conservation Objectives for the Interest Feature(s). Objectives define Favourable Condition by setting standards (taking into account generic guidance) that are to be met for the Feature.	A carefully standardised and relatively simple system that is in use across the UK, and could be adapted for elsewhere. Allows performance to be compared over time and between areas, organisations, landowners etc.	Selection of Features and setting of objectives entails inevitable simplification of the conservation goals.
Threat Reduction Assessments (Salafsky and Margoluis 1999)	P	It focuses on monitoring threats to the achievement of the desired state of biodiversity components as a proxy measure of conservation success. The assumption being that if threats (i.e. biodiversity pressures) can be identified then monitoring can assess progress by monitoring the degree to which these threats are reduced.	Sensitive to and quick to detect potentially harmful environmental changes, can allow comparisons between different projects and is fairly simple, practical and cost effective.	Unrealistic assumptions. Unless the biodiversity component has been the subject of intensive long-term studies it can only serve as a guide to likely impacts. Addition of threat reduction scores may not be valid.
ISO 14031 Environmental Performance Evaluation	PSR	An international standard that describes a process for measuring environmental performance, based on the typical EMS model of business management. It provides guidance on defining three basic types of indicator: environmental condition indicators, management performance indicators and operational performance indicators.	Useful standardised EMS related system that focuses on objectives	Focuses on general environmental issues and impacts.
Initial Biodiversity Assessment and Planning	PSR	CI's Centre for Environmental Leadership is developing IBAP, which aims to help companies incorporate biodiversity into their risk analysis, decision making and planning processes from the conceptual phase through EIA to the development of an EMS. The process involves rapid biological surveys, production of a BAP and recommendations for indicators and monitoring protocols.	Introduces biodiversity at an early stage in project planning. Identifies important issues and actions and includes monitoring.	Not clear if SMART Objectives are to be set within BAPs and if indictors relate directly to them. Issues best treated within the legal framework of a formal Strategic Environmental Assessment and EIA.

Type / title	**PSR**	**Description**	**Advantages**	**Disadvantages**
BirdLife International Important Bird Area Monitoring (in prep.)	PSR	The framework provides a standardised way to assign scores for the status of IBA biodiversity, threats and conservation actions. Monitoring focuses on important bird populations and uses the IUCN system to categorise threats. The simple scoring is not directly related to site-specific SMART objectives. However, more in-depth monitoring is carried out, where resources allow, at a sub-set of priority sites. The sites and variables to be monitored are selected according to IBA conservation objectives. The system is being developed and has been trialed in some countries (e.g. Kenya).	Collects PS and R data in a simple, standardised and relatively efficient system that should enable consistent reporting at national, regional and global levels.	Scoring system rather simplistic and partly subjective, and not directly linked to site-specific objectives. More detailed site monitoring is related to IBA objectives, but this will cover few sites and guidance on this is unclear. The monitoring system is not integrated with a comprehensive conservation planning system

3.2 GENERIC INDICATORS

These are primary guidelines that develop a framework for measuring conservation performance using a variety of pressure, state and response indicators. These indicators are either selected from recommended lists, or by following an indicator identification guideline. Systems that focus on conservation programme / projects and overall corporate level performance by using process indicators are described later.

Related proposed indicators are listed in Table 3.2 at the end of this section.

3.2.1 The Global Reporting Initiative guidelines

The Global Reporting Initiative (GRI) is a multi-stakeholder process and independent institution (a Collaborating Centre of the United Nations Environment Programme) whose mission is to develop and disseminate globally applicable Sustainability Reporting Guidelines[6]. The *Sustainability Reporting Guidelines* – SRG (GRI 2002) form the foundation upon which all other GRI reporting documents are based, and provide generic guidance that is broadly relevant to all organisations regardless of size, sector, or location. The aim of the SRG is to assist reporting organisations and their stakeholders in articulating and understanding contributions of the reporting organisations to sustainable development. In particular they aim to:

- present reporting principles and specific content to guide the preparation of organisation-level sustainability reports;
- assist organisations in presenting a balanced and reasonable picture of their economic, environmental, and social performance;
- promote comparability of sustainability reports, while taking into account the practical considerations related to disclosing information across a diverse range of organisations, many with extensive and geographically dispersed operations;
- support benchmarking and assessment of sustainability performance with respect to codes, performance standards, and voluntary initiatives; and
- serve as an instrument to facilitate stakeholder engagement.

The SRG identifies 11 reporting principles essential to producing a balanced and reasonable report on an organisation's economic, environmental, and social performance (Box 3.1). These also aim to facilitate comparisons over time and across organisations, and credibly address issues of concern to stakeholders.

The 2002 Guidelines[7] propose performance indicators, which fall into two categories: core and additional. Core indicators are relevant to most reporting organisations and of interest to most stakeholders. Additional indicators are defined as those that have one or more of the following characteristics:

- represent a leading practice in economic, environmental, or social measurement, though currently used by few reporting organisations;
- provide information of interest to stakeholders who are particularly important to the reporting entity; and
- are deemed worthy of further testing for possible consideration as future core indicators.

[6] This includes corporate, governmental, and non-governmental organisations. All are included within GRI's mission. In its first phase, GRI has emphasised use of the SRG by corporations with the expectation that governmental and non-governmental organisations will follow in due course.

[7] These are currently being revised.

Box 3.1 The 11 reporting principles of the GRI Sustainability Reporting Guidelines

Source GRI (2002)

1) **Transparency:** Full disclosure of the processes, procedures, and assumptions in report preparation are essential to its credibility.
2) **Inclusiveness:** The reporting organisation should systematically engage its stakeholders to help focus and continually enhance the quality of its reports.
3) **Auditability:** Reported data and information should be recorded, compiled, analysed, and disclosed in a way that would enable internal auditors or external assurance providers to attest to its reliability.
4) **Completeness:** All information that is material to users for assessing the reporting organisation's economic, environmental, and social performance should appear in the report in a manner consistent with the declared boundaries, scope, and time period.
5) **Relevance:** Relevance is the degree of importance assigned to a particular aspect, indicator, or piece of information, and represents the threshold at which information becomes significant enough to be reported.
6) **Sustainability Context**: The reporting organisation should seek to place its performance in the larger context of ecological, social, or other limits or constraints, where such context adds significant meaning to the reported information.
7) **Accuracy:** The accuracy principle refers to achieving the degree of exactness and low margin of error in reported information necessary for users to make decisions with a high degree of confidence.
8) **Neutrality:** Reports should avoid bias in selection and presentation of information and should strive to provide a balanced account of the reporting organisation's performance.
9) **Comparability:** The reporting organisation should maintain consistency in the boundary and scope of its reports, disclose any changes, and re-state previously reported information.
10) **Clarity:** The reporting organisation should remain cognizant of the diverse needs and backgrounds of its stakeholder groups and should make information available in a manner that is responsive to the maximum number of users while still maintaining a suitable level of detail.
11) **Timeliness:** Reports should provide information on a regular schedule that meets user needs and comports with the nature of the information itself.

In accordance with the conventional model of sustainable development, the performance indicators are grouped under three sections covering the economic, environmental, and social dimensions of sustainability. The environmental indictors relating to biodiversity are listed in Table 3.2 and form a variety of high-level mostly indirect indicators of biodiversity state. They are poorly defined in the SRG and many actually include multiple measures of more than one potential indicator. The SRG are currently being reviewed through wide consultation process and a revised publication is due in 2006.

In addition the GRI have produced a number of sector supplements to be used in conjunction with the SRG, including a pilot *Mining and Metals Sector Supplement* in partnership with ICMM (GRI 2005). This includes further guidance for the sector on sustainability reporting but retains the same biodiversity indicators as the SRG (GRI 2002).

3.2.2 International Council for Mining and Metals good practice guidance

The International Council for Mining and Metals (ICMM) has recently produced a consultation draft of *Good practice guidance for mining and biodiversity* ICMM (2005). This recognises the importance of monitoring, evaluation and auditing of impacts and mitigation measures, and provides general guidance on these issues. It recommends that "*monitoring should begin prior to the start of an exploration programme, last throughout the construction and operation of the mine, and continue for years after closure and rehabilitation. Monitoring is essential to understanding the effects of a proposed project on biodiversity. Monitoring is* *also important for verifying the predicted effects of an ESIA, and ultimately, should be part of a company's overall environmental management system"…... "Monitoring evaluates the degree of implementation of mitigation measures and assesses the degree of success obtained in managing biodiversity*".

The guidance suggests that mining companies should, in conjunction with its government regulators and stakeholders, determine what set of indicators will be required to measure and manage impacts on biodiversity. It lists a number of potential indictors (see Table 3.2) and recommends that specific site indicators should be determined based on the biodiversity context and values already identified for the site from baseline assessments and EIAs. This guidance is rather vague and might encourage the selection of a broad range of inappropriate indictors based on expediency, rather than indicators linked to clear objectives.

Later guidance in the document (section 3.3.1) explicitly recommends that "*clear goals for the outcomes of the biodiversity management projects need to be set and communicated to all involved. Those goals and objectives should be set in consultation with the various parties who will judge the success of the work"… "The objectives will depend on the biodiversity aspects identified and the requirements and opportunities to mitigate impacts*." The section on biodiversity performance management then concludes that "*The aim of reporting monitoring results is to indicate whether the performance of a company is in line with the objectives, or whether activities need to be modified to ensure biodiversity is managed to the level prescribed in the EMS"*. Thus overall, although the guidance is clear on the importance of setting objectives, there is confusion over the use and linkage of indicators to the objectives. There is an opportunity, which is missed, to explicitly link the selection of indicators to the monitoring of conservation performance with respect to the achievement of the stated objectives, particularly if they are set using SMART principles (which are discussed in the ICMM guidance with respect to indicators). This issue is further discussed in the Conclusions (Chapter 4) of this report.

Further guidance is given in the ICMM document on important issues such as the need for properly designed and scientifically rigorous surveys, transparency in data collection methods, credibility with stakeholders and reporting. Reference is also made to the GRI Indicators (see above) but no clear recommendation is made on their use.

3.2.3 Criteria and indicators for the conservation and sustainable management of temperate and boreal forests

The Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests ("Montreal Process") was formed in Geneva in June 1994 to advance the development of internationally agreed criteria and indicators for the conservation and sustainable management of temperate and boreal forests at the national level. Participants in the Working Group included Australia, Canada, Chile, China, Japan, the Republic of Korea, Mexico, New Zealand, the Russian Federation and the United States of America, which together represent 90 percent of the world's temperate and boreal forests. Several international organizations, non-governmental organizations and other countries also participated in meetings of the Working Group.

In February 1995 in Santiago, Chile, the above countries produced the "Santiago Declaration" which endorsed a comprehensive framework of criteria and indicators for forest conservation and sustainable management for use by their respective policy-makers.

The framework identified the following seven criteria that are further defined by 67 associated indicators:

- Conservation of biological diversity.
- Maintenance of productive capacity of forest ecosystem.
- Maintenance of forest ecosystem health.

- Conservation and maintenance of soil and water resources.
- Maintenance of forest contribution to global carbon cycles.
- Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of society.
- Legal, institutional and economic framework for forest conservation and sustainable management.

The biological diversity conservation indicators are listed in Table 3.2.

The aim of the criteria and indicators is to characterise the essential components of sustainable forest management and provide a framework for answering the fundamental question, "What is important about forests?" They recognize forests as ecosystems that provide a wide, complex and dynamic array of environmental and socio-economic benefits and services. According to the Montreal Process website (http://www.mpci.org/rep-pub/1999/broch_e.html#6) they can be used to monitor and assess national trends in forest conditions and forest management. The indicators can also be adapted for site or project related sustainability measurements purposes. However, the Montreal criteria and indicators do not relate to SMART objectives. Thus they cannot be used for monitoring in the sense of testing whether conservation objectives have been met.

3.2.4 Conservation International's Outcome Indicators

Conservation International (CI) has recently developed a list of simple indicators for Outcome Monitoring. These are being applied at an institution wide level, and are being used by CI for measuring the long-term outcomes of its Global Conservation Fund projects.

The primary purpose of the Outcome Monitoring is to consistently measure progress with achieving CI's highest level outcomes, namely the avoidance of extinctions, protection of habitats and creation / maintenance of ecological corridors. The six indicators for these three categories are listed in Table 3.2. At the moment these indicators overlook many other important aspects of biodiversity, but it is understood that measures for intact biotic assemblages and ecological and evolutionary processes may be added. Supplementary measures (e.g. of species exploitation) are used to help CI interpret the Outcome Monitoring results.

3.2.5 Foundations of Success Strategic Indicators Selection System (StratISS)

Foundations of Success (FOS www.fosonline.org) works with a wide variety of organisations to "*improve the practice of conservation through adaptive management – working with practitioners to test assumptions, adapt, and learn*". It focuses on three foundations, the first of which is to define clear and practical measures of conservation success. In this respect it is working with partners on developing clear and practical methods and indicators for measuring conservation success across all four elements of the Actors, Actions, Threats and Conservation Target model (Margoluis & Salafsky 1998).

FOS is also in the process of developing StratISS, a computer-based tool designed to help conservation managers select the most appropriate indicators to measure the impact of conservation interventions. The StratISS system will be divided into two main components. The first component is a decision tree that will help identify key project features to narrow down the total number of appropriate indicators. This component will aid identification of causal chains that depict the assumptions about how project activities will lead to expected impacts.

The second component of StratISS is an extensive database of indicators, which can be used to help identify appropriate indicators for each causal chain. Each indicator in the database will link to one or more causal chains and will contain a profile of key characteristics so that the indicator's strengths and limitations can be assessed.

Although the system is under development it is likely to be a useful tool for companies and conservation organisations. It can avoid 'reinventing the wheel' problems when selecting indicators for new projects and can align indicator selection to other related initiatives.

Table 3.2. Proposed biodiversity conservation performance indicators

Key: Guidance reference: GRI *Sustainability Reporting Indicators* (GRI 2002): c = Core indicator, a = Additional; ICMM *Good Practice Guidance for Mining and Biodiversity* (ICMM 2005); MP = Montreal Process biological diversity indicators for the conservation and sustainable management of temperate and boreal forests; CI = Conservation International's Outcome Monitoring Indicators (http://www.conservation.org/ImageCache/gcf/content/documents/gcf_5foutcomes_5fmonitoring_2epdf/v1/gcf_5foutcomes_5fmonitoring.pdf)

Indicator Type reference: S = State of biodiversity (direct indictor of biodiversity).: P = Pressure; R = Response Indictor; a = activities; p = processes.

Guidance / Indicator	**Guidance**	**Type**	**Comments**
EN6. Location and size of land owned, leased, or managed in biodiversity-rich habitats.	GRIc	P	
EN7. Description of the major impacts on biodiversity associated with activities and/or products and services in terrestrial, freshwater, and marine environments.	GRIc	PS	Means of measurement and reporting unclear
EN23. Total amount of land owned, leased, or managed for production activities or extractive use.	GRIa	P	Low linkage to biodiversity impacts
EN24. Amount of impermeable surface as a percentage of land purchased or leased.	GRIa	P	Link to biodiversity unclear
EN25. Impacts of activities and operations on protected and sensitive areas. (e.g., IUCN protected area categories 1-4, World Heritage Sites, and Biosphere Reserves).	GRIa	S	Means of measurement and reporting unclear
EN26. Changes to natural habitats resulting from activities and operations and percentage of habitat protected or restored. Identify type of habitat affected and its status.	GRIa	S	Means of measurement and reporting unclear. More than one indicator
EN27. Objectives, programmes, and targets for protecting and restoring native ecosystems and species in degraded areas.	GRIa	R	Means of measurement and reporting unclear
EN28. Number of IUCN Red List species with habitats in areas affected by operations.	GRIa	S	
EN29. Business units currently operating or planning operations in or around protected or sensitive areas.	GRIa	P	
Native vegetation clearance	ICMM	S	
Aquatic habitat destruction	ICMM	S (P in ICMM)	
Introduced species (e.g. richness, composition, abundance, distribution)	ICMM	P	
Human inhabitancy (e.g. number of employees)	ICMM	P	Low relevance to biodiversity
Fragmentation (e.g. vegetation patch size, area occupied by roads and tracks)	ICMM	P	
Extent and condition of native vegetation (e.g. species richness, cover abundance, distribution of species / vegetation, stand-age distribution)	ICMM	S	Vague & needs to be linked to key feature's requirements
Extent and condition of terrestrial fauna habitat (e.g. density of logs, tree size density, plant species diversity)	ICMM	S/P	As above
Extent and condition of aquatic habitats (e.g. water depth, vegetation cover abundance / composition, dissolved oxygen, invertebrate taxa composition / abundance	ICMM	S/P	As above

Guidance / Indicator	Guidance	Type	Comments
Soil condition and nutrient cycling (e.g. nutrient levels, soil infiltration rate, depth of litter layer, ecosystem function analysis)	ICMM	S/P	Linkage to biodiversity features not very clear
Nutrient condition of aquatic habitats	ICMM	P	
Significant (extinct, endangered, vulnerable, or otherwise threatened) species and communities (flora and fauna) – e.g. number of species or area of communities	ICMM	S	Vague and difficult to measure
Microclimate	ICMM	P	Linkage to biodiversity features not very clear
Terrestrial, marine, estuarine and wetland protected areas (e.g. hectares or funds committed to management)	GRI, ICMM	Ra	
Recovery plans (e.g. ratio of plans for significant species to number of significant species)	ICMM	Ra	Low value unless actions are reported
Pest plant and animal plans (e.g. implementation of pest management plans, area of weeds controlled)	ICMM	Ra	
Rehabilitation plans (e.g. area revegetated, number of new species recorded since implementation)	ICMM	Ra	
Extent of area by forest type relative to total forest area	MP	S	
Extent of area by forest type and by age class or successional stage	MP	S	
Extent of area by forest type in protected area categories as defined by IUCN2 or other classification systems	MP	P	
Extent of areas by forest type in protected areas defined by age class or successional stage	MP	P	
Fragmentation of forest types	MP	P/S	
The number of forest dependent species	MP	S	Vague & difficult to measure
The status (threatened, rare, vulnerable, endangered, or extinct) of forest dependent species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment	MP	S	As above
Number of forest dependent species that occupy a small portion of their former range	MP	S	As above
Population levels of representative species from diverse habitats monitored across their range	MP	S	Need to be linked to objectives
Percent change in number of threatened species in each IUCN Red List category, number of species downlisted, and number of species that have gone extinct.	CI	S	Dependent on many factors and other organisations
Percentage improvement towards achieving downlisting of each threatened species, concentrating on rates of decline, starting with Critically Endangered Species	CI	S	Difficult to measure, and dependent on many factors and organisations
Percentage and total number of all Key Biodiversity Areas that are protected with (a) legal recognition and (b) biodiversity conservation as an official goal.	CI	S	Dependent on many factors and other organisations
Percentage change in habitat cover at Key Biodiversity Areas	CI	S	Does not take into account habitat quality
Change in fragmentation statistics	CI	S	
Percentage change in suitable habitat cover for corridor-level species	CI	S	

3.3 CONSERVATION PROCESS (RESPONSE) PERFORMANCE INDICATORS

These are systems that have been developed to assess corporate or conservation project / programme performance in relation to processes (i.e. responses in the PSR framework). Corporate evaluation systems (e.g. benchmarks) tend to focus on the integration of biodiversity into company policies, systems and activities. Conservation project / programme evaluation systems tend to focus on activities and the quality of processes. All are indirect indicators of impacts, and are based on the assumption that appropriate processes will result in greater and better biodiversity conservation achievements. However, these impacts are not measured and therefore ultimately these measures cannot be used to establish if a positive biodiversity impact has been achieved, and are not therefore described in detail here.

3.3.1 The Environment Index of Corporate Environmental Engagement

The Environment Index (formerly known as the BiE Index) is widely recognised as the UK's leading benchmark of corporate environmental engagement and the only self-assessed survey of its kind.

The objectives of the Environment Index are:

- To drive continuous improvement in environmental management and performance through benchmarking;
- To determine the progress that major corporate bodies and, specifically, FTSE 350 companies have made;
- To raise awareness of the environment as a strategic, competitive issue at boardroom level;
- To provide credible, independent, comparable information for stakeholders.

Companies invited to participate on the basis of their worldwide operations are FTSE 100 and FTSE 250 (excluding Investment Trusts); Non-FTSE listed Business in the Community members; Sector leaders from the Dow Jones Sustainability Index.

A simple four stage framework is used for performance measurement and reporting in the wider business context. The framework can be broadly aligned to the typical stages of company business management, covering strategic review, planning, control and measurement of core processes, and public reporting of business performance.

Checklists and tools are included to help companies establish the current state of environmental performance measurement processes and to help identify and prioritise actions for improvement. The index is almost entirely focused on processes, in particular the integration of biodiversity into management systems, and is thus an indirect indicator of actual impacts.

3.3.2 The Australian Benchmarking Biodiversity Conservation Framework

The Australian Government's Department of Environment and Heritage has developed a Benchmarking Biodiversity Conservation framework that is designed to guide councils through a series of steps or benchmarks to ensure biodiversity conservation is a key council priority (see http://www.deh.gov.au/biodiversity/toolbox/benchmarking/index.html). The system measures the performance of councils, and also permits the comparison of progress across local governments throughout Australia. Each of the 5 benchmarks listed below is broadly defined to provide some direction while encouraging local innovation:

- Benchmark One - Commit to change
- Benchmark Two - Establish baseline position
- Benchmark Three - Develop strategic approach

- Benchmark Four - Implement and monitor
- Benchmark Five - Review and evaluate

Of particular importance is Benchmark Three, which focuses on the development of a Biodiversity Conservation Strategy or Local BAP. The purpose of this benchmark is to outline immediate actions to be commenced, and to plan for the longer term changes to council activities and responsibilities. It includes the identification of performance indicators, for eight standard local government biodiversity management outcomes (i.e. response – process indicators). Thus the benchmark has a requirement for performance measurements, but the system does not appear to relate indicators to SMART biodiversity objectives.

3.3.3 The Nature Conservancy scorecards

In the mid-1990s various, mainly US, conservation organisations developed score cards to structure site-level conservation assessments (Stem *et al.* 2005). These scoring systems are generally subjective assessments of the implementation and quality of conservation activities, thus (like the benchmark systems – see above) they are indirect response/process-based measures of conservation performance, though some include subjective assessments of the state of biodiversity components. According to Stem *et al.* (2005) scorecards can be a status assessment tool that reflects process performance at a site (or project) at a moment in time, or (if the scoring system remains unchanged) can be used to measure performance over time (e.g. TNC 1999). One of the leading proponents of scorecards has been the Nature Conservancy (TNC), who used this approach to develop (with the US Agency for International Development) the Site Consolidated Scorecard (TNC 1999). TNC have also used a scorecard ranking tool for its 5-S framework for site conservation (TNC 2001). The 5-S approach and its successor, the enhanced 5-S project Management Process (TNC/FOS 2003) is a more comprehensive approach, where staff categorically rank different elements associated with systems, stresses, sources, strategies and success.

3.3.4 World Bank / WWF scorecard for protected areas

The World Bank - WWF Alliance for terrestrial Protected Areas has used the World Commission on Protected Areas (WCPA) framework for assessing management effectiveness of protected areas (see Section 3.3.2) as the basis for a *Score Card to Assess Progress in Achieving Management Effectiveness Goals* (Stolton *et al.* 2003). This has recently been revised and re-released by the World Bank (Staub & Hatziolos 2004). The Score Card was developed for use by marine protected area (MPA) managers to assess and report on their progress in a standardized way consistent with the World Summit on Sustainable Development (WSSD) target of a representative network of MPAs by 2012. It also allows reporting and evaluation by the World Bank to its shareholders and other partners on the performance of its investments in MPAs. It is a simple (WCPA Level 1) site-level tracking tool to facilitate reporting on management effectiveness in MPAs. The purpose of the Score Card is to help marine protected area managers and local stakeholders determine their progress along the management continuum. It is a short, straightforward self-assessment tool to help managers identify where they are succeeding and where they need to address gaps.

As the guidelines state the “approach is useful for prioritization of issues and improving the management process, but tells you little about the achievement of management objectives”. Evaluation of actual achievements and impacts requires a more in depth assessment tool (such as the *WCPA-Marine/WWF Management Effectiveness Guidelines* available at http://effectivempa.noaa.gov).

As discussed by Stem *et al.* (2005), scorecards have a number of significant limitations, including the lack of linkage between actions and impacts, the loss of information on composite or averaged scores, problems with comparing actions of differing importance (though some systems use weightings to address this) and the subjective nature of most assessments. The latter issue can be minimised to some extent by the provision of detailed guidance and criteria for assessments (as used by TNC), but the other limitations are more fundamental, and thus scorecards cannot be readily used for the conservation performance measurement requirements that are the focus of this study.

3.3.5 Conservation Measures Partnership audits

The CMP has used its Open Standards (see 3.3.5 below) as a basis for conservation audits being undertaken by The Nature Conservancy (TNC) and WWF (Dutton *et al.* 2005). The CMP defines a conservation audit as "*An independent review of the process of conservation based on a set of predetermined standards*". Conservation audits aim to determine the extent to which projects follow a predefined "gold standard" that clearly defines "quality" from a process point of view - the process being the necessary steps and requirements for designing, managing, and monitoring effective conservation projects. The overall aim of undertaking audits is to raise the quality of the conservation process and to increase the likelihood of success of conservation efforts.

As CMP points out, audits differ from more traditional forms of evaluation in which the progress or impacts of a project are assessed relative to their own goals and objectives, independent of the process that was employed.

TNC and WWF have undertaken a number of cross-organisation and within organisation conservation audits on a voluntary basis, and completed an audit process review workshop in which some 45 audit team members, clients and external partners reviewed the three phases of the audit approach. The workshop proposed a set of 'best practices' for future audits, which are currently being reviewed and will form the basis of a 'standard audit protocol' that will guide future audits.

3.4 OBJECTIVE SPECIFIC MEASURES OF PERFORMANCE

Most conservation project related evaluations tend to be specific to the project and its reporting requirements, and do not follow specific standard guidelines, systems or formats. Consequently, conservation performance assessments vary considerably, which is one of the reasons for the CMP Open Standards initiative (described above). Good projects though should at least have clearly defined objectives that can be reported against.

3.4.1 Logical Frameworks

One of the most widely used systems for defining project objectives is the Logical Framework Approach (LFA). This has its origins in private sector management theory, such as the 'management by objectives' approach which initially became popular in the 1960s. It was then taken up as a planning tool for overseas development activities by USAID in the early 1970s. Subsequently it has been adopted, and adapted as a planning and management tool by a large number of agencies involved in providing development assistance (e.g. the UK DFID, Canada's CIDA, the OECD Expert Group on Aid Evaluation, the International Service for National Agricultural Research, Australia's AusAID and Germany's GTZ) and various conservation organisations (e.g. it is now used as the basis for project application forms for the EU LIFE Programme).

According to AusAid guidance (http://www.ausaid.gov.au/ausguide/ausguidelines/index.cfm) LFA is an analytical, presentational and management tool which can help planners and managers:

- analyse the existing situation during project preparation;
- establish a logical hierarchy of means by which objectives will be reached;
- identify the potential risks to achieving the objectives, and to sustainable outcomes;
- establish how outputs and outcomes might best be monitored and evaluated;

- present a summary of the project in a standard format;
- monitor and review projects during implementation.

The LFA approach involves problem analysis, stakeholder analysis, developing a hierarchy of objectives and selecting a preferred implementation strategy. The product of this analytical approach is the Logical Framework Matrix (or Logframe), which summarises what the project intends to do and how, what the key assumptions are, and how outputs and outcomes will be monitored and evaluated (see Table 3.3).

Its key advantages are that it helps to provide a standardised summary of the project and its logic, and, if carried out correctly defines clear objectives and performance indicators against which project success can be objectively assessed. But the process can be time consuming and complex, and has been criticised, e.g. by Gasper (2000) for being too mechanistic and rigid, making simplistic and overly rigid objectives, downgrading qualitative objectives, ignoring unintended effects and disagreements and for being top-down which can lead to staff alienation. But despite such problems, the system has stood the test of time and is being taken up more widely.

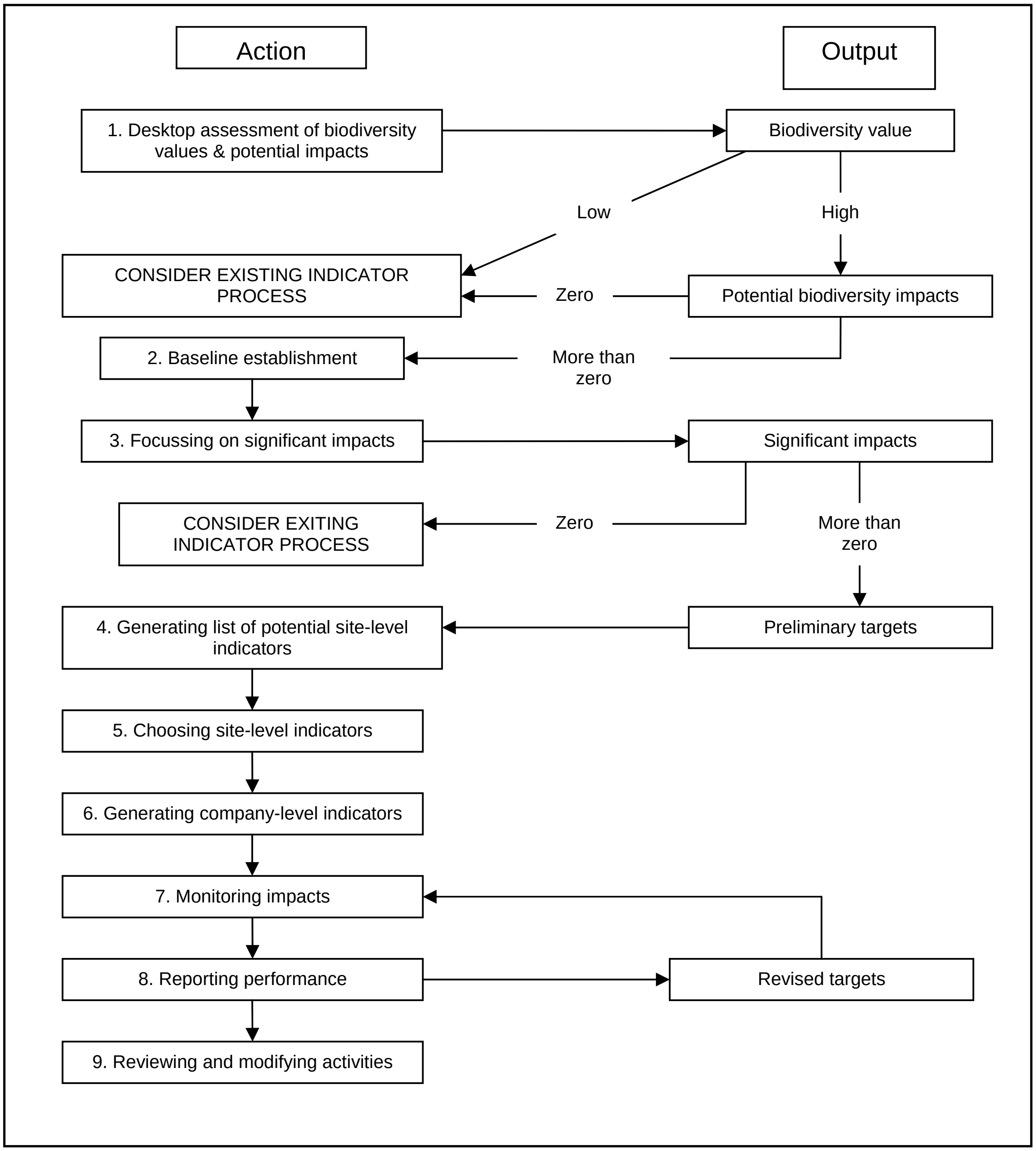
Table 3.3. The Logical Framework Matrix

Project Description	**Performance Indicators**	**Means of Verification**	**Assumptions**
Goal: The broader development impact to which the project contributes - at a national and sectoral level.	Measures of the extent to which a sustainable contribution to the goal has been made. Used during evaluation.	Sources of information and methods used to collect and report it.	
Purpose: The development outcome expected at the end of the project. All components will contribute to this	Conditions at the end of the project indicating that the Purpose has been achieved and that benefits are sustainable. Used for project completion and evaluation.	Sources of information and methods used to collect and report it.	Assumptions concerning the purpose/goal linkage.
Component Objectives: The expected outcome of producing each component's outputs.	Measures of the extent to which component objectives have been achieved and lead to sustainable benefits. Used during review and evaluation.	Sources of information and methods used to collect and report it.	Assumptions concerning the component objective/purpose linkage.
Outputs: The direct measurable results (goods and services) of the project which are largely under project management's control	Measures of the quantity and quality of outputs and the timing of their delivery. Used during monitoring and review.	Sources of information and methods used to collect and report it.	Assumptions concerning the output/component objective linkage.
Activities: The tasks carried out to implement the project and deliver the identified outputs.	Implementation/work program targets. Used during monitoring.	Sources of information and methods used to collect and report it.	Assumptions concerning the activity/output linkage

3.4.2 Energy and Biodiversity Initiative

Using an approach based on risk assessment, the Energy and Biodiversity Initiative (EBI) has outlined a methodology for the oil and gas industries of identifying site-level and company-level indicators of significant positive and negative biodiversity impacts (EBIa,b). The approach develops a system for selecting appropriate indicators as indicated in Figure 3.1, rather than a recommended list of indicators. Some examples of possible indicators for use by the oil and gas industry are provided, but these are not clearly defined, and as suggested by the scheme depicted in Figure 3.1, there is no stated clear link with conservation objectives. However, it is understood that the methodology is designed to sit alongside a number of EBI framework tools, one of which is the development of an EMS (B. Semroc pers. com. 2005). The EMS should establish the company's objectives for the site, and the indicators should relate to these objectives.

Figure 3.1. Overview of EBI methodology for generating indicators



3.4.3 The World Commission on Protected Areas framework for assessing management effectiveness of protected areas

In 1997, the WCPA set up a Management Effectiveness Task Force to focus attention on the issue of management effectiveness and to look at options for assessment (see http://www.enhancingheritage.net/about.htm). The WCPA Task Force concentrated on developing a 'framework', both to provide some overall guidance in the development of assessment systems and to encourage basic standards for assessment and reporting. In 2000 a review of management effectiveness evaluation systems was published by Hockings (Hockings 2000) and the WCPA produced *A framework for assessing the management of protected areas* (Hockings *et al.* 2000a). The framework was proposed as a 'toolkit' which provides a structure and an approach to developing systems for assessing, or evaluating[8], management effectiveness of protected areas.

The framework sets out a simple system for assessing management effectiveness in relation to three key issues:

- Design of individual protected areas and systems.
- Appropriateness of management and responses to challenges.
- Delivery of stated aims and objectives of the protected area.

It is also based on the belief that effective management is based on 6 key components as summarised in Table 3.4.

They recognise three levels of evaluation each requiring different levels of data collation and effort. Thus the proposed framework includes methods that can be used to create a variety of levels of assessment, from broad and relatively quick assessments, which might be applied at a national level, to detailed, on-going monitoring programmes that will provide a more in-depth assessment of management effectiveness at the site level. Level 3 evaluations place most emphasis on monitoring the achievement of management objectives by focussing on outputs and outcomes. Guidance is given on selection of the appropriate level of evaluation.

Hockings *et al.* (2000a) state that "*outcome indicators are important because they measure the real impacts of management action: they assess the extent to which the management objectives are being achieved*". As such, they need to be based upon a clear understanding of what it is that management is aiming to accomplish. However, they also note that it is often difficult to identify desired outcomes because sometimes objectives are framed in terms of activities to be undertaken rather than results to be achieved, and sometimes no explicit management objectives are set. Thus they go on to state "*The importance of establishing clear, measurable, outcome-based objectives as a basis for management cannot be stressed too much. It is fundamental, not only to the assessment of management effectiveness but to the whole process of management itself (MacKinnon et al. 1986)*".

The WCPA framework includes a suggested process for designing monitoring programmes for outcome evaluation (Figure 3.2). This should be linked to the objectives for the specific protected area, and therefore performance indicators should be specific for each (though some may relate to common issues, such as the presence of threatened species). A similar system was proposed for biodiversity monitoring in protected areas by Tucker *et al.* (Tucker *et al.* 2005) in which further details are given on objective setting and the practical issues concerned with devising a monitoring programme.

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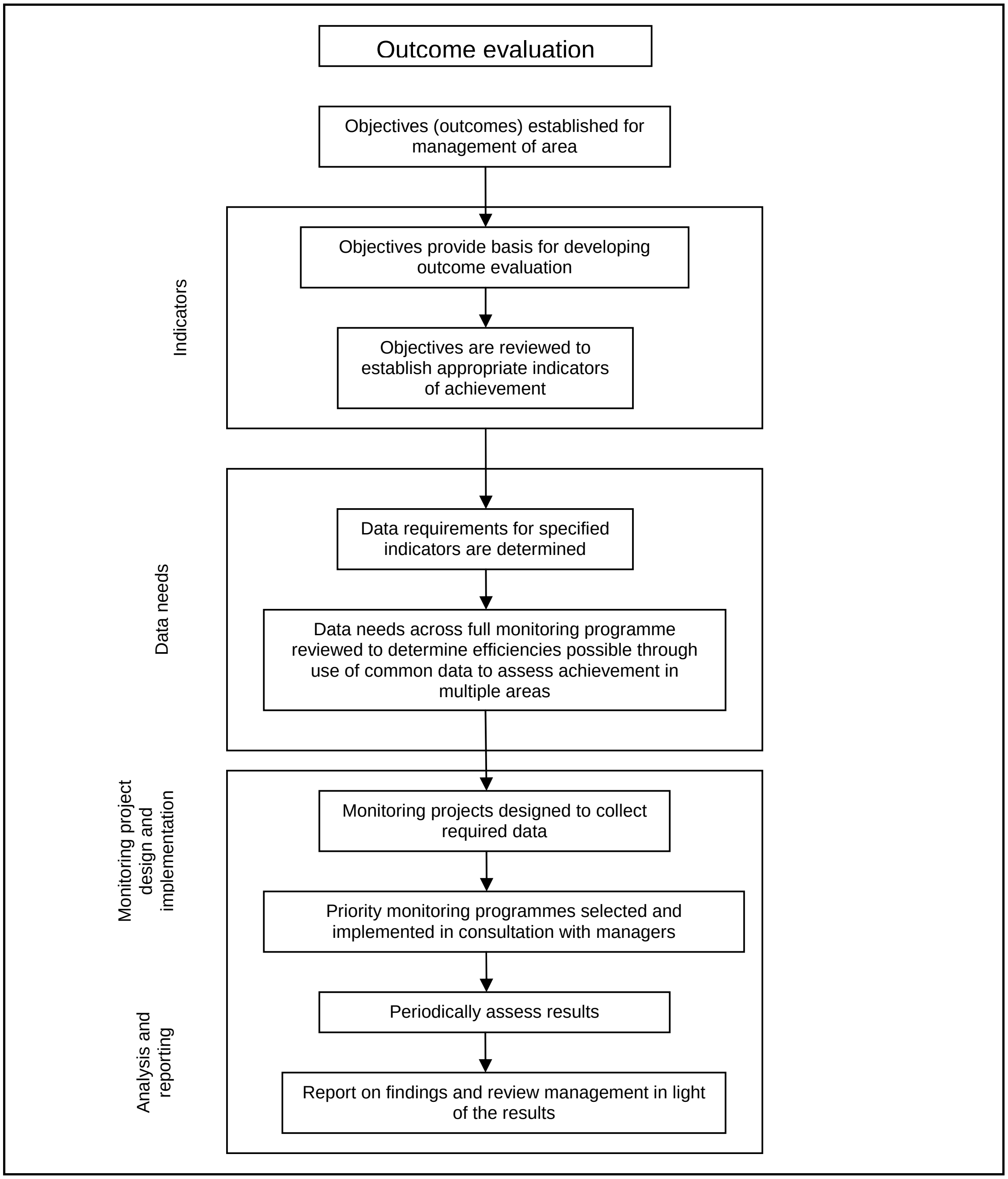
[8] Assessment and evaluation are used in interchangeably in the report and refer to the judgement or assessment of achievement against some predetermined criteria (usually a set of standards or objectives); in this case including the objectives for which the protected areas were established.

Table 3.4. WCPA framework for assessing management effectiveness of protected areas and protected area systems (Hockings *et al.* 2000)

Abbreviations: PA = protected area

Elements of evaluation	**Context**	**Planning**	**Input**	**Process**	**Output**	**Outcome**
Explanation	Where are we now?	Where do we want to be?	What do we need to do?	How do we go about it	What were the results	What did we achieve?
	Assessment of importance, threats and policy environment	Assessment of PA design and planning	Assessment of resources needed to carry out management	Assessment of the way in which management is conducted	Assessment of the implementation of management programmes and actions; delivery of products and services	Assessment of the outcomes and the extent to which they achieved objectives
Criteria that are assessed	Significance Threats Vulnerability National context	PA legislation and policy PA system design Reserve design Management planning	Resources of agency Resourcing of site Partners	Suitability of management processes	Results of management actions Services and products	Impacts: effects of management in relation to objectives
Focus of evaluation	Status	Appropriateness	Resources	Efficiency Appropriateness	Effectiveness	Effectiveness Appropriateness

Figure 3.2. WCPA Process for developing an outcome-monitoring programme



As noted previously, clear objectives are unfortunately not always defined for protected areas. Where these are lacking, they should be defined, e.g. by the development of a Protected Area Management Plan (Thomas & Middleton 2003). Hockings *et al.* (2000) though suggest that as an alternative, broad conservation objectives could be set according to *IUCN Guidelines for Protected Area Management Categories* (IUCN 1994).

Subsequently, a four-year UNESCO/IUCN Enhancing our Heritage (EoH) project, funded by the United Nations Foundation, has been set up to develop and test the WCPA assessment framework and to improve monitoring and evaluation in natural World Heritage sites. The project team is working with staff at ten pilot World Heritage sites in Africa, Asia and Latin

America to develop and test assessment methods looking at management systems and processes along with social and ecological impacts.

Rather than impose a prescriptive system on the whole Heritage Site network, the project is developing and testing a toolkit of methodologies, which will help managers and stakeholders assess current activities, identify gaps and discuss how problems might be addressed. The *Toolkit for Assessing Management Effectiveness* (Hockings *et al.* 2000b, c) consists of a Manual, Workbook and CD (containing both publications and explanatory PowerPoint presentations) and can be viewed at the EoH website http://www.enhancingheritage.net/docs_public.asp.

Following an initial assessment of management effectiveness, team members and managers are using the results to improve management and develop monitoring and assessment systems. According to Stolton (2003) the following four clear lessons on developing monitoring and evaluation systems can be drawn from the experiences of implementing the project so far:

- Relevance and applicability: assessments have to provide insights that are easily translated into realistic and achievable management actions.
- Adaptability: sites need assessment systems developed from a range of methodologies (‘toolkits’) to suit realities and needs.
- Partnerships: self-assessment needs to be strengthened by stakeholder involvement - achieved through open and transparent processes.
- Reporting: assessments have to produce results suitable for various reporting purposes – from local and national to international requirements.

3.4.4 World Bank guidelines for monitoring and evaluation for biodiversity projects

The World Bank has produced guidelines for the design and implementation of M&E plans for biodiversity conservation projects or projects with biodiversity components (World Bank 1998). They are intended primarily to assist World Bank task teams and consultants, but it is also hoped that they may serve as useful reference materials for others involved in the design, implementation and evaluation of biodiversity projects.

M&E plans are mandatory for all Bank projects and must be developed as integral elements of projects to provide information on whether project interventions are successful in achieving project objectives and on how social, economic, political and institutional factors are affecting project performance. According to the World Bank terminology, monitoring and evaluation for biodiversity projects involves two kinds of indicators: implementation performance indicators (termed project inputs and outputs in this report) and project impact indicators, which the guidelines focus primarily on. The guidelines recommend that a biodiversity M&E plan should:

- answer a clearly stated set of questions (i.e. have clear objectives);
- state clearly what indicators will be chosen;
- specify how often monitoring and evaluation will be done, and by whom;
- outline any necessary training or financial inputs that are required;
- state the intended audience for the evaluations;
- specify how information will feed back into management decisions; and
- state clearly the decision points at which action must be taken to address negative trends.

The guidelines also note that scoping of M&E plans should be done during project preparation and should define the spatial and temporal scales of monitoring activities. Furthermore, because biodiversity management deals with ecological processes which are generally long-term (e.g. changes in numbers of a population of a key species) there is a need to establish a monitoring framework that will extend beyond the project term. The appropriate spatial scale for project monitoring will be determined by the specific goals and objectives of the project, and depend on whether it focuses at the landscape, ecosystem or species level.

According to the guidance, the most important aspect of any M&E project is the choice of suitable and meaningful indicators. In particular indicators must be consistent with the main objectives of the project, practical and realistic, and whenever possible, meaningful at both the national and site level. Thus, the specific indicators chosen for any individual project will depend on the particular objectives and goals of that project and the activities that are proposed to meet those goals. Preparation of M&E plans and identification of relevant indicators should, as much as possible, involve those communities and institutions likely to be affected by project interventions.

General guidance is provided on identifying appropriate biodiversity M&E indicators in different thematic areas and examples of possible indicators are outlined in annexes.

3.4.5 The Nature Conservancy's Conservation Action Planning system

The Nature Conservancy (TNC) in the USA, has been developing an integrated process for planning, implementing and measuring conservation success. This process is now called "Conservation Action Planning" (CAP) and builds on previous project-level planning practices in TNC, including Site Conservation Planning, Conservation Area Planning, and the 5-S Framework.

Until recently the 5-S framework (which focussed on systems, stresses, sources, strategies, and success) was used by TNC as the principal tool for designing conservation strategies, planning conservation actions and developing measures of conservation effectiveness (TNC 2003). However, despite being widely adopted by TNC and having many strengths, it is recognised that it had a number of weaknesses, particularly in its ability to measure project effectiveness. For example, it did not have explicit tools for rigorously measuring viability, conducting a situation analysis, setting explicit goals and objectives, monitoring indicators related to key assumptions, or using the information to then adapt and learn. TNC therefore developed an enhanced version of the 5-S Framework that incorporates and emphasizes all the elements of an adaptive management approach (TNC/FOS 2003).

Subsequently the process has been further developed in accordance with planning and adaptive management principles into the CAP system. It aims to provide objective, consistent and transparent accounting of conservation actions and the intended and actual outcomes of conservation projects. The CAP process is supported by a network of trained CAP professional that make up the Efroymson Coaches Network. An overview of the CAP process is provided in TNC (2005), which is available online at www.conserveonline.org/workspaces/cap/ together with CAP and Efroymson Coaches Network news, tools, training opportunities, examples and guidance documents. Further information on the monitoring components are provided in the original 5-S framework (TNC 2003) and *Measures of Success* (Margoluis & Salafsky 1998). TNC state that a CAP handbook will soon be forthcoming.

It is beyond the scope of this report to describe the CAP system in detail, but its key concepts and some examples of its potential application are given below.

According to TNC (2005) the process includes the following 4 key steps and 10 actions (which although listed in a linear fashion is a circular process, though it may in practice involve some simultaneous or iterative actions).

A. Define your project

1. Identify people involved in your project
    - Develop your core project team
    - Identify a good process leader
2. Define project scope and focal conservation targets
    - Describe project area(s) and your overall project vision
    - Select a minimum set of focal conservation targets

B. Developing strategies and measures

3. Assess viability of focal conservation targets
    - Select key ecological attributes (KEAs) and associated indicators for each focal conservation target
    - Determine acceptable variation for each attribute
    - Determine current and desired status of each attribute
    - Document the sources of your information
4. Identify critical threats
    - Identify and rate the stresses affecting each target
    - Identify and rate the sources of stress affecting each target
    - Combine the stress and source ratings to determine critical threats
5. Conduct situation analysis
    - Assess the situation
    - Identify key stakeholders
6. Develop strategies: objectives and actions
    - Set objectives that describe “success”
    - Identify strategic actions you and/or your partners will undertake
7. Establish measures
    - Select a limited set of indicators to measure
    - Develop methods to track each indicator

C. Implementing your conservation strategies and measures

8. Develop work plans
    - Identify action steps and monitoring tasks
    - Access project resources and address critical needs
9. Implement
    - Put your plans into action

D. Using results to adapt and improve

10. Analyze, learn, adapt and share
    - Analyze actions and data from monitoring efforts
    - Use results to adapt actions and monitoring plans

- Update project documents
- Share your results with key audiences

CAP (2005) provides a number of hypothetical examples of some stages of the CAP process, including a viability assessment and establishment of measures, which are adapted below in Boxes 3.2 and 3.3.

Box 3.2 Example of a CAP viability assessment

Source. Adapted from TNC 2005

A project has selected a grassland habitat and a population of migratory fish as two of its focal conservation targets. The team decides that a key ecological attribute (KEA) of the grassland is the frequency of fires. The indicator here is merely the years between fires (basically the attribute itself). After consulting local experts, the team makes an assumption that a healthy frequency is to have fires every 5-10 years. If fires happen more or less often then that, then the grassland will lose integrity over time, leading to serious degradation of the system. Likewise, the team decides that a key attribute of the migratory fish is population size. An indicator here is a sample of adults observed going over a fish ladder during the peak of the spring spawning season. The team currently has no idea what constitutes a viable population, but makes an initial assumption that at least 10 adults per hour are required. They hope to refine this estimate over time and add in specific ranges for each rating category.

			Indicator ratings						
Focal Conservation Target	**Key ecological attribute**	**Indicator**	**Poor**	**Fair**	**Good**	**Very Good**	**Current Status**	**Current Rating**	**Desired Rating**
Grassland	Fire regime (frequency)	Years between fires		>10 or < 5	5-10		8	Good	Good
Migratory fish	Population size	Spawning adults observed per hour		<10	>10		<2?	Poor	Good

The CAP system is based on the typical project planning cycle (e.g. Figure 1.1) and puts into practice many of the principles discussed in Section 2 of this report. For example, the identification of focal conservation targets (Step 2) broadly equates to the identification of key features described in Section 2.3.1, whilst the identification of critical threats and the situation analysis is similar to the identification of pressures described in Section 2.3.2.

The underlying principles of the CAP system are very similar to the CMP Open standards (descried below), which is not surprising as TNC has been a key partner within the CMP Partnership. It is also noteworthy that several steps, including the identification of focal conservation targets and the assessment of the viability of focal conservation targets, have similarities to the UK Common Standards Monitoring framework (see below), especially regarding the identification and assessment of key ecological attributes (KEAs). The TNC system has not, however, developed generic guidelines for determining acceptable variation in attributes as a basis for objective setting.

Box 3.3 Example of the establishment of measures under the CAP system

Source. Adapted from TNC 2005

In developing its measures, the project team first considers how to track progress towards meeting stated objectives from Step 5 – which were:

Objective 1. By 2009, commercial fishing take has been reduced to 50% of 2004 levels.

Objective 2. Remove the downstream dam by 2007.

Measures will often include indicators informing critical threats as well as indicators for key attributes developed during Step 3. Next, they consider the need for status indicators not directly tied to ongoing actions. For example, the migratory fish target requires adequate water quality for successful recruitment. The team does not currently believe water quality is compromised but they periodically want to confirm this assumption. They also identify the need to track the introduction of invasive fish species as an early warning of a possible new threat that may warrant action in the future. As the team develops each indicator, it also decides on the specific method they will use to track it. Most of these methods are very simple and where possible, make use of data already being collected by other people.

Information need and type

Objectives			
O1. Reduce commercial fishing	Threat	Commercial fishing take	Download government records
	Threat	Boats in watershed	Download government records
	KEA	Spawning adults observed/hr * (*Also informs next objective)	Direct observations by volunteers each spring
O2. Remove dam	Threat	Presence of dam	Direct observation
Other status (early warning measures)			
Water quality	KEA & threat	Concentration of specific toxic chemicals	State water quality records
Exotic fish species	Threat	Presence of invasive species in watershed	Interview fish & wildlife reps and track news stories

3.4.6 Conservation Measures Partnership (CMP) Open Standards (CMP 2004)

The CMP has used the experience gained by conservation organisations (such as TNC – see above) while designing, implementing and appraising their conservation projects, to develop a set of project cycle or adaptive management open standards that they believe, are fundamental to effective conservation. These standards are not designed to be prescriptive, but form a framework and guidance for conservation action. Their goal is “*to bring together common concepts, approaches, and terminology in conservation project design, management, and monitoring in order to help practitioners improve the practice of conservation. In particular, these standards are meant to provide the steps, principles, tasks, and guidance necessary for the successful implementation of conservation projects*.” In addition, the standards are also intended to form the foundation of a conservation audit process, which has also been developed by CMP (see below).

The main components of the open standards – principles, tasks, and guidance – are organised according to seven generic steps (Table 3.5). These, or similar, steps are widely followed in conservation and other fields that implement projects to achieve clearly defined goals. In addition they recognise the following general principles that apply to all the steps, namely that a project should:

- Involve stakeholders.
- Clearly define a timeline.
- Budget sufficient financial resources and human capacity.
- Document decisions.

Table 3.5 Principles of good practice listed in the CMP Open Standards for the Practice of Conservation

Step	Principle
1. Conceptualize what you will achieve in the context of where you are working	
	1a. Be clear and specific about the issue or problem you intend to address
	1b. Understand the context in which your project takes place
	1c. Create a model of the situation in which your project takes place
2	**Plan both your actions and monitoring and evaluation (M&E)**
	2.1a Develop your goal and objectives.
	2.1b Strategically select activities that will accomplish your goal and objectives
	2.1c Develop a formal action plan
	2.2a Focus your M&E on what you need to know
	2.2b Develop a formal M&E plan
3	**Implement both your actions and monitoring and evaluation**
4	**Analyze your data to evaluate the effectiveness of your activities**
	4a Analyse your M&E information
	4b Analyse why an intervention succeeded or failed
	4c Communicate results within project team
5	**Use your results to adapt your project to maximize impact**
	5a. Adapt your action plan and M&E plan based on your results
6	**Communicate your results to key external and internal audiences**
	6a Develop a clear dissemination strategy aimed at your audiences
7	**Iterate – Go through the project cycle continuously to constantly improve**
	7a Revisit steps in the overall process on a regular basis
	7b Create a learning environment

Several of the steps and principles relate to issues discussed in Section 2.3.1 above. In particular Principle 2.1a (associated with Step 2 - planning) stresses the need to develop clear goals and objectives in the formulation of an action plan. It suggests that a goal[9] is firstly set, which describes the future status of the biodiversity features that one is aiming to conserve. Objectives are then set for key factors (i.e. key pressures cf Figure 2.2) that will be

[9] A goal is a general summary of the desired state that a project is working to achieve.

addressed by the project. Principle 2.2a then recommends that M&E efforts are almost exclusively focussed on the goals, objectives and activities that have been set. This helps to ensure that sufficient data are collected to evaluate progress objectively, whilst avoiding unnecessary data collection.

However, the CMP guidance does not suggest that specific objectives are set for the key biodiversity features themselves, which is a weakness, as it will not be possible to establish if management of key factors actually clearly delivers desired biodiversity impacts. Unless the goals are very clearly defined (using SMART criteria) and are directly monitored, it will not be possible to assess performance directly.

3.4.7 UK Statutory Common Standards Monitoring

The UK statutory conservation agencies have developed a detailed standardised Common Standards Monitoring (CSM) framework for monitoring the condition of habitats and species on Sites of Special Scientific Interest (JNCC 2003). The key element of CSM is that the condition of each site is assessed with respect to site-specific Conservation Objectives for the ***Interest Feature*(s)** for which the site was notified. A common terminology is used to describe the condition of each feature (JNCC 1998) and the principal aim is to achieve ***Favourable Condition*** in the feature. The UK Government also has a Public Service Agreement to achieve 95% Favourable Condition (by area) of SSSIs by 2010.

CSM Conservation Objectives define Favourable Condition by setting standards that are to be met for the feature to be considered to be in Favourable Condition. Each feature on a site will have one or more attributes that are used to define FC. Attributes are characteristics of a feature that describe its condition, either directly or indirectly. They can be regarded as indicators which allow judgements to be made about the condition of the feature. The selection of attributes must take into account two important principles:

- All attributes must be measurable, so that targets can be set as part of the Conservation Objective for the feature.
- Attributes should describe the condition of the feature and not the factors which influence it – in general, management activities are not suitable attributes. Thus in determining if grassland is in Favourable Condition or not, one of the attributes to be assessed may be sward height – this is what is being aimed at, not the mechanism by which it is achieved, which might be via grazing or by mowing.

There is a wide range of suitable possible biodiversity attributes. For example, habitat attributes may include extent, floristic composition, vegetation structure, and physical characteristics; species attributes may include population size, distribution, food availability, and habitat factors.

For habitat interest features, floristic or vegetative attributes have generally been used as indicators of the condition of the habitat. However, the definitions of Favourable Condition for habitats are not based solely on maintaining suitable conditions for plant species. In some cases, the requirements of animal species have also been taken into account, and attributes have, where possible, been selected which convey information about the typical fauna associated with each habitat (e.g. structural features and fine-scale patterning of vegetation).

Conservation objectives are set out for each attribute of each feature in Favourable Condition Tables which taken into account generic guidance on acceptable variation and limits of attributes. Generic guidance is produced for all the main habitat types in the UK. For example, generic guidance for the condition of blanket bogs includes minimum standards for vegetation composition. These state that:

- At least 6 indicator species should be present (from a list of agreed indicator species).
- At least 50% of the vegetation cover should consist of at least 3 indicator species.
- No more than 1% of the vegetation should consist of non-native species.

- Less than 10% of vegetation cover should be made up of a scattered canopy of trees and shrubs.

Full details of the system and the generic guidance for assessing Favourable Condition is available from the JNCC website http://www.jncc.gov.uk/page-2217.

The system is now in use across the UK and a report on the condition of all statutory protected sites is expected soon. The widespread use of this standardised system has enabled the UK government to set a SMART objective of achieving Favourable Condition on 95% of SSSIs by 2010. This has very successfully stimulated considerable conservation efforts focused on improving the conservation management of many SSSIs.

Another important property of the system is that, because it uses standard definitions of Favourable Condition for specific habitats and species, performance can be compared over time, and amongst habitats, species, regions and landowners etc. Thus corporations can set SMART objectives for and report on the percentage of Features that are on SSSIs on their landholdings that are in Favourable Condition. In fact the Kelda Group has stated its intention to return at least 15% of SSSIs to favourable status (see Appendix 77).

Although developed for the monitoring of habitats and species on SSSIs in the UK, the system can be adapted for use on other protected areas, non-protected areas and other countries.

3.4.8 Threat Reduction Assessments

Salafsky and Margoluis (1999) have proposed an approach to evaluating conservation and development projects that is based on a Threat Reduction Assessment (TRA). The approach focuses on monitoring threats to the achievement of the desired state of biodiversity components as a proxy measure of conservation success. The core principle being that if threats (i.e. biodiversity pressures) can be identified then monitoring can assess progress by monitoring the degree to which these threats are reduced (Margoluis & Salafsky 1998).

The system involves the following 7 steps:

1. Define the project area spatially and temporally.
2. Develop a list of all direct threats to the biodiversity at the project site (NB. this is problematical unless biodiversity objectives are set, but this is not mentioned by the authors).
3. Rank each threat according to three criteria: area, intensity and urgency.
4. Add up the rank scores across the three criteria.
5. Determine the degree to which each threat is reduced (expressed as percentage change), either by quantitative survey or subjective means. (NB. Although not explicitly stated by the authors, the specific objectives being monitored are the alleviation of each threat. However, with the setting of SMART objectives for each threat it may be difficult to consistently assess alleviation of threats).
6. Calculate the raw score for each threat (by multiplying the total ranking score by percentage reduction)
7. Calculate the final threat reduction index (i.e. the sum of all raw threat scores divided by the sum of all rankings, multiplied by 100). (NB. This addition of threat scores may be scientifically invalid if one or more threats are of critical importance).

The advantages of the approach, compared to assessments of biodiversity state indicators, is that it is quicker to detect changes, allows comparisons between different projects (if common threat indicators are used) and is simple, practical and cost effective. However, the approach has three assumptions which limit its reliability as an indirect performance impact measure. Firstly, all biodiversity threats are human induced; secondly, they can be identified, distinguished and ranked in terms of impact and intensity; and thirdly, they can be measured or estimated. In reality, these assumptions are unlikely to be sufficiently met for the system to provide reliable and accurate assessments of actual biodiversity impacts. Thus, unless the biodiversity component and its ecosystem has been the subject of intensive long-term studies TRA can only serve as a guide to likely impacts. In such circumstances assessments should also address state and response indicators – i.e. follow the full Pressure, State, Response framework.

3.4.9 ISO 14301 Environmental Performance Evaluation

ISO 14031 is an international standard that describes a process for measuring environmental performance. It is not a standard for certification, such as ISO 14001, but it fits into the ISO 14000 series of standards, and is intended to assist organisations in obtaining ISO 14001 certification. The evaluation process aims to provide management with reliable and verifiable information on an ongoing basis to determine whether or not its organisation's environmental performance is meeting criteria it has set for itself.

Companies that use an EMS should evaluate their performance against policies, objectives and targets set within their EMS. However, organisations without an EMS may still use the process to determine environmental aspects of importance and to set performance criteria for these. Indeed, Putnam (2002) found that ISO 14031 is being used by organizations of all sizes, types, locations and complexity, and provides benefits to organizations with and without EMS.

The process is based on the typical EMS Plan-Do-Check-Act model of business management. Rather than listing potential indicators ISO 14031 provides guidance on defining three basic types of indicator: environmental condition indicators (e.g. number of fish deaths in a water course per year), management performance indicators (e.g. number of management levels with specific environmental responsibilities) and operational performance indicators (e.g. waste water discharged per unit of product).

4 CONCLUSIONS

4.1 SUMMARY OF THE ADVANTAGES AND DISADVANTAGES OF THE KEY APPROACHES FOR BIODIVERSITY CONSERVATION PERFORMANCE MEASUREMENT

This project aims to identify performance measures that can be used to evaluate the outcomes of conservation efforts both within the corporate sector and the conservation community.

With respect to performance measures the study has found that corporate biodiversity conservation performance measurement systems developed so far are of limited direct relevance. This is primarily because (as described in Section 2.3), the direct measurement of biodiversity conservation performance impacts is normally very difficult. Biodiversity cannot be directly measured as one parameter. Thus performance measurement requirements vary considerably between sectors, individual organisations and audiences. Consequently 'off-the-shelf' solutions such as lists of generic indicators are unlikely to be satisfactory.

Furthermore, biodiversity often responds slowly and in complex ways to environmental changes and conservation actions. Direct measures of biodiversity performance thus tend to be costly, and time consuming, and often provide inconclusive assessments of performance. Therefore, most systems that have been developed or recommended for biodiversity conservation performance measurements have focussed on indirect indicators that measure inputs, activities, processes or outputs, rather than impacts (or outcomes). Those that do suggest direct indicators of the state of biodiversity (such as some GRI indicators) are very broad and ill-defined, and need to be refined and focussed on relevant project-specific issues for them to be applicable to specific company needs.

Some useful guidance has been produced, including the EBI and ICMM guidance for identifying such project specific indicators. The EBI system, however, does not appear to clearly link indicators to predefined objectives, which may lead to potential confusion. As pointed out in much of the guidance (e.g. Hockings *et al.* 2000 – see page 41), performance monitoring needs first and foremost to be linked to clearly defined objectives. In this respect corporate performance systems can learn much from the practical systems developed by conservation organisations, such as TNC, CMP and the UK Statutory Agencies (as described above).

Many of the same problems discussed above also relate to guidance on the assessment of conservation projects. So far conservation performance measurement systems either tend to focus on processes (e.g. the CMP Open Standards and audits), indirect measures (e.g. the Threat Reduction Assessment system) or are related to project specific objectives identified through processes such as Logical Framework Approach. The latter approach if carried out thoroughly should provide clear SMART objectives against which projects can be assessed. In practice, these often tend to be expressed in terms of outputs rather than impacts (for the reasons discussed above). However, some conservation organisations (such as the TNC and UK Statutory Agencies) have further developed results focussed approaches so that they now include direct measures of actual impacts in an objective yet practical way (see Section 3.4).

Another important issue regarding the performance measurements systems so far developed is that most tend to be internal self-assessments. As conflicts of interest could arise through such systems, then additional independent verification / audit systems are needed to ensure credibility with all stakeholders (Kleiman *et al.* 2000). The CMP audit system might provide a means of meeting such requirements, but further details of the process and outputs are needed to evaluate its suitability for these purposes.

4.2 RECOMMENDATIONS FOR FURTHER INVESTIGATION

4.2.1 Generic issues and requirements

This study has found that it should be possible to develop appropriate systems for corporate and conservation NGO reporting by adapting some of the existing systems in accordance with the specific requirements of each organisation and the best practice principles of project design and monitoring identified in this study.

As a guideline, all conservation performance measurements systems should have the following properties:

1) Comprehensive coverage of all likely significant detrimental and beneficial biodiversity impacts within the sphere of influence of the organisation in question.
2) Provision of sufficiently accurate and precise quantitative data on achievement of SMART biodiversity conservation objectives.
3) Standard operating protocols for monitoring, analysis and reporting so that results can be compared across business units / projects / programmes, and between years.
4) Ownership and support amongst staff (i.e. they realise the benefits of measuring their performance), perhaps with impact linked incentives (e.g. performance related bonuses).
5) Cost-effectiveness (i.e. they use the lowest cost methods to provide the required data of the required standard).
6) Credibility, such that the data and reported results are trusted by all stakeholders (e.g. as a result of independent data collection and audits).

Approaches for developing these systems and some key considerations are outlined below.

4.2.2 Corporate reporting on net biodiversity impacts

Many businesses should be able to quantify significant biodiversity impacts by developing a system based on an expanded and best practice EIA approach linked to established EMS procedures as summarised in Figure 4.1 (assuming that these procedures are already implemented).

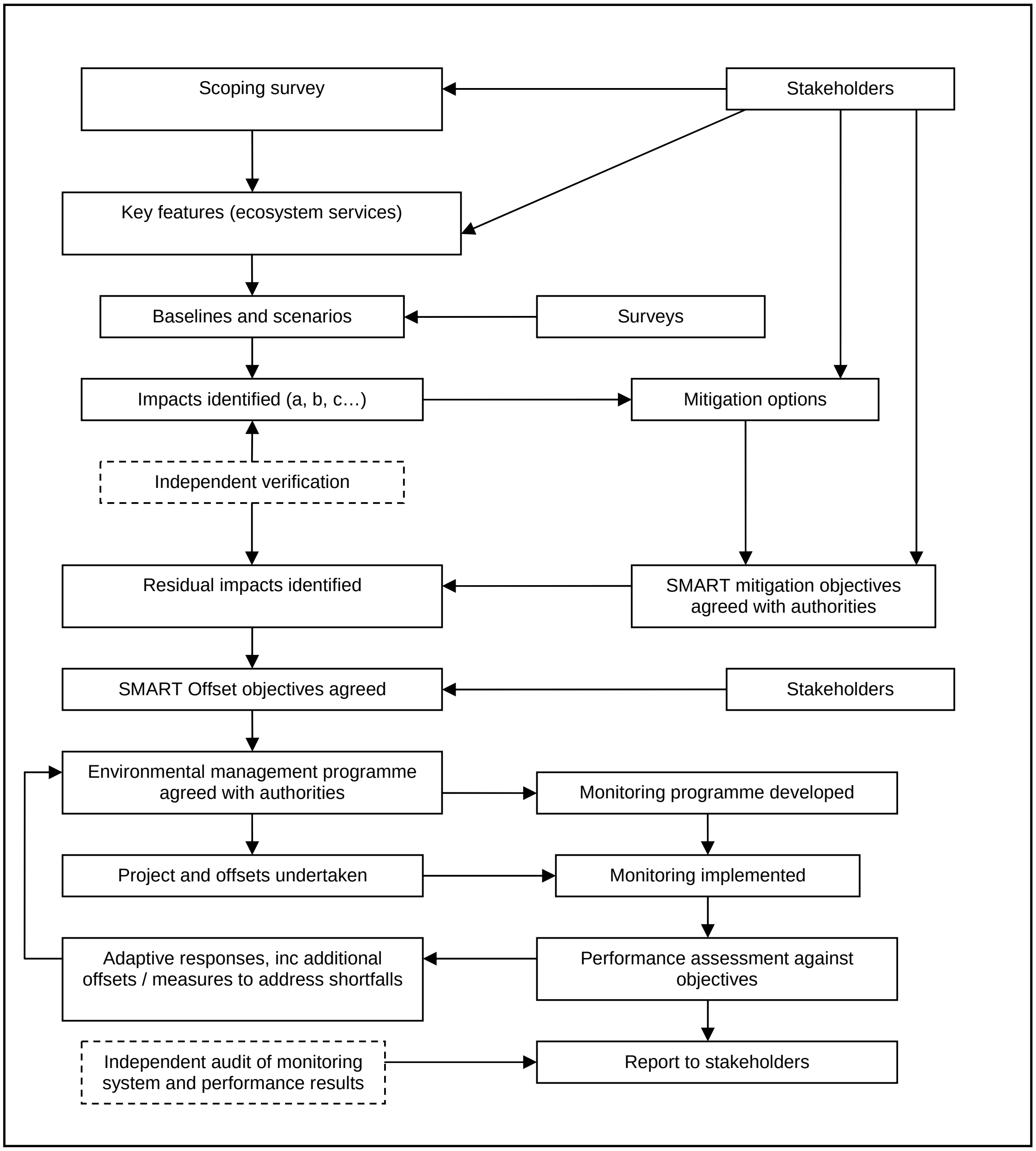
This would entail the following key stages for each project undertaken (which could then be collated and consolidated for corporate level reporting).

- Identify all significant ecosystems services (e.g. provision of food, water resources, support for threatened species, medicinal plants, cultural uses), identity key attributes and indicators of these and set objectives (e.g. maintenance of minimum river flows and water quality to maintain populations of threatened species, fish stocks and drinking water). This should follow the CBD guidelines for EIA (CBD Decision VI/7[10]). It should also take into account the ecosystem approach as agreed by the CBD (CBD Decision V6[11]), which requires that the management of natural resources gives priority to the maintenance of local ecological processes. Those processes include activities such as nutrient cycling, population changes and water balance.
- Establish baselines for these, and likely no-project future scenarios (e.g. threatened species may be destined for certain extinction anyway).
- Set SMART objectives for services and attributes.
- Determine residual project impacts on each and acceptable means of offsetting residual impacts (if these cannot be agreed then the project should be modified, until impacts and offsets are acceptable, or abandoned).
- Monitor impacts on services via pressure, response and state indicators, and modify project and offset measures etc according to adaptive management principles where necessary.
- Assess and report on project monitoring results against agreed objectives, amalgamate results of projects and report at corporate level.
- If necessary, consult with relevant stakeholders and agree options with authorities for further measures / offsets to make up for non-critical shortfalls in objective achievements and to obtain a net biodiversity benefit.

[10] Available at http://www.biodiv.org/decisions/default.aspx?m=COP-06&id=7181&lg=0

[11] Available at http://www.biodiv.org/decisions/default.aspx?m=COP-05&id=7148&lg=0

Figure 4.1. A potential system for monitoring business project related biodiversity impacts.



The process should be a bottom-up approach, so that decisions on net biodiversity gain are made at a local level with stakeholders. However, the system should be designed to enable amalgamation of performance measures for reporting at higher levels (e.g. business units and corporate level).

To develop such a system companies need to ensure clearly defined requirements for reporting (including audiences) and the scope of impacts must be taken into account in the assessment of net biodiversity impact (in particular the issues of the starting point, longitudinal scope and breadth of impacts discussed in Section 1.2.3).

4.2.3 NGO reporting on conservation project performance

A conservation performance measurement system for conservation NGOs can be developed, integrated and standardised with existing reporting systems given that these exist. The principal step would be to ensure that SMART objectives are set for each project according to the pressure, state, response framework. Thus, feasible and appropriate objectives would be set for biodiversity conservation inputs, activities, outputs, and where possible impacts on the state of the target biodiversity features. For example, a research project that aims to establish the distribution of a highly threatened forest animal at risk of further logging might set SMART targets relating to:

- Total research man-days fieldwork carried out.
- Research outcome (e.g. distribution reliably established across all project area).
- Research output (e.g. advisory leaflet and mapped location of species distribution produced for government conservation agencies and logging companies).
- Outcome (e.g. logging companies avoid the area).
- Impact (e.g. recent rapid decline in threatened species stabilised).

Such a system could be developed by following the CMP Open Standards principles and adapting the Log Frame Approach to design the project and set SMART objectives that are the focus of performance assessment. Occasional independent audits could be carried out to ensure appropriate project management and reporting.

Reporting would then be against objectives grouped according to the NGOs specific needs (e.g. xx% of all research project outcome objectives achieved, or xx% of all project objectives in country xx achieved).

Further consideration of such a system could be given after the results of the current CCF Conservation Measures project are reported in May 2006.

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6 GLOSSARY AND ACRONYMS

Attributes	Characteristics, qualities or properties of a feature that are inherent to, and inseparable from, the feature. For species these may include population size, structure, habitat requirements, distribution and other parameters. Attributes of habitats may include key species, composition, structure, supporting processes and other parameters.
BAP	Biodiversity Action Plan
Biodiversity	“the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.” (Convention on Biological Diversity, Rio, 1992)
Biodiversity (Biological Diversity)	The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems (U.N. Convention on Biological Diversity, Article 2).
CBD	Convention on Biological Diversity
CMP	Conservation Measures Partnership
Compensation	Actions taken to compensate for residual environmental impacts of a project; broadly analogous to offsets
COP	Conference of Parties
CR	Corporate Responsibility
CSR	Corporate Social Responsibility
Cumulative impacts	Impacts that accumulate over space and time from multiple projects
Ecosystem	Communities of organisms interacting with abiotic factors and with each other as a distinct unit
EIA	Environmental Impact Assessment
EMS	Environmental Management System. The system of organizational capacity, plans, procedures, resources, policies and standards used by companies to manage their environmental programs.
NGO	Environmental non-governmental organisation
ESIA	Environmental and Social Impact Assessment
Feature	A habitat, habitat matrix, species or a species assemblage occurring on a site.
GRI	Global Reporting Initiative
IBA	Important Bird Area (as defined by BirdLife International)
ICMM	International Council for Mining and Metals
Indicator	An indicator is a measurable entity used to assess the status and trend of a specific factor
M&E	Monitoring and Evaluation
MEA	Millennium Ecosystem Assessment
Mitigation	The process of preventing, avoiding or minimising adverse environmental impacts
Monitoring	“The collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective” (Elzinga *et al.* 2001).

NGO	Non-governmental organisation
Offset	Biodiversity offsets as conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure no net loss of biodiversity (ten Kate *et al.* 2004).
Protected Area	IUCN (1994) defines a protected area as: An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.
Restoration	reclamation that is guided by ecological principles and promotes the recovery of ecological integrity; reinstatement of the original (pre-mining) ecosystem in all its structural and functional aspects
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice, a subsidiary body of the CBD COP
Secondary impacts	Environmental impacts that occur as a result of actions taken by a project, but which are not an integral part of the project
SMART	Refers to objectives that are Specific, Measurable, Achievable, Realistic and Time-specific
SSSI	Sites of Special Scientific Importance, as designated under the UK Wildlife and Countryside Act
Stakeholders	People that will be affected by, or will influence a programme, project or action.
Surveillance	An extended programme of surveys systematically undertaken to provide a series of observations to ascertain the variability that might be encountered over time (but without preconceptions of what these might be).
TNC	The Nature Conservancy
Target population	The population that we are interested in (e.g. the population of a species, or an area of habitat, that we are managing and have set a conservation objective for).

APPENDICES

APPENDIX 1. INDICATORS AND POTENTIAL MEASURES FOR ASSESSING PROGRESS TOWARDS THE 2010 BIODIVERSITY TARGET

(Source: Adapted from the report of the Subsidiary Body on Scientific, Technical and Technological Advice on the work of its tenth meeting http://www.biodiv.org/doc/meetings/cop/cop-08/official/cop-08-02-en.pdf)

Indicators in bold typescript are recommended for immediate testing and use. Indicators in italics require further testing. Potential measures are listed as bullets

1. **Trends in extent of selected biomes, ecosystems and habitats**
   - Forests and forest types (including mangroves)
   - Peatlands (probably for certain geographic areas only by 2010)
   - Coral reefs
   - Croplands
   - Grasslands/savannahs
   - Polar/ice
   - Inland wetlands
   - Tidal flats/estuaries
   - Seagrasses
   - Dry and sub-humid lands
   - Urban
2. **Trends in abundance and distribution of selected species**
   - Living Planet Index
   - Various species-assemblage trend indices
3. **Coverage of protected areas**
   - Coverage according to World List of Protected Areas
   - Overlays with areas of key importance to biodiversity
   - Inclusion on community and private Pas
   - Management effectiveness
4. **Change in status of threatened species**
   - Red List Index
5. **Trends in genetic diversity of domesticated animals, cultivated plants and fish species of major socio-economic importance**
   - *Ex-situ* crop collections
   - Livestock genetic resources
   - Fish genetic resources
   - Varieties of landraces on farms
6. **Area of forest, agricultural and agriculture ecosystems under sustainable management**

- Certification and other measures

7. *Proportion of products derived from sustainable sources*
8. *Ecological footprint and related concepts**
   - Ecological footprint
   - Other measures of the area of land and sea needed to support production of goods and services
9. **Nitrogen deposition**
10. **Trends in invasive alien species**
    - Number and cost of alien invasive species
    - Other measures to be developed
11. **Marine trophic index**
12. **Water quality freshwater systems**
    - Indicator of biological oxygen demand (BO), nitrates and sediments/turbidity
13. *Trophic integrity of other ecosystems*
14. **Connectivity/fragmentation of ecosystems**
    - Patch size distribution of terrestrial habitats (forests and possibly other habitat types)
    - Fragmentation of river systems
15. *Incidence of human-induced ecosystem failure*
16. *Health and well-being of communities who depend directly on local ecosystem goods and services*
17. *Biodiversity for food and medicine*
18. **Status and trends of linguistic diversity and numbers of speakers of indigenous languages**
19. *Other indicators of the status of indigenous and traditional knowledge*
20. *Indicator of access and benefit-sharing*
21. **Official development assistance provided in support of the Convention**
22. *Indicator of technology transfer*

* New indicator recommended by SBSTTA at its tenth meeting

APPENDIX 2. COMPANIES THAT REPORT ON BIODIVERSITY AMONGST EARTHWATCH CERG MEMBERS AND THE TOP 100 OF THE COMPANIES THAT COUNT 2005 DTI LIST

Company Name	Date of Most Recent Report	Report Name	Mention of biodiversity? (Yes / No and details)	Biodiversity Indicators? (Yes / No and details)	Approach to biodiversity (if not in Report)	Web Link
Actis	none since co. changed from CNC					
Amerada Hess Ltd	2003	Environment, Health, Safety and Social Responsibility Report 2003	Yes - 1 small para. Biodiv. Impacts are 'managed' through EIAs & baseline surveys, ongoing monitoring & site restoration.	No		http://www.hess.com/downloads/reports/ehs/us/2003/home.htm
Anglo American plc	2003 (2004 report due in April 2005)	Report to Society 2003: Anglo American Working for Sustainable Development	Yes. Devt of BAPs on sites with sig. biodiv. risk	No		http://www.angloamerican.co.uk/corporateresponsibilty/publications/sdreports/sd2003reports/
Aviva plc	2004	CSR Report 2004	No	No	Not mentioned - presumably because company activities not recognised as having an impact on biodiversity though no mention that it has been considered.	http://www.aviva.com/index.asp?pageid=105
Barclays plc	2003	CSR Report 2003	No	No - company measures performance in other env impacts against UK targets, eg for carbon emissions (UK Carbon Trading Scheme), waste, paper, water, travel	No specific mention of biodiversity - only that the company recognises that its activities will have indirect 'environmental impacts' through lending policies and supply chains	http://www.personal.barclays.co.uk/BRC1/jsp/brccontrol?task=channelsocial&value=5748&target=_self&site=pfs
Beacon Press	2003	Beautiful Print for Beautiful World	No, but have separate Biodiversity Policy Statement (not mentioned in Env Report). Site based initiatives and support for range of NGOs	Use industry initiatives - Future Forest's Carbon Neutral status, FSC endorsement	Biodiversity Policy Statement	http://www.beacon.org/about.html

Company Name	Date of Most Recent Report	Report Name	Mention of biodiversity? (Yes / No and details)	Biodiversity Indicators? (Yes / No and details)	Approach to biodiversity (if not in Report)	Web Link
BP plc	2004	Making the right choices: BP Sustainability Report	Yes - section 1.3 and pg 30 of report	* Use impact on biodiversity as a measure of company environmental performance - but no detail on how this impact is measured * Online environmental mapping tool plotting major sites alongside ESAs and biodiversity management initiatives in each location (see link on right)	* Risk assessment (EHS) drives priorities * High risk = Supply Chain (LEAF; Pulp); habitat impact; societal expectation; Social issues; * Site level relationship building & improving biodiversity performance * Seeking indicators see link	http://www.bp.com/downloadlisting.do?categoryId=666&contentId=2004066
British American Tobacco plc	2003/04	Social Report	Yes - pg 111	Yes - follow GRI guidelines Unclear how BATBP is helping to monitor biodiversity performance		http://www.bat.com/OneWeb/sites/uk__3mnfen.nsf/vwPagesWebLive/0979C269F4EE8C4280256BF4000331D6?opendocument&SID=FAA44557371946BF054C1D69C6D0E3A0&DTC=
Cadbury Schweppes plc	2004	CSR Report	Yes - section 11.14	No	* Stakeholder Consultation > establish priorities for biodiversity * Understand role of CS > Develop actions > Report progress *Approach has been fragmented with no clear company strategy, but several site-based initiatives.	http://www.cadburyschweppes.com/EN/EnvironmentSociety/Overview/reports2.htm
Diageo Foundation	2004	Corporate Citizenship Report	Yes	No		http://www.diageo.com/en-row/ValuesAndPolicies/CorporateCitizenshipReports/2005
GE Healthcare	none found					

Company Name	Date of Most Recent Report	Report Name	Mention of biodiversity? (Yes / No and details)	Biodiversity Indicators? (Yes / No and details)	Approach to biodiversity (if not in Report)	Web Link
GlaxoSmithKline plc	2004	Corporate Responsibility Report	No, but EHS Standard and Guideline on Biodiversity (under review),	Yes - GRI based	* Vision-> Plan-> Systems -> Review process * Driven by 'risk assessment' priorities * Guidelines developed * Internal dissemination / implementation unknown * No external information on process / EMS / guidelines etc. * Community involvement approach (road side surveys; Ulverston Site BAP; Nature reserves)	http://www.gsk.com/corporate_responsibility/cr_report_2004/
Good Energy	2004	Environmental Report	No	No		http://www.good-energy.co.uk/climate/22_report.html
HSBC Holdings plc	2003	HSBC in Society - CSR Report	No			http://www.hsbc.com/hsbc/news_room/news/news-archive-2004/corporate-social-responsibilty?isPc=false
ICI plc	2003	Sustainability Report	Yes - aim to survey each company site and develop biodiversity management plans	No		http://www.ici.com/ICIPLC/ici-she/2003/pdf/ICI_sustain_rep.pdf
KPMG	2003	CSR Report	No	No		http://www.kpmg.co.uk/about/csr/environment/index.cfm
J Sainsbury	2004	CSR 2004	Yes	Yes (see page 63)		http://www.j-sainsbury.co.uk/index.asp?pageid=20&subsection=2004

Company Name	**Date of Most Recent Report**	**Report Name**	**Mention of biodiversity? (Yes / No and details)**	**Biodiversity Indicators? (Yes / No and details)**	**Approach to biodiversity (if not in Report)**	**Web Link**
Price Waterhouse Coopers	2005	Corporate Responsibility Report	No	No		http://www.pwc.com/extweb/pwcpublications.nsf/4bd5f76b48e282738525662b00739e22/b57daf4fa3b308f385256fa2006025dc/$FILE/CRR_VolII_Winter_2005_final.pdf
HBOS	2004	Taking care of tomorrow: The HBOS Corporate Responsibility Report	No	Yes (Ecopoint system)	EMS based on ISO14001 standard	hbosplc.com
John Lewis Partnership	2004	Corporate Social Responsibility Report 2004	Yes	No (CSR indicators available online)		http://www.johnlewispartnership.co.uk/assets/pdf/WaitroseCSRReport2004.pdf
Rolls-Royce	2003	Rolls-Royce powering a better world	No	No (but performed well in BiE, CRI and Dow Jones indices)	EMS, to ISO14001 standard, govern business practices	http://www.rolls-royce.com/community/downloads/environment04/environment.pdf
United Utilities	Jun-04	Biodiversity Strategy: Working for wildlife	Yes	Yes (BAP - SSSIs etc)		unitedutilities.com
Veolia Water UK	2002/2003	Environmental Performance in 2002-3	Yes	Yes- We continued to foster priority species and habitats targeted in Biodiversity Action Plans.	Yes, they have a policy to Co-operate in the conservation of legislatively designated sites and other locations of archaeological, historical or environmental interest and sensitivity where they may be affected by our activities. More generally, we will promote biodiversity where practicable	http://www.veoliawater.co.uk//Corporate_Responsibility/popups/env_perf.html

Company Name	Date of Most Recent Report	Report Name	Mention of biodiversity? (Yes / No and details)	Biodiversity Indicators? (Yes / No and details)	Approach to biodiversity (if not in Report)	Web Link
BHP Billiton	2004	Working for a sustainable future. BHP Billiton Health, Safety, Environment & Community Report. Full Report 2004	Yes	Yes (GRI)		http://www.bhpbilliton.com/bbContentRepository/Reports/bhpb_full_hsec_report_04.pdf
Lloyds TSB	2003	taking account: The community and our business	No	No	Environmental impacts are managed by EMS following ISO14001 standard	lloydstsb.com
Scottish and Southern Energy	2004	Environment Annual Report 2004	Yes	Yes (environmental performance indicators)		http://www.scottish-southern.co.uk/Shareholder/ReportsAndPresentations/PDFs/AR2004/EnvironmentReport.pdf
Scottish Power	2001/2001	Environmental sustainability Report	Yes	Yes (GRI and KPIs linked to headline indicators of UK sustainable development strategy)		scottishpower.plc.uk
Severn Trent	2004	Severn Trent PLC Corporate Responsibility: Stewardship Report 2004	Yes	Yes (BAP, management plans and site specific biodiversity initiatives)		severntrent.com
CE Electric UK						ceelecticuk.com
Co-operative Insurance Society	2003	Co-operative Financial Services Sustainability Report	Yes	Yes (CFS reporting its Land footprint)		cis.co.uk
Friends Provident	2004	Corporate Responsibility Report	Yes	Yes		friendsprovident.com

Company Name	Date of Most Recent Report	Report Name	Mention of biodiversity? (Yes / No and details)	Biodiversity Indicators? (Yes / No and details)	Approach to biodiversity (if not in Report)	Web Link
Reckitt Benckiser	2003	A Passion to Perform: Environment Report 2003	Yes	No	Development of BAP as a means to identify areas where their operations impact upon habitats supporting rare or protected species of animals or plants.	reckitt.com
Camelot	2004	Camelot Social Report 2004	? Report N/A	? N/A	No	camelotgroup.co.uk
BNFL	2003	Environment, Health & Safety Report	Yes	No	Committed to protection of ecologically sensitive wildlife species and their habitats where nuclear sites operate. BNFL has a target of producing a BAP for all nuclear sites in the UK by 2005-06	bnfl.com
Northumbrian Water	2002	Northumbrian Water Biodiversity Strategy	Yes	Yes	Development of BAP as working document - Survey > Audit > Identifying Priorities > Action Plans > Implementation. BAP to be integrated with EMS and into ISO14001 system.	nwl.co.uk
Tesco Stores	2004	Tesco Corporate Responsibility Report 2003/2004	Yes	Yes - Corporate Responsibility Key Performance Indicators		tesco.com
BBC	2004	Environment Report 2003/2004	Yes	No	Biodiversity Management Plan covers BBC's estates recognized for their important habitats. In terms of product output, and approach to Biodiversity, BBC is interesting. Tries to balance science with business as usual (e.g. compare scientific documentaries with Jeremy Clarkson)	bbc.co.uk
Carillion	2004	Carillion Company Report 2004	Yes	No	Developing BAPs on 2 major projects and extending their use during 2005	carillionplc.com
Reed Elsevier	2004	Environmental Management System 2004	no	no		reedelsevier.com

Company Name	Date of Most Recent Report	Report Name	Mention of biodiversity? (Yes / No and details)	Biodiversity Indicators? (Yes / No and details)	Approach to biodiversity (if not in Report)	Web Link
Unilever	2003	Environment Report	Yes- the sustainable use of agriculture, fish and water all contributes to the conservation of biodiversity	Yes (target, performance and comments) pg. 19		http://unilever.com/Images/Environmental_Report_2003_tcm3-10357_tcm13-5512.pdf
Allied Domecq	2004	CSR Report	YES- sustainable use of plants/ conservation activities in New Zealand/ Biodiversity conservation in Portugal	Use the Global Reporting Initiative (GRI) biodiversity indicators in their report (land owned in bio-rich habitats and major impacts on biodiversity) and they use case studies	On the web under LAND USE: "Biodiversity programmes are on the agenda in Scotland at our whisky warehouses, while at the Laphroaig malt whisky distillery the peat-harvesting techniques now used help to restore the surface of the peat beds, upholding their landscape value and increasing their regeneration potential. Our kilns are also carefully managed to make sure that peat is used in a sustainable way. In Spain, where one of our distilleries is located close to a national park, we have put strict rules in place to make sure we don't upset the park's delicate ecosystems." Has four case studies.	http://allieddomecq.com/NR/rdonlyres/5FE13714-D0D9-4EAC-9F9F-524F55E851C9/0/SocialResponsibilityReportpdf.pdf
AWG	2004	Sustainable Development Performance	Yes- measuring their impacts on biodiversity, also Anglian Water has a 10-year Biodiversity Action Plan, currently in its fifth year.	yes- 2 measurement indicators 1. percent of operations with a system for recording use and management plan covering energy consumption and 2. Percent of other significant resource use/impacts subject to management plan. They list achievements in 2004 against a target in 2005.		http://www.awg.com/assets/sustainable_development/2004/
BOC Group	2004	Social, Environmental and Ethical Performance	No	No	No	http://boc.com/investors/annual_and_quarterly_reports/2004/report/social_environmental.pdf
Kelda Group	2004	CSR Report	Yes- recognition of the need for biodiversity conservation	Yes- return at least 15% of SSSIs to favourable status		CSR Report (2004)

Company Name	Date of Most Recent Report	Report Name	Mention of biodiversity? (Yes / No and details)	Biodiversity Indicators? (Yes / No and details)	Approach to biodiversity (if not in Report)	Web Link
Lafarge Cement UK	2003	Sustainability Report	NO	NO	Under Sustainable Construction the only thing on their website that mentions biodiversity is Partnership with the Nicolas Hulot Foundation for a HQE construction Lafarge has contributed to the construction of the Nicolas Hulot School, located in the Morbihan area (France). Its architecture has been designed according to an ecological procedure and aims at High Environmental Quality (HQE) targets. Lafarge Ciments, Lafarge Bétons and Lafarge Granulats donated building materials. The School will serve as an environmental awareness center for education and training on biodiversity for everyone.	http://www.lafarge.com/cgi-bin/lafcom/jsp/content.do?function=presspublication&BV_SessionID=@@@@2068284245.1113562221@@@@&BV_EngineID=ccccadddljijjjhcfngcfkmdhgfdggf.0
MM02	2004	Corporate Responsibility Report	Yes	Yes, GRI Index: 1. Location and size of land owned, leased, or managed in biodiversity-rich habitats. 2. Description of the major impacts on biodiversity associated with activities and/or products and services in terrestrial, freshwater, and marine environments. - Environment and sustainability 3. Impacts of activities and operations on protected and sensitive areas. In addition, there are case studies on Biodiversity Protection activities undertaken.		http://www.o2.com/downloads/O2_CR_full_report.pdf
EDF Energy	2003	Core Responsibility Report 2003	No	NO	No	edfenergy.com
Ford Motor Company	2003/2004	Ford 2003-2004 Corporate Citizenship Report	Yes	Yes (plant locations in biodiversity hotspots. If so, then work to minimize potential impact on biodiversity)		ford.com

Company Name	Date of Most Recent Report	Report Name	Mention of biodiversity? (Yes / No and details)	Biodiversity Indicators? (Yes / No and details)	Approach to biodiversity (if not in Report)	Web Link
International Power	2003	International Power Annual Report 2003	No	No	No	http://internationalpowerplc.com/ipplc/investors/findata/reports/ar03/ar03.pdf
Amec	2004	Annual Report	no	no	Earth and Environment web site -- Environmental Impact and Permitting - mention of biodiversity indirectly.	http://www.amec.com/annualreport2004/index.html
Astra Zeneca	2004	Annual Report	No	NO	Yes - AstraZeneca is developing a biodiversity strategy aimed at conserving, and if possible increasing, local biodiversity on and around the Company's properties worldwide. Work is already being done at one site.	http://www.astrazeneca.com/Article/11142.aspx
Centrica	2003	Corporate Responsibility Summary Report 2003	No	No	Yes- impacts on biodiversity (high, medium, low)	http://centrica.co.uk/index.asp?pageid=657
Aggregate Industries	2003	Sustainability Report	Yes	Yes -2002 Company BAP 5 company objectives with targets and progress (pg. 30/31)		http://www.aggregate.com/plc/flash_template/pdffiles/SR03z.pdf