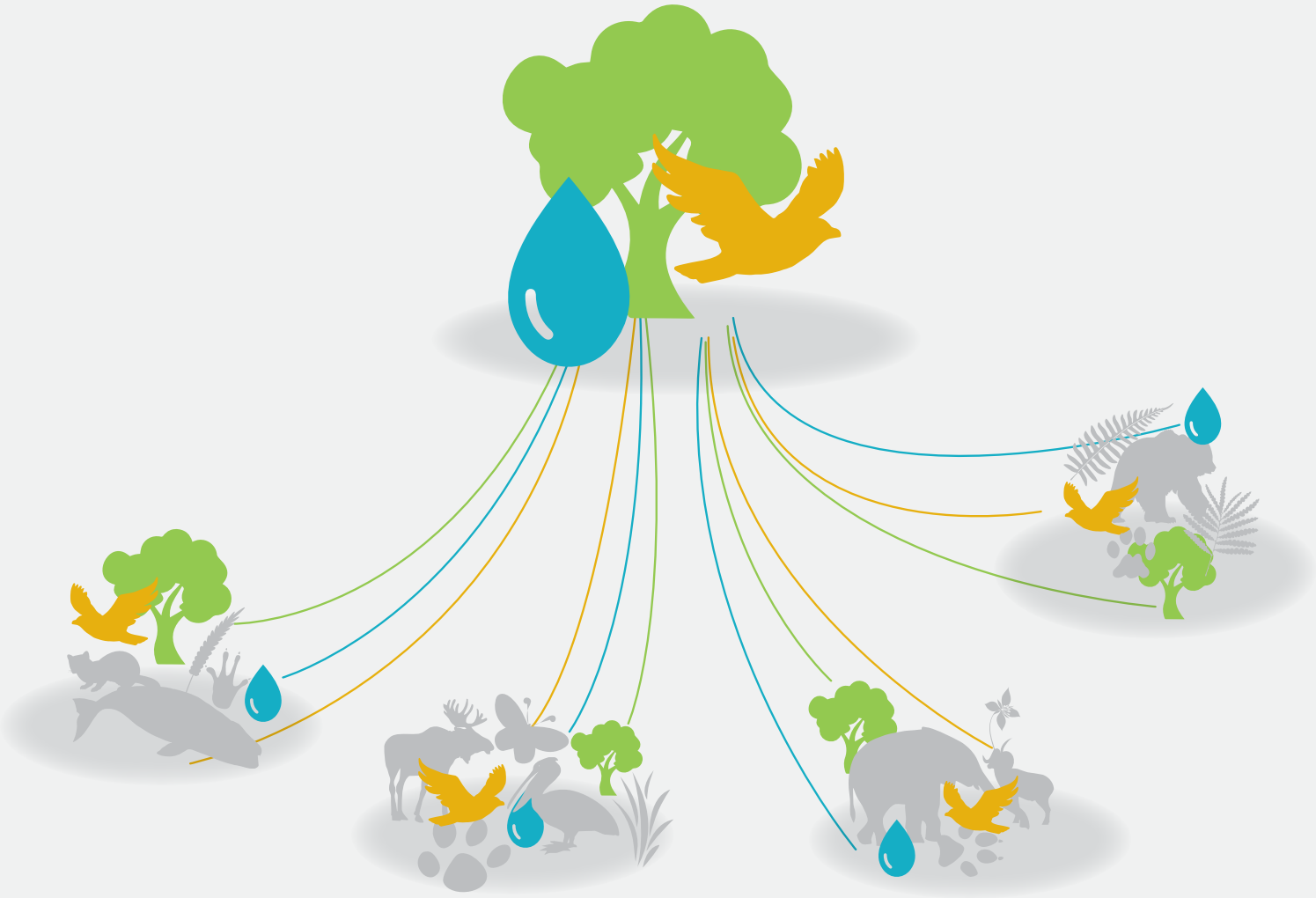
Guidelines for planning and monitoring corporate biodiversity performance



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Species Monitoring Specialist Group

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Executive summary

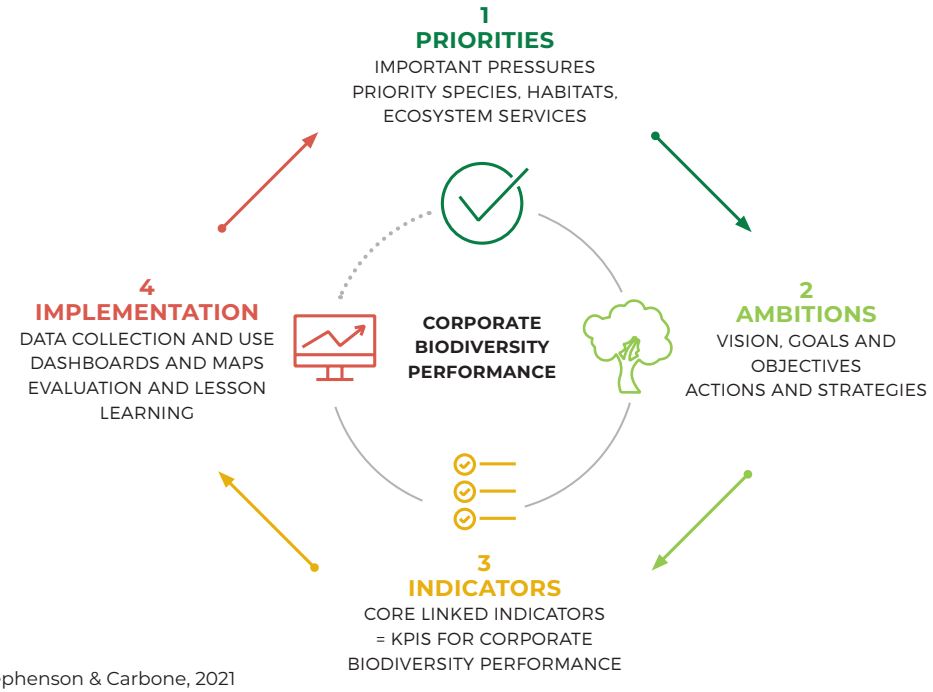
The *Guidelines for planning and monitoring corporate biodiversity performance* offer an approach for developing a corporate-level biodiversity strategic plan, including measurable goals and objectives and a set of core linked indicators, that will allow companies to measure their biodiversity performance across their operations. The Guidelines can be used by any company in any sector that has impacts and dependencies on biodiversity, whether large or small, national or multinational.

Why these Guidelines have been developed

Businesses, committed to address the risks and opportunities associated with their activities, increasingly need information on the state of biodiversity, the pressures they may cause on species and ecosystems and the effectiveness of their responses, in order to plan and monitor their operations. However, nature is complex and significant challenges exist in developing indicators that provide clear and simple measures of biodiversity that are relevant to business needs. In particular, it has often proven difficult to identify suitable goals, indicators and monitoring systems that facilitate corporate biodiversity performance assessment and support internal decision-making and external disclosure. Fortunately, in the last few years, many conservation organisations have been working to improve the methods and tools for biodiversity planning and monitoring and many of their findings are transferrable to a business context.

What the Guidelines do for companies

The *Guidelines for planning and monitoring corporate biodiversity performance* are aimed at sustainability teams, managers and other company staff whose roles include strategic planning and reporting related to biodiversity. They are shaped around four stages that steer businesses through a series of practical steps to plan biodiversity goals, choose and apply appropriate biodiversity indicators and to collect, present and analyse data in a way that facilitates results-based management and corporate biodiversity reporting.



Source: Stephenson & Carbone, 2021

The Guidelines are aimed at the corporate level but should be informed by, and directly relate to, company activities on the ground or along supply chains. The focus is on a full-cycle, results-based management approach (not just risk analyses, goal setting or indicator development), since assessing pressures on biodiversity, and planning and developing measurable goals, are key prerequisites for monitoring. They also explain how, by choosing and using appropriate core indicators and building internal capacity and partnerships, companies can aggregate and use biodiversity data at the corporate level in a meaningful way.

By following the Guidelines, a company will be able to:

- Identify the species, habitats and ecosystem services it should focus on;
- Identify the pressures on biodiversity that are most important for the company to address;
- Define a vision, measurable goals and objectives and a set of strategies to address biodiversity;
- Identify a suite of core biodiversity indicators that will facilitate data aggregation across its operations to corporate level, thereby allowing the company to assess, report and communicate its biodiversity performance;
- Develop and use maps and dashboards to visualise information and facilitate data-driven decision-making;
- Mainstream biodiversity data into corporate reporting and adaptive management
- And, where a company wants to do so, help demonstrate its contribution to international biodiversity goals (such as the Sustainable Development Goals and the post-2020 Global Biodiversity Framework of the Convention on Biological Diversity).

Ensuring biodiversity is factored into operations will also allow companies to gain various direct and indirect benefits, including managing and mitigating risks, ensuring the sustainability of the ecosystem services they depend on and developing a strong environmental reputation in a competitive marketplace.

Outputs include a summary of the key elements of the company's biodiversity strategic plan in an easy-to-interpret tabular format.

What makes the Guidelines unique

Companies will find added value in the use of the Guidelines as they:

- Allow companies to be more specific and targeted in their choice of biodiversity to conserve, in naming species and habitats and in identifying the benefits they provide to people;
- Apply a framework of scalable, linked indicators that gives a more complete picture of biodiversity and allows aggregation of data at the corporate level;
- Offer a more objective and science-based approach to planning and monitoring biodiversity performance and link to current global efforts to harmonise approaches and indicators;
- Complement companies' non-financial disclosure efforts to provide an overview of performance at corporate level;
- Cross-reference and link to existing standards, guidelines and tools so as to provide an overarching framework for results-based management for biodiversity.

Enabling conditions

For a company to develop and implement a biodiversity strategic plan and manage and monitor biodiversity performance, it will need to consult key stakeholders (e.g. staff, suppliers, similar companies, government agencies, local communities, civil society) as well as shareholders and to build company capacity and partnerships for mainstreaming biodiversity data into corporate decision-making. The Guidelines can only be applied effectively by companies willing to assess their impacts on biodiversity across their operations and throughout their supply chains.

Expected outputs

At the end of the process, after having implemented Stages 1 to 4, the company will have in place a corporate level biodiversity strategic plan which will include the following components generated during the process of implementing the Guidelines:

Key outputs from the Guidelines	Stage
Summary of biodiversity pressures caused by company activities in its corporate scope of biodiversity influence	1
List of priority species, habitats, areas and ecosystem services around which company goals and objectives can be focused and against which company biodiversity performance can be measured	1
Corporate biodiversity vision	2
Scalable biodiversity goals and objectives	2
Key strategies to deliver goals and objectives	2
A framework of core pressure-state-response-benefit indicators to monitor the company's goals, objectives and strategies	3
The key elements of a biodiversity strategic plan	3
A monitoring plan describing the linked indicators to be used and mapping out how data will be collected, when, how, where and by whom	4
A database of relevant data on indicators	4
Monitoring and reporting systems that ensure data are provided in a standardised format that can be displayed in appropriate data products, such as maps and dashboards, to meet decision-makers' needs at each level of the company	4

How the Guidelines have been developed

The Guidelines are based on the experiences and practices of some of the world's largest conservation organisations and on the lessons learned from decades of applying conservation project management standards. They take into account the experiences, lessons and ideas of several large, forward-thinking companies from different sectors that helped to test them and ensure they meet user needs. They also build on, complement, cross-reference and add value to other relevant business standards, guidelines and tools, such as International Finance Corporate Performance Standard 6, ISO standards, the Natural Capital Protocol, the Global Reporting Initiative and many more. In the Annexes, we list and link to such standards, guidelines and tools that might help a company implement each stage. As the Guidelines are used over the coming months and years, and applied by different companies in different sectors, we will actively seek to learn lessons from peoples' experiences and adapt and improve the Guidelines as necessary. To that end, we welcome feedback from any companies that apply some or all of the stages.

Acknowledgements

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Key terms used in the Guidelines

Aggregation unit: The elements of a company's activities that will be used to plan and monitor impacts on biodiversity.

Biodiversity performance indicators: The pressure-state-response benefit indicators companies will develop to monitor their goals, objectives and strategies.

Core indicators: Indicators that are used across the company at multiple levels by multiple people to provide common measures of progress against biodiversity goals and objectives.

Corporate level monitoring: Monitoring of the performance of the company aggregating all activities.

Corporate scope of biodiversity influence: Activities such as operations, processes and services managed by the company, all the supply chains and the services feeding and supporting the company's activities.

Goal: The desired impact of a company's conservation work. Characteristics: measurable; achievable within a specific time period; directly associated with one or more biodiversity priorities and their desired state in the long term.

Objective: A formal statement detailing a desired outcome of a project. Characteristics: measurable; feasible; achievable within a specific time period; directly associated with one or more threats or opportunities for defined biodiversity priorities.

Pressures: Natural and anthropogenic threats that influence biodiversity and ecosystem processes.

Scalable (goal, objective or indicator): A goal, objective or indicator is considered scalable if the company can use the same type of ambition or the same type of measurement at multiple scales (e.g. a goal focused on restoring natural habitat cover, and the related indicator monitoring the change in habitat cover, can be used at a site level as well as at the corporate level).

Situation Analysis: A process that will help create a common understanding of a project's context – including describing the relationships among the biological environment and the social, economic, political and institutional systems, and associated stakeholders, that affect the biodiversity the company wants to conserve. Depending upon the scale of the project, and the resources available to it, a situation analysis can be an in-depth formal review of existing evidence and study of the area/problem, or a less formal description based on input of those familiar with the area/problem.

Strategy: A set of actions with a common focus that work together to achieve specific goals and objectives.

Vision: The desired state of biodiversity a company is aiming to achieve. Characteristics: simple and succinct; general and broad to encompass all company activities; inspirational.

Glossary of other terms used

Derived and adapted from multiple sources. For definitions of additional terms, see the UNEP-WCMC Biodiversity A-Z (https://www.biodiversitya-z.org/).

Activities: The operations, processes and services managed by the company, the supply chains and the services feeding and supporting the company's operations, as well as the final product in its consumption and post consumption phase.

Aggregation: The clustering of data from multiple sources to enable an analysis of collective responses, outcomes and impacts.

Area important for biodiversity: Areas of land or sea which are identified as important for biodiversity and defined as, for example, critical habitats, Key Biodiversity Areas, priority ecoregions, biodiversity hotspots and Alliance for Zero Extinction sites.

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. For these guidelines when we refer to biodiversity we mean the species, habitats and ecosystems (including the services they provide) that occur within a company's area of influence.

Biodiversity loss: Biodiversity loss is usually observed as one or all of: (1) reduced area occupied by populations, species and community types, (2) loss of populations and the genetic diversity they contribute to the whole species and (3) reduced abundance (of populations and species) or condition (of communities and ecosystems). The likelihood of any biodiversity component persisting (the persistence probability) in the long-term declines with lower abundance and genetic diversity and reduced habitat area.

Community of Practice: A group of practitioners who share a concern, a set of problems, or a passion about a topic and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.

Critical habitats: Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

Dependency: A company depends on an ecosystem service if that service functions as an input or if it enables, enhances or influences environmental conditions required for successful corporate performance.

Drivers (of biodiversity loss): Natural and anthropogenic threats that operate diffusely by altering and influencing pressures as well as other drivers (also referred to as 'underlying causes').

Ecoregion: A relatively large area of land or water containing a characteristic set of natural communities that share a large majority of their species, ecological dynamics and environmental conditions.

Ecosystem: A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Ecosystem services: Benefits people obtain from ecosystems (often referred to as "nature's contributions to people"). These include provisioning services such as: food and water; regulating services such as the regulation of floods, drought, land degradation and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other non-material benefits.

Endemic species: A species found only within a defined geographic area (e.g. a country, an ecoregion, a habitat type) and nowhere else.

High conservation value areas: Natural habitats, which are of outstanding significance or critical importance due to their high biological, ecological, social or cultural values. These areas need to be appropriately managed in order to maintain or enhance those identified values (UNEP-WCMC 2014). There are 6 categories: species diversity, landscape level ecosystems, ecosystems and habitats, ecosystem services, community needs and cultural value.

Impact: The desired future state of biodiversity; or the effect an organisation or company has on the economy, the environment, or society, which in turn can indicate its contribution (positive or negative) to sustainable development.

Indicator: A unit of information measured over time that documents changes in a specific item or condition (e.g. a threat, a species, a benefit). Characteristics: measurable (in quantitative or qualitative terms); precise; consistent; sensitive (changing proportionately in response to actual changes).

Key Biodiversity Areas: Sites contributing significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems.

Learning: The process of filling an information need.

Mitigation hierarchy: The sequence of actions to anticipate and avoid and, where avoidance is not possible, minimise and, when impacts occur, restore and, where significant residual impacts remain, offset for biodiversity-related risks and impacts on affected communities and the environment.

Monitoring: The periodic collection and evaluation of data relative to stated project goals and objectives.

Monitoring Plan: The plan for monitoring your project. It includes information needs, indicators, methods, timeframe and roles and responsibilities for collecting data.

Natural habitats: Areas composed of viable assemblages of plant and/or animal species of largely native origin and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

Opportunity: A factor that potentially has a positive effect on biodiversity either directly or indirectly. In some senses, the opposite of a threat.

Outcome: The desired future state of a threat or opportunity.

Product: Article or substance that is offered for sale or is part of a service delivered by an organisation.

Protected area: A clearly defined geographical space recognised, dedicated and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

Restricted-range species: Species with a geographically restricted area of distribution (area of occupancy or extent of occurrence). IFC (2012c) specifies the size of range considered restricted for terrestrial and

marine species (an EOO of less than 50,000 or 100,000 km^2 respectively).

Service: The action of an organisation to meet a demand or need.

Site: A location within the corporate scope of biodiversity influence where the company's activities take place (see also Activities). Sites include the areas on which the company operates its assets; the sites from which it sources its materials; and the areas associated to the projects serviced by the company.

Species abundance: The number of individuals in a population of a given species.

Species richness: The number of species in a given area.

Stakeholder: Entity or individual that can reasonably be expected to be significantly affected by the reporting organisation's activities, products and services, or whose actions can reasonably be expected to affect the ability of the organisation to successfully implement its strategies and achieve its objectives. Stakeholders include entities or individuals whose rights under law or international conventions provide them with legitimate claims vis-à-vis the organisation. Stakeholders can include those who are invested in the organisation (such as employees and shareholders), as well as those who have other relationships to the organisation (such as other workers who are not employees, suppliers, vulnerable groups, local communities and NGOs or other civil society organisations, among others). Stakeholders are all those who need to be considered in achieving biodiversity goals and whose participation and support are crucial to success.

Strategic plan: A summary of the company's vision, goals, objectives and actions/ strategies, as well as its theory of change.

Supply chain: Sequence of activities or parties that provides products or services to a company.

Target: The value within a goal or objective that a company is trying to attain (e.g., the number of trees it wants to plant).

Theory of change: A description of the logical causal (if-then) relationships between multiple levels of strategies, outputs, outcomes and impacts needed to achieve a long-term goal.

Acronyms

BAP	Biodiversity Action Plan
BSI	British Standards Institution
CBD	Convention on Biological Diversity
CMP	Conservation Measures Partnership
CSR	Corporate social responsibility
IBAT	Integrated Biodiversity Assessment Tool
IFC	International Finance Corporation
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
NGO	Non-governmental organisation
SDG	Sustainable Development Goal
STAR	Species Threat and Recovery
UN	United Nations
UNEP-WCMC	United Nations Environment Programme World Conservation Monitoring Centre
WDPA	World Database on Protected Areas

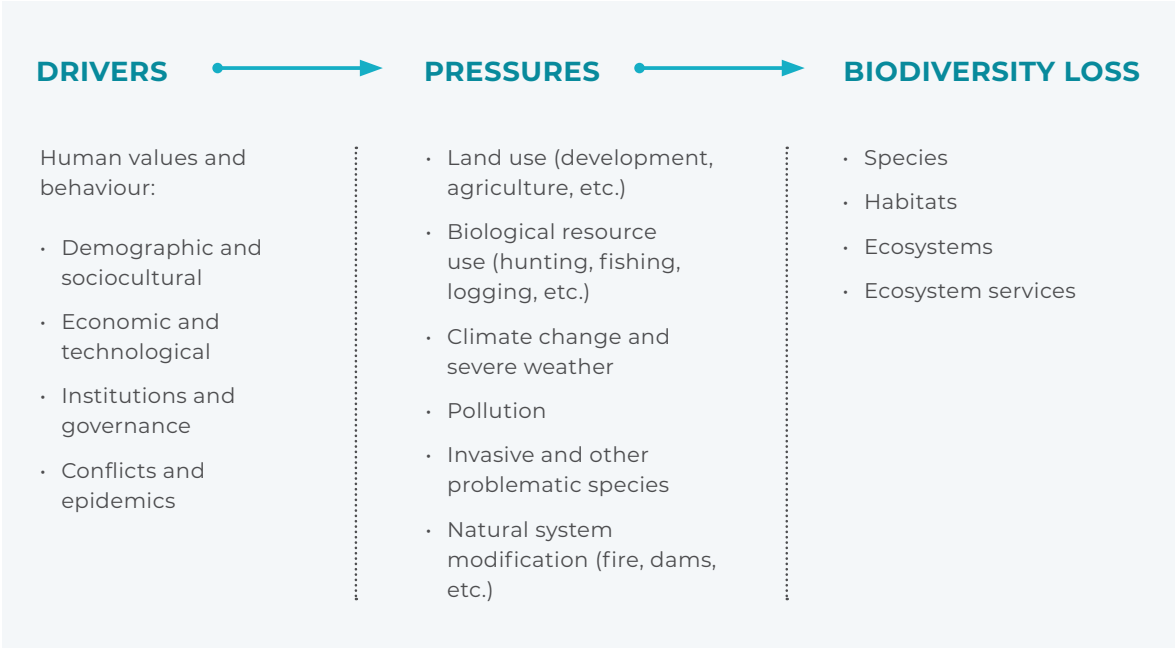
1. Introduction

1.1 Linking biodiversity and business activities

Biodiversity – the diversity within and between species and ecosystems – offers a huge and critical array of ecosystem services on which people and nature co-depend and is fundamental to the resilience of our planet [1-4]. However, biodiversity is under threat. The main direct pressures driving the loss of biodiversity and, in turn, the degradation of ecosystem services, include the development and use of land (leading to habitat loss, alteration and fragmentation), exploitation of species, natural system modifications, invasive species, pollution and climate change. Industry and agriculture are among the main drivers of land-use change [4, 5] (Fig. 1). The result is that most businesses have some level of impact on biodiversity and ecosystem services directly through their core operations and indirectly through their supply chains or investment choices. Many companies also depend on biodiversity, and the ecosystem services underpinned by biodiversity, as key inputs to products and production processes, whether that's for raw materials (e.g. fruits, nuts, rubber, timber) or ecosystem services, such as climate regulation, fisheries, pollination and water quality [4].

Many companies are already addressing global concerns about greenhouse gas emissions and plastics pollution. An increasing number of businesses also recognise broader environmental concerns and the risks and opportunities associated with their impacts and dependencies on biodiversity and, as a result, many have committed to integrating biodiversity into their decision-making processes and corporate operations. Many companies adopt relevant standards and best practices based on defining their ambitions in relation to the mitigation hierarchy's objectives of No Net Loss or a Net Gain of biodiversity [6] and the Sustainable Development Goals or SDGs [7].

Figure 1. The connection between drivers, pressures and the state of biodiversity and ecosystem services. Based on IPBES [4] and CMP & IUCN [8].



Ensuring biodiversity is factored into their operations allows companies to gain various direct and indirect benefits, including: managing and mitigating risks; developing a strong environmental performance and reputation in a competitive marketplace; developing new markets such as certified sustainable products; cost-savings through more efficient use of natural resources; obtaining the social licence to operate by addressing civil society's concerns at local and global levels; and attracting and retaining employees with environmental practices that can favourably represent a company's core values and ethical stance.

Businesses committed to taking action on biodiversity increasingly need information on the state of biodiversity, the pressures they may cause on species, habitats and ecosystems and the effectiveness of their responses, in order to plan and monitor corporate biodiversity performance. Planning and monitoring corporate biodiversity performance are essential in order to effectively and efficiently manage a company's financial and human resources, as well as the various risks affecting biodiversity directly or indirectly. Furthermore, the increasing regulations on non-financial disclosure (such as the European Union's non-financial reporting directive 2014/95/EU [9]) are putting more pressure on businesses to identify credible indicators for their biodiversity performance that can be shared publicly.

However, the development of a unified corporate-level performance management system, built around the key elements of a biodiversity strategic plan, is a complex challenge for many companies [10, 11]. Many businesses struggle to find ways of aggregating data in a meaningful way from multiple activities, sites, products or brands, often with multiple raw materials and supply chains. This challenge is aggravated when the business is not in control of site-level activities related to its operations (for example, when manufacturing companies source all their raw materials, or a service provider delivers only certain services on site and does not control the full project). Further complications, such as lack of clarity on how to define, prioritise and measure biodiversity relevant to the company, and how to set suitable levels of ambition, mean that many companies have struggled to monitor their biodiversity performance [11, 12]. Fortunately, in the last few years, many conservation organisations have been working to improve the methods and tools for biodiversity planning and monitoring and many of their findings are transferrable to a business context.

These Guidelines therefore build on decades of conservation science and practice which suggest that a systems-based approach is most effective for monitoring biodiversity, measuring goal delivery through indicators designed to answer specific management questions (such as: what have our responses achieved?; which pressures have been reduced?; and how is biodiversity faring?) [13-16]. The identification of scalable goals and objectives, and the use of a small number of core linked indicators, allows data to be aggregated from site level to higher levels, which is key for companies wanting to measure corporate level biodiversity performance. Although the Guidelines do not suggest pre-defined performance indicators, the indicators that the company will identify through this process can be used also as part of non-financial disclosure efforts as they provide an aggregate overview of the company's performance.

The Guidelines have been developed in the context of a wider effort among a range of stakeholders to support companies in measuring their negative and positive impacts on biodiversity. This effort includes the work led by UNEP-WCMC on biodiversity indicators for extractive companies and the Aligning Biodiversity Measures for Business Initiative, which aims to form a common view on the measurement, monitoring and disclosure of corporate biodiversity impacts and dependencies. In the Annexes to the Guidelines, other standards, guidelines and tools that might help a company implement each stage are listed and links to them provided.

1.2 A corporate-level biodiversity strategic plan to support corporate-level biodiversity performance

The *Guidelines for planning and monitoring corporate biodiversity performance* are designed to support the planning and monitoring of corporate-level biodiversity performance, enabling adaptive, results-based management and facilitating informed decision-making in relation to environmental risks, sustainability, investments and product development.

By following the Guidelines, a company will be able to:

- Identify the pressures and dependencies on biodiversity that are most important for the company to address;
- Identify the species, habitats and ecosystem services the company can focus on;
- Define a vision, measurable goals and objectives and a set of strategies to address biodiversity and, where appropriate, help demonstrate its contribution to international biodiversity goals;
- Identify a suite of core biodiversity indicators that will facilitate data aggregation across its operations to corporate level, thereby allowing the company to assess, report and communicate its biodiversity performance;
- Develop and use maps and dashboards to visualise information and facilitate data-driven decision-making;
- Mainstream biodiversity data into corporate reporting and adaptive management.

The four stages will therefore provide the company with the key elements of a **corporate-level biodiversity strategic plan.**

The Guidelines are aimed at the corporate level but should be informed by, and directly relate to, company activities on the ground or along supply chains. A corporate level biodiversity strategic plan will never replace site-level or supply-chain-specific management measures, such as Environmental Impact Assessments, biodiversity action plans, site-level monitoring and evaluation plans, or the implementation of site-level certification and chain of custody systems. On the contrary, corporate-level and site-level planning and monitoring are inter-related and both are necessary to ensure that the right biodiversity management responses are implemented effectively and accounted for.

A corporate-level biodiversity strategic plan will complement a number of other standards, guidelines and tools that a company might want to, or need to, follow (Table 1). The Guidelines take these into account and highlight where each might be relevant to a given stage. Annexes 1 to 4 provide a detailed list of standards, guidelines and tools that might help a company implement Stages 1 to 4.

What makes the *Guidelines for planning and monitoring corporate biodiversity performance* unique, and where companies will find added value in their use, is that they:

- Allow companies to be more targeted in their biodiversity focus, naming the species and habitats that are commonly important across their operations and supply chains and identifying the benefits they provide to people;
- Apply a framework of scalable, linked indicators that gives a more complete picture of biodiversity and allows aggregation of data at the corporate level;
- Offer a more objective and science-based approach to planning and monitoring biodiversity performance and link to current global efforts to harmonise approaches and indicators;
- Complement companies' non-financial disclosure efforts to provide an overview of performance at corporate level;
- Cross-reference and link to existing standards, guidelines and tools so as to provide an overarching framework for results-based management for biodiversity.

The Guidelines were developed with support and input from several companies and tested to see how well they responded to corporate needs. As the Guidelines are used over coming months and years and applied by different companies in different sectors, IUCN will actively seek to learn

lessons from peoples' experiences and adapt and improve the Guidelines as necessary. To that end, we welcome feedback from any companies who have applied some or all of the stages.

Finally, while the IUCN Guidelines are aimed at helping companies plan and monitor their own progress towards delivering their own goals, as the approach is adopted more widely it should become possible to compare the performance of some companies, at least those in the same sectors or those that have similar goals. Ways of developing comparative analyses, and when and how they might be recommended or of most use, will be explored as Version 1 of the Guidelines is tested.

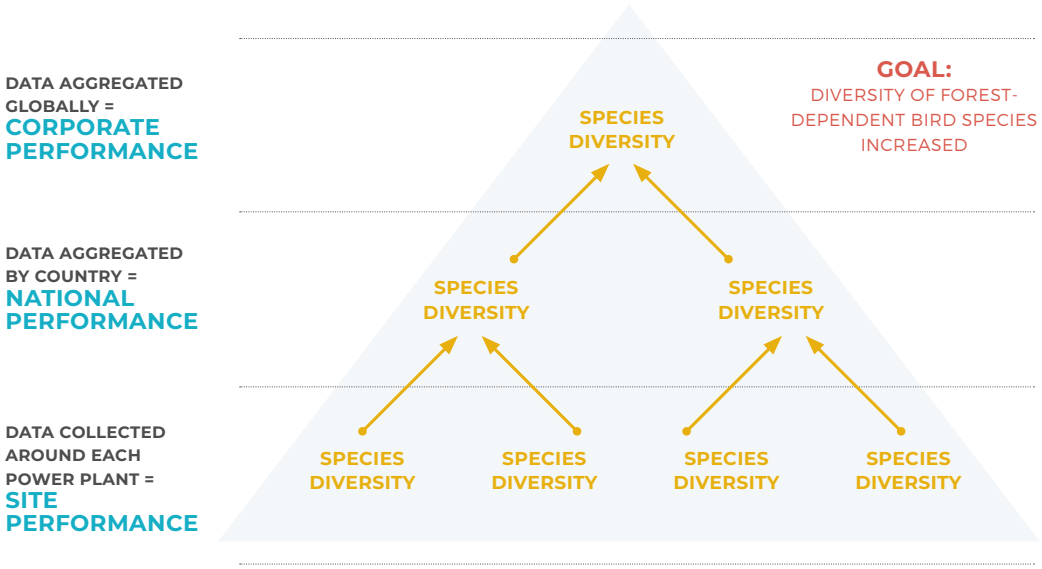
Table 1. Corporate-level management needs and a selection of available standards, guidelines and tools that can help meet them. Details of these examples and many others can be found in the annexes. The Aligning Biodiversity Measures for Business collaboration [17], alongside the EU Business @ Biodiversity platform [18], is working to assess which measures are appropriate based on the business application and organisational focus.

Corporate level management needs	Examples of existing standards, guidelines and tools
Assess the value of nature's contribution at a company or product level	• Biodiversity Guidance to the Natural Capital Protocol
Calculate the biodiversity footprint of products and supply chains	• Product Biodiversity Footprint • Cool Farm Tool from the Cool Farm Alliance • Biodiversity Input-Output for Supply Chain & Operations Evaluation - BioScope • ENCORE (for financial institutions)
Develop a corporate-level biodiversity strategic plan with goals, objectives and indicators to manage and monitor the biodiversity impacts and dependencies associated with the company's operations	• IUCN's Guidelines for planning and monitoring corporate biodiversity performance
Determine how much, where and with what actions, a company should contribute to nature conservation in order to be aligned with CBD's global targets	• Science-based Targets for Nature
Monitor biodiversity performance at a cluster of similar sites	• The Biodiversity Indicators for Site-Based Impacts methodology (UNEP-WCMC) • Biodiversity Indicators and Reporting System (BIRS) for the cement and aggregates sector (IUCN)
Publicly report on biodiversity performance (as part of a corporate sustainability report)	• Global Reporting Initiative Standards (GRI 304 Biodiversity)
Rate how a company is performing in managing its biodiversity impacts compared with others	• ESG ratings (such as those produced by agencies such as MSCI, Sustainalytics and Vigeo Eiris)

1.3 Target audience and expectations

The Guidelines are aimed at the teams working on sustainability related issues at the corporate level, as well as those staff whose roles include strategic planning and reporting that relate in any way to biodiversity. The Guidelines can be used by any company that has impacts and dependencies on biodiversity. They are applicable for companies in the primary sectors (raw materials), secondary sectors (manufacturing) and tertiary sectors (services), whether large or small, national or multinational. However, applying the Guidelines requires a minimum level of knowledge about the presence and status of species, habitats, ecosystems and ecosystem services in

Figure 2. An example of an indicator hierarchy. In this fictitious case of an energy company, the company goal is to increase the diversity of forest-dependent bird species at corporate level and around all the power plants in the two countries it works in. The same indicator (bird species diversity) is therefore collected around each plant, aggregated at national level (to monitor biodiversity performance in each country) and then at a global level, to monitor corporate biodiversity performance.



Source: Stephenson & Carbone, 2021

the areas where the company operates and from where it sources its raw materials. For example, a company will not be able to set biodiversity goals and objectives without understanding the origin of its raw materials, as this knowledge is a pre-requisite for identifying the biodiversity affected by company activities which will need to be monitored to assess if the goals, objectives and strategies adopted are effective.

A key step in the Guidelines is for the company to identify how and where its activities put pressures on species, habitats and ecosystem services. Therefore, applying the Guidelines is likely to be easier for companies with a greater control over the activities that are driving impacts on biodiversity and the more directly they use, or influence the use of, natural resources at sites within their value chains. As a result, companies in primary sectors (e.g. extractive industries, agriculture, farming, fishing, forestry, bioenergy) may find it easier to identify the biodiversity they impact, or depend on, than businesses in the secondary or tertiary sectors (manufacturing, retail and other services).

The Guidelines have been designed to be implemented by companies with different levels of maturity in relation to biodiversity: some will have a few actions focused on biodiversity but without a defined overarching goal; others will already have some form of goal and a suite of biodiversity-related actions underway. Many companies will already have in place some elements of the system and the Guidelines allow the retrofitting and adaptation of existing goals and indicators, as well as the creation of new ones. Some companies will already be testing or applying other standards, guidelines and tools (some of the most common include International Finance Corporation's Performance Standard 6 [19], ISO standards [20], the Natural Capital Protocol [21] and the Global Reporting Initiative [22]); the Guidelines accommodate and build on their use. Those companies with less maturity can still implement the Guidelines but will likely need more time to conduct relevant assessments to implement Stage 1.

In order to apply the Guidelines successfully, there are several pre-requisites whichever sector a company is in:

- A willingness to gather information about biodiversity in relation to the company's operations (at sites, supply chains and commodities levels);

- Commitments from senior management to define and work towards corporate biodiversity goals, to develop a results-based management culture and to share data internally and (wherever possible) externally (many companies already have such a culture for certain activities relating to, for example, health and safety);
- Human and financial resources are mobilised to put in place the necessary capacity and tools for biodiversity. In some cases, this may simply be a reallocation of existing budgets – for environment projects, broader corporate social responsibility work or marketing (which supports biodiversity work in some companies). However, all companies that apply the Guidelines need to be prepared to invest the time and resources necessary to follow the four stages. The process may not be for the faint hearted, but the investment will be rewarded by providing the company with a far more powerful way of defining, addressing and monitoring biodiversity.

1.4 Structure of the Guidelines

There are three key elements to the *Guidelines for planning and monitoring corporate biodiversity performance*.

The first element is the adoption of a **results-based management system** that flows through a cycle of identifying priorities, planning and then monitoring, in line with the Assess-Plan-Implement-Analyse/Adapt-Share steps of the Conservation Standards [23]. This will be familiar to some companies since the steps reflect elements of the Plan-Do-Check-Act model that is encouraged in, for example, BSI environmental management systems (ISO 14001 [20]), International Finance Corporation (IFC) Performance Standard 1 [24] and the Natural Capital Protocol [21]. Goals and objectives should be established based on the company's vision and its direct, indirect and cumulative impacts on biodiversity and can be linked to global goals and processes, such as the SDGs and the post-2020 Global Biodiversity Framework of the Convention on Biological Diversity (Stage 2; Annex 2).

The second element is the use of **scalable goals and indicators** that can be applied at multiple levels to ensure a company can plan and monitor its performance across its corporate scope of biodiversity influence. Such a system allows data to be collected and used locally (e.g. at a site or in a value chain) but then aggregated at higher levels (e.g. country, commodity) and globally at the corporate level, while providing information of value in communicating the company's performance (Fig. 2; Fig. 5).

Examples of scalable indicators include "area of company managed land under forest cover" or "number of species" or "level of illegal offtake" or "area under sustainable production", as they can be calculated in an area of a few hectares and also aggregated at multiple levels (e.g. landscape, national, regional and global). In contrast, examples of indicators that are not easily scalable include ecological footprint [25] (which is calculated at national and global levels but cannot be disaggregated easily to more local levels) and many wildlife trade statistics and greenhouse gas emissions data which are often collated nationally, not at subnational and site levels.

The third element is the use of the **Pressure-State-Response-Benefit framework of linked indicators** [5, 13, 14, 26-28] (Box 1; Fig. 3), where a change in one type of indicator is expected to lead to a change in another. This will enable companies to gain a more holistic picture of their biodiversity performance at multiple levels and understand how and where to act in response to the results obtained. It will also ensure that biodiversity impacts (the change in state of species, habitats and ecosystem services) will be measured and reported, as well as outcomes from any reductions in pressures. The strategies adopted to reduce pressures will also be monitored. This system is used by many conservation agencies and is recommended by the UN to monitor global goals such as the SDGs and the Aichi Targets.

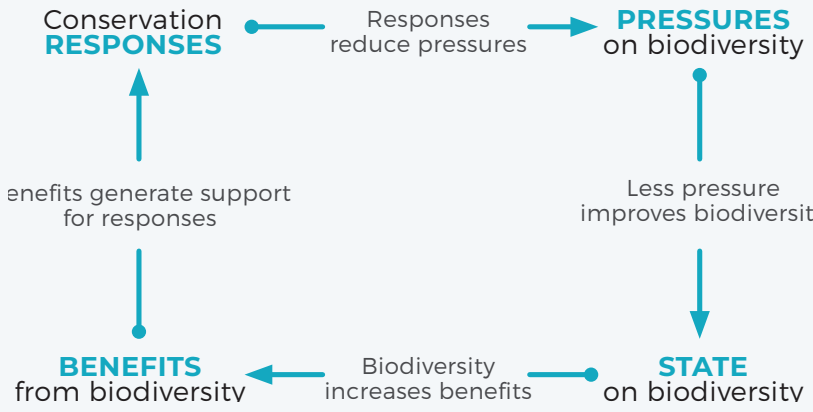
Box 1. The Pressure-State-Response-Benefit framework of linked indicators

The type of linked indicators in the Pressure-State-Response-Benefit framework are:

- Pressures: indicators monitoring the extent and intensity of the causes of biodiversity loss that responses aim to address (e.g. levels of exploitation (offtake), nitrogen deposition rate (pollution), habitat loss, invasive alien species, climate change impacts). Pressure indicators measure outcomes – the desired future state of a threat or opportunity. An objective is a formal statement of an outcome.
- States: indicators analysing the condition and status of aspects of biodiversity (e.g. species populations, community composition, habitat extent, water quality). State indicators measure impact – the desired future state of biodiversity. A goal is a formal statement of an impact.
- Responses: indicators measuring the implementation of policies or actions to prevent or reduce biodiversity loss (e.g. protected area coverage, Protected Areas management effectiveness, area under sustainable management).
- Benefits: indicators quantifying the benefits that humans derive from biodiversity (e.g. livelihoods, fuelwood availability, populations of utilised species, aesthetic, cultural and spiritual values).

A key element of the framework is that there should be a relationship between the indicators (Fig.3): a change in response is expected to lead to a change in pressure which leads to a change in state which provides more benefits for people, encouraging more responses. Therefore, the linked indicators create a more complete picture of the situation, allowing an understanding of how company strategies, actions and interventions (responses) are faring, how these then relate to any change in pressures on biodiversity and how these in turn lead to any improvements in the state of biodiversity and the ecosystem services benefits available to people. Therefore, such indicators can also help monitor a company's delivery of its theory of change.

Figure 3. A framework of linked indicators.



Source: Stephenson & Carbone, 2021

Another advantage of the linked indicator framework is that, given that state level indicators generally change slowly and companies may only be able to demonstrate improvements in species and habitats and ecosystem services after a few years, pressure and response indicators can demonstrate change and progress more rapidly. This may be especially important early on in the implementation of a company's biodiversity strategic plan, as it will want to demonstrate quickly how its strategies are leading to the expected reduction in pressures to verify the choice of strategies or to adapt them as necessary.

Photo © P.J Stephenson

2. The four-stage approach

There are four stages in the *Guidelines for planning and monitoring corporate biodiversity performance* (Fig. 4). These stages can be developed in a stepwise, cyclical process but are iterative and can also be used in any order appropriate for the company.

Stages 1 and 2 provide the basis for the development of a set of linked corporate level biodiversity performance indicators in Stage 3. Stage 4 supports the implementation of systems to use the indicators and the data they produce. Part of Stage 4 is evaluating progress and learning lessons and this should lead to a periodic review of priorities, ambitions and indicators, essentially making this a circular process.

Stage 1 Priorities: Understand the company's impact and dependencies on biodiversity and identify priority species, habitats and ecosystem services

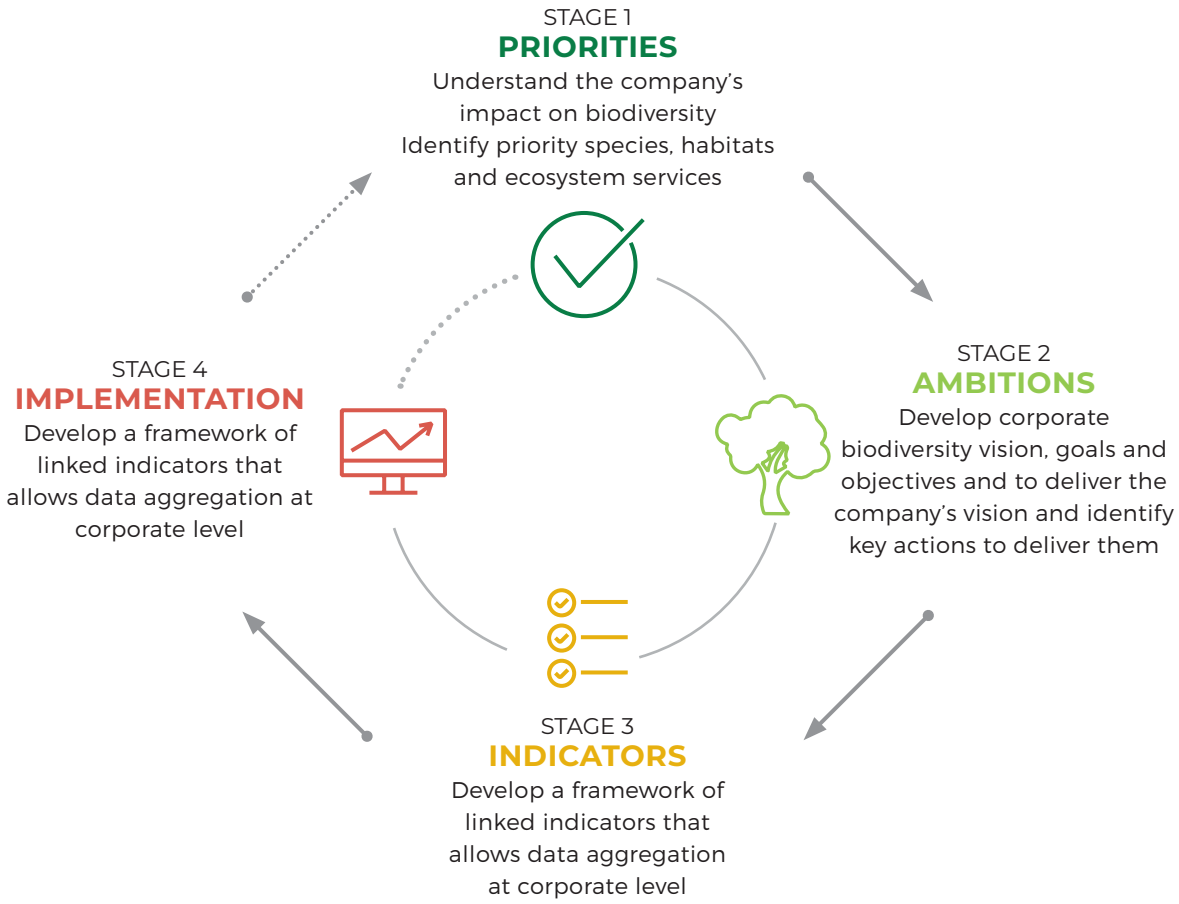
1A. Define the corporate scope of biodiversity influence and identify which company operations affect or depend on biodiversity;

1B. Identify the pressures and dependencies associated with company operations;

1C. Identify the most important pressures and dependencies on biodiversity the company will tackle;

1D. Identify priority species, habitats and ecosystem services.

Figure 4. The stages of the *Guidelines for planning and monitoring corporate biodiversity performance*.



Source: Stephenson & Carbone, 2021

Stage 2 Ambitions: Develop corporate biodiversity vision, goals and objectives and identify key strategies to deliver them

- 2A. Develop a vision;
- 2B. Decide on the relevant aggregation unit for planning and monitoring;
- 2C. Define goals and objectives;
- 2D. Identify strategies to deliver corporate goals and objectives;
- 2E. Summarise the results so far.

Stage 3 Indicators: Develop a framework of linked core indicators that allows data aggregation at corporate level

- 3A. Define state and benefit indicators against goals;
- 3B. Define pressure and response indicators against objectives and strategies;
- 3C. Bring together the elements of a biodiversity strategic plan.

Stage 4 Implementation: Collect, share and analyse data, learn lessons and adapt

- 4A. Develop and implement a monitoring plan and collect data;
- 4B. Share data in formats that facilitate interpretation and decision-making;
- 4C. Conduct periodic evaluations and assessments and encourage learning and continued improvement;
- 4D. Review biodiversity priorities and goals.

For each stage of the Guidelines, information is provided on: a) the main outcome from the stage; b) what the company needs to do; and c) expected outputs (what a company can expect to have achieved at the end of this stage). Some examples, and some relevant tools, are presented in the text to provide clarity on what is expected and to offer companies ideas for what else is available to help them move through the stages. Many of these examples are based on real company experiences, but have been anonymised. A broader suite of examples, as well as relevant standards, guidelines and tools that a company might find useful, is presented in annex for each of the stages. References are cited throughout to allow companies to understand where the thinking has come from and to explore ideas and examples in more depth.

Stage 1: Understand the company's impact on biodiversity and identify priority species, habitats and ecosystem services

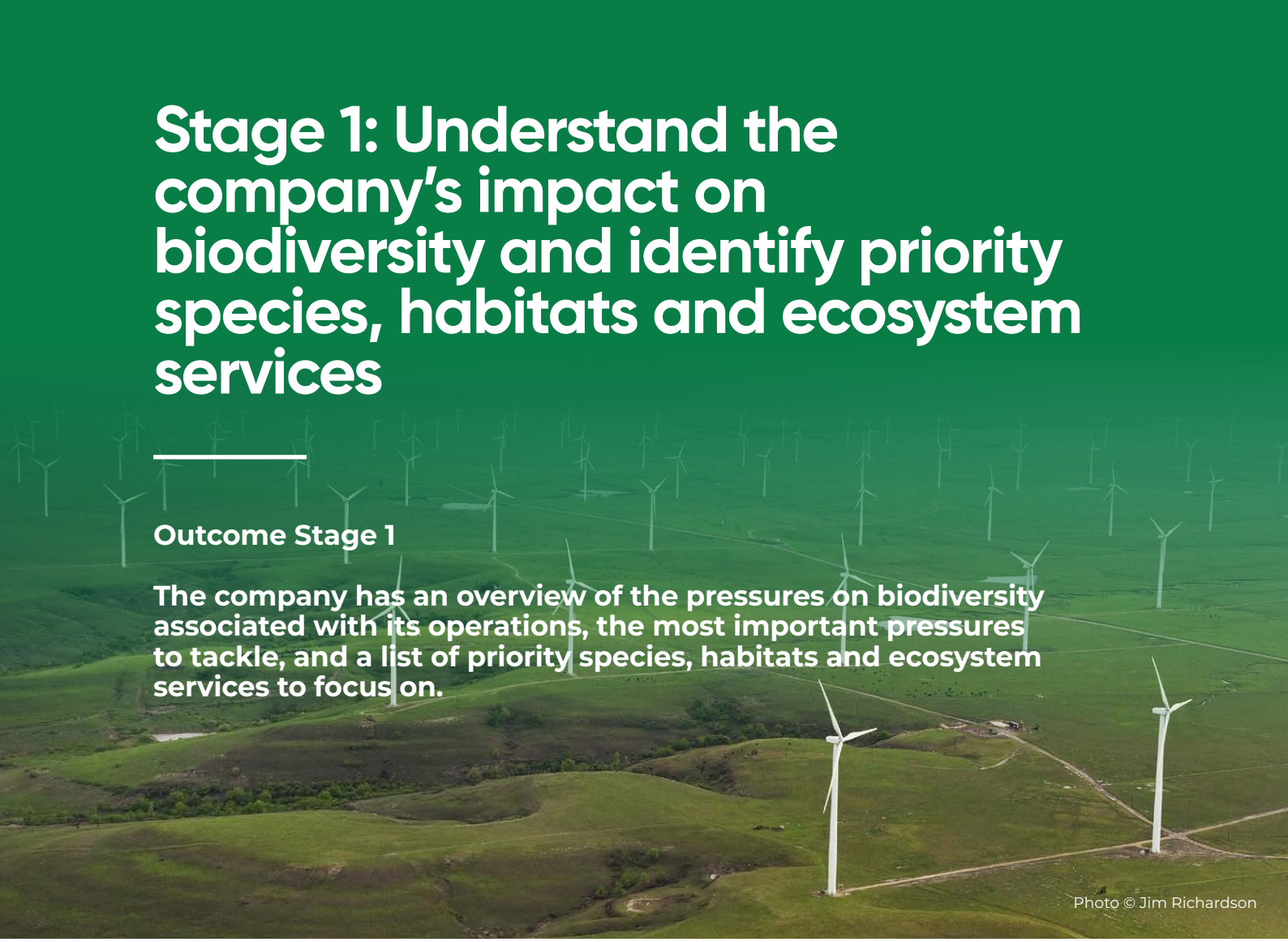


Photo © Jim Richardson

Outcome Stage 1

The company has an overview of the pressures on biodiversity associated with its operations, the most important pressures to tackle, and a list of priority species, habitats and ecosystem services to focus on.

What the company needs to do

Stage 1 will facilitate and set the tone for the entire process as it will define not only the company's activities and operations that could impact biodiversity but also include more specific information on the species, habitats and ecosystem services affected. The identification of these factors will enable the definition of relevant goals, objectives and strategies (Stage 2) and the appropriate indicators (Stage 3). Note that, in line with the aim of this process (which is to set corporate-level direction), this stage is not about extensive assessments at the site or supply chain level, but rather the identification of pressures and priorities common and relevant across the company's operations. It does not preclude the necessity for appropriate site or supply chain assessments as, in many cases, these will identify more specific biodiversity work needed locally.

1A. Define the corporate scope of biodiversity influence and identify which company operations, affect or depend on biodiversity

The first step in the process is to map the corporate scope of biodiversity influence[1]. This should include all of the company's activities, including the operations, processes and services managed directly by the company; the supply chains associated with its raw materials; the services feeding and supporting the company's operations; as

1 This term has been inspired by the IFC's definition [19] of area of influence which applies at the project or activity level.

well as the final product in its consumption and post consumption phase.

Some examples of corporate scopes of biodiversity influence include:

- For an extractives company, such as a mining company: mining, refining, smelting, ore transport;
- For a manufacturing company, such as a) a food manufacturer: production or farming of raw materials; transformation of raw materials; manufacturing of finished product; packaging, transport to points of sale b) a fashion company: raw material production; raw material processing; manufacturing; assembly¸ stores, warehouses and offices;
- For a services company, such as a marine construction company: areas where the company conducts construction, dredging, sediment extraction, sediment transport, sediment deposition.

While mapping the corporate scope of biodiversity influence, the company can start defining:

- Activities over which it has direct control and those over which it has more or less influence. This differentiation will be useful in understanding then relative importance of pressures and in defining the scale and feasibility of the corporate goals and objectives;
- Activities that are most central to the company's business and the ancillary ones.

Companies unable to trace the raw materials they use to their origins will not be able to follow their supply chains to where they affect biodiversity. If such companies want to report on biodiversity performance they will need to improve the traceability of their supply chains. In the meantime, even if some details of the supply chains remain unclear, the company could use raw materials certified according to sustainability standards that include performance criteria to address the associated biodiversity impacts.

1B. Identify the pressures and dependencies associated with company operations

The next step is to conduct a situation analysis to identify the pressures and dependencies on species, habitats and ecosystem services that are associated with the company's operations in its corporate scope of biodiversity influence. In this exercise, it is important to also consider the pressures indirectly caused by the company's activities (e.g. the illegal logging and poaching that result from the construction of roads in forests).

The pressures worldwide that have the largest impact on biodiversity have been identified as changes in land and sea use, direct exploitation of organisms, climate change, pollution and invasion of alien species [4]. The pressures companies put on biodiversity will be varied but may include the loss of animals, plants, habitats and ecosystem services through land-use change (from construction to agriculture to mining), direct use (such as overexploitation of trees from logging or fish from fishing), contributions to climate change (from greenhouse gas emissions or logging), pollution (through the use of agrochemicals or the discharge of waste), the introduction of harmful alien invasive species (through, for example, ship ballast), natural system modifications (such as dam construction) and transportation corridors (such as roads and shipping lanes). Companies may find it easier to reference the categories of pressure identified by IUCN (Box 2).

Businesses are also dependent on many of the services that ecosystems provide, such as water purification, flood protection, climate protection, pollination, soil formation and nutrient recycling [4, 29, 30] (Box 3). Therefore, in addition to pressures, the company should identify the major ecosystem services dependencies associated with its activities, as these will also contribute to setting the biodiversity priorities (Step 1C) and trigger specific goals and objectives. Even if the business is not dependent on the affected ecosystem services, it will still be critical that these are considered in the prioritisation as their loss might affect local communities as well as species and habitats.

Box 2. Pressures placed on biodiversity

Ten types of anthropogenic pressure are identified in the CMP/IUCN threat categories (version 3) [8] which can be placed under IPBES headings [4] and may be useful for companies defining their pressures.

Changes in the use of land, sea or water

- Residential and commercial development (housing and urban areas, commercial and industrial areas, tourism and recreational areas) – which can be seen as a form of land-use change
- Agriculture (annual and perennial crops, wood and pulp plantations, livestock farming and ranching) and aquaculture (marine and freshwater) – which can be seen as a form of land-use change
- Energy production and mining (oil and gas drilling, mining and quarrying, renewable energy such as solar and wind farms) – which can be seen as a form of land-use change
- Transportation and service corridors (roads and railways, utility and service lines such as electrical/phone wires and aqueducts), shipping lanes including dredging, canals and ship strikes and flight paths) – which can be seen as a form of land-use change

Direct exploitation

- Biological resource use (hunting and collecting animals, gathering plants, logging and wood harvesting, fishing and harvesting aquatic resources)

Climate change

- Climate change and severe weather (ecosystem encroachment such as sea level rise and desertification, changes in geothermal regimes such as ocean acidification and atmospheric CO_2, changes in temperature regimes such as heat waves, cold spells and ice melt, changes in precipitation and hydrological remines such as droughts, changes in the timing of rains and increased flooding, severe and extreme weather events such as thunderstorms, blizzards, hurricanes and dust storms)

Pollution

- Pollution (household sewage and urban waste water, industrial and military effluents, agricultural and forestry effluents, garbage and solid waste, air-borne pollutants such as acid rain, smog or smoke, excess energy such as noise and light emissions)

Invasion of alien species

- Invasive and other problematic species, genes and diseases (invasive non-native alien plants and animals, problematic native plants and animals such as overabundant deer, algae, grass or fish, introduced genetic material such as pesticide resistant crops or genetically-modified insects, pathogens and microbes)

Other pressures

- Natural system modifications (fire and fire suppression, dams and water management/use, other ecosystem modifications such as land reclamation and tree thinning, removing/reducing human maintenance, such as lack of supplementary feeding or indigenous management of ecosystems)
- Human intrusions and disturbance (recreational activities, war and civil unrest, work and other activities such as law enforcement and vandalism).

This situation analysis is not a site-based assessment but an assessment by types of activities and the pressures associated with them across company operations

Note that, only by identifying the specific impacts and dependencies the company has on biodiversity (and then defining that biodiversity in Stage 2), can the company develop a credible and coherent corporate-level biodiversity strategic plan that can be monitored.

At this point, the analysis may only be qualitative. A first draft can be based on general information (available in the company or through a literature review) known about the specific type of company operations, commodities, products and supply chains to identify the pressures that will likely be triggered by the activities. This draft can then be validated and refined with information from the various company operations. Indeed, many companies, especially in sectors such as energy and extractives, will already be legally obliged to assess their potential environmental impacts and develop mitigation strategies at project level. If such assessments have already been conducted, they can inform this corporate-level situation analysis.

Table 2 shows how, once the pressures have been identified, the company can identify expected impacts on biodiversity. Each company activity can lead to multiple pressures and in turn likely impacts on species, habitats and ecosystem services. Several methods and tools exist for identifying a company's expected impacts on biodiversity and ecosystem services, including various forms of biodiversity screening involving expert consultation, analysis of global datasets and site-level data analysis [31] and corporate ecosystem services reviews [32]. See Annex 1 for a list of available tools. If a company has already conducted such assessments (e.g. to comply with local regulations), it can use the results to inform this step.

Box 3. Business dependencies on ecosystem services

Companies depend upon a variety of goods and services that are provided by ecosystems [4, 29, 30]. This dependency relationship often contributes to establishing the "business case" for taking action in mitigating the impacts on biodiversity, as biodiversity underpins a healthy and resilient system.

Ecosystem services include:

- Provisioning services: the goods or products obtained from ecosystems such as food, freshwater, timber and fibre;
- Regulating services: the benefits obtained from an ecosystem's control of natural processes such as climate, disease, erosion, water flows and pollination, as well as protection from natural hazards;
- Supporting services: the natural processes such as nutrient cycling and primary production that maintain the other services;
- Cultural services: the non-material benefits obtained from ecosystems such as recreation, spiritual values and aesthetic enjoyment.

Table 2. A selection of activities from a variety of companies showing examples of the pressures and potential impacts they can place on biodiversity. These examples are indicative, not exhaustive and do not represent a comparison of the impacts of different types of company. Impacts that may affect dependencies are marked with a star (*). These will need to become automatic priorities.

Company activities	Examples of biodiversity pressures triggered	Potential impacts on the state of species, habitats and ecosystem services
Mining, including mine construction, ore processing and transport, as well as deep-sea mining NOTE: Any company that uses mined raw materials in its supply chain will have the same pressures, plus others relevant to raw product transformation, packaging, distribution, etc.	Land-use change from mining and associated infrastructure	Decrease in habitat cover Increase in habitat fragmentation Decrease in distribution of species dependent on the habitat (e.g. forest-dependent birds; sea mount dependent sharks) Decrease in population sizes of species
	Pollution from discharge of chemicals and wastewater	Decrease in the abundance and diversity of species impacted by chemicals (e.g. soil invertebrates, insects) and the species that feed on them (e.g. birds) Decrease in water quality
	Biological resource use: hunting of threatened species along mining roads	Decrease in the abundance and diversity of animal species that are hunted (usually larger mammals and birds)
	Natural systems modifications by altering surface water flow	Changes in natural flow regimes and potential loss of water supplies* Reduction in native vegetation cover
	Noise pollution and vibrations from operations and blasting and light pollution from artificial light emissions	Change in distribution and behaviour of animals
Farming NOTE: Any company that uses farmed raw materials in its supply chain will have the same pressures, plus others relevant to raw product transformation, packaging, distribution, etc.	Land-use change, converting natural habitats for agriculture	Decrease in habitat cover Increase in habitat fragmentation Decrease in distribution of species dependent on the habitat (e.g. forest-dependent birds) Decrease in population sizes of species Loss of soil fertility and quality Loss of water supplies*
	Pollution from use of agrochemicals (pesticides, herbicides, fertiliser)	Decrease in the abundance and diversity (or health) of species impacted by chemicals (e.g. soil invertebrates, insects) and the species that feed on them (e.g. birds) Decrease in water and/or soil quality Increase in eutrophication (and decreased habitat for local species) Loss of pollinator species (e.g. bees, birds)*
	Biological resource use: exploitation of wild plants and animals on or close to farms	Decrease in species abundance
	Air pollution including greenhouse gas emissions from vehicles transporting product	Decrease in air quality Climate change*

Company activities	Examples of biodiversity pressures triggered	Potential impacts on the state of species, habitats and ecosystem services
Marine construction, including sediment extraction, transport and deposition	Commercial development such as harbour construction and natural system modifications from dredging (including resultant habitat loss and turbidity)	Decrease in distribution of species dependent on the habitat (e.g. corals, algae, fish, benthic invertebrates, etc.) Decrease in population sizes of species Decrease in fish stocks and potential loss of fisheries Decrease in water quality
	Pollution from ship emissions	Decrease in habitat quality and habitat cover Reduced species diversity
	Noise pollution from ships and construction work causing disturbance to cetaceans and marine turtles (e.g. disruption of foraging, breeding or social behaviour)	Decrease in population sizes of cetaceans, marine turtles and other species
	Shipping lanes causing collisions with marine wildlife and resultant injury or accidental mortality	Decrease in population sizes of cetaceans, marine turtles and other species
	Introduction of alien invasive species that compete with native species	Increase in populations of alien invasive species (e.g. molluscs, algae such as Caulerpa taxifolia) Decrease in populations of native species
Leather production	Land-use change, converting natural habitats for: • Livestock farming for leather; • Agriculture to produce cattle feed; • Commercial developments such as factories and outlets; • Pulp and paper production for packaging.	Decrease in habitat cover Increase in habitat fragmentation Decrease in distribution of species dependent on the habitat Decrease in population sizes of species Loss of soil fertility and quality* Loss of pollinator species (e.g. bees, birds)*
	Pollution from processing products (emission of waste water, agricultural effluent, etc.)	Decrease in species impacted by chemicals (e.g. soil invertebrates, insects) and the species that feed on them (e.g. birds) Decrease in water quality*
	Air pollution including greenhouse gas emissions from vehicles transporting raw materials and finished products	Decrease in air quality Climate change*

1C. Identify the most important pressures and dependencies on biodiversity the company will tackle

The aim of this step is to generate a list of the most important pressures and dependencies that need to be addressed proactively by the corporate-level biodiversity goals and objectives. It does not mean, however, that pressures being tackled locally at a site or along a supply chain should not still be mitigated if they address a relevant environmental impact assessment or focus on specific threatened species or critical habitats. This is simply an effort to see which pressures and dependencies are most important company-wide and common across the corporate scope of biodiversity influence. This process will be based on qualitative information on pressures, often based on literature review and staff understanding and knowledge, but lessons from site or supply chain specific assessments should be taken into account wherever possible.

The company can assess the relative importance of different pressures by assessing the proportion of the company's activity causing the pressure (pressure's scope) and the impact or level of damage caused to biodiversity by the pressure (pressure's severity). The importance of the pressure calculated from its scope and severity can then be combined with the degree of control to identify the level of priority it represents for the company at the corporate level.

Here we present a proposed methodology to identify priority pressures, but other similar assessment methods can be used. Most company dependencies will be included in this assessment, but the company needs to ensure any that are not present are listed separately for consideration in choosing biodiversity priorities and goal-setting.

i) Define the level of importance of each pressure

To define the level of importance, each pressure should be rated based on its **scope** and **severity**. Both criteria can be given a score of 1 (low) to 4 (very high). In order to make these assessments, the company can use information generated directly from sites impacted by the activities triggering the pressures.

Pressure's Scope. The proportion of the company's activity (measured in terms of number of locations or proportion of supply chain across its corporate scope of biodiversity influence) that is expected to cause this pressure on biodiversity.

4 - Very High: The pressure is likely to be pervasive, affecting species, habitats and/or ecosystem services across all or most (71-100%) of the company's corporate scope of biodiversity influence.

3 - High: The pressure is likely to be widespread, affecting species, habitats and/or ecosystem services, across much (31-70%) of the company's corporate scope of biodiversity influence.

2 - Moderate: The pressure is likely to be restricted, affecting species, habitats and/or ecosystem services across some (11-30%) of the company's corporate scope of biodiversity influence.

1 - Low: The pressure is likely to be very narrow, affecting species, habitats and/or ecosystem services across a small proportion (1-10%) of the company's corporate scope of biodiversity influence.

Pressure's Severity. Within the pressure scope (i.e., in the parts of the company's corporate scope of biodiversity influence where impacts are made on biodiversity), the level of damage to species, habitats and/or ecosystem services that is expected to be caused by the pressure. For habitats and ecosystem services, this is measured as the degree of destruction or degradation. For species, it is measured as the degree of reduction of the key populations.

4 - Very High: Where the pressure impacts biodiversity it is likely to destroy or eliminate habitats and ecosystem services or reduce species populations by 71-100%.

3 - High: Where the pressure impacts biodiversity it is likely to seriously degrade/reduce habitats and ecosystem services or reduce species populations by 31-70%.

2 - Moderate: Where the pressure impacts biodiversity it is likely to moderately degrade/reduce habitats and ecosystem services or reduce species populations by 11-30%.

1 - Low: Where the pressure impacts biodiversity, it is likely to slightly degrade/reduce habitats and ecosystem services or reduce species populations by 1-10%.

The scores for each activity can then be assessed against a simple pressure importance matrix to calculate overall **importance** of a pressure to a company:

		Pressure Scope			
		4 - Very High	3 - High	2- Moderate	1 - Low
Pressure Severity	4- Very High	**Very High**	**Very High**	**Moderate**	**Low**
	3 - High	**Very High**	**High**	**Moderate**	**Low**
	2 - Moderate	**Moderate**	**Moderate**	**Moderate**	**Low**
	1 - Low	**Low**	**Low**	**Low**	**Low**

A theoretical example from a coffee farm (part of the value chain for a coffee trading company or a food company) might include the following calculations:

- Coffee farming using sun-grown coffee will probably cause land-use change, converting natural habitats for agriculture in around 31-70% of farms (high scope) and where it occurs it is likely to destroy the habitats and ecosystem services present, reducing species populations around the farms by 71-100% (very high severity). Therefore, the land-use change associated with agriculture is a pressure of high importance for this company.
- Coffee farming (without certification) will cause pollution from agrochemical use in around 31-70% of farms (high scope) and where it occurs it is likely to seriously degrade/reduce habitats and ecosystem services or reduce species populations by 31-70% (high severity). Therefore, pollution is also a pressure of high importance for this company.

Note that another option is to add the pressure's scope and pressure's severity scores and then rank the totals to have a prioritised list. But companies will rarely have enough information to develop the precision necessary for accurate ranking, so identifying the category of importance (low to very high) is usually adequate.

ii) Define the level of control

Once different pressures have been assessed for their importance and rated low, moderate, high or very high, the company can assess the extent of its control over that pressure.

Degree of control can be scored as:

0 - none: the activities causing the pressure cannot be influenced or controlled in any way by the company.

1 - low: the company does not control the activities causing the pressure but has some level of influence on those partners or clients that do.

2 - moderate: the company partially controls the activities causing the pressure.

3 - high: the company has complete control over the activities causing the pressure.

When combined with importance scores, the **level of priority** of the pressures can be rated:

		Degree of control			
		High (3)	Moderate (2)	Low (1)	None (0)
Importance (Scope + severity)	Very High	**High priority** pressures against which to identify suitable goals and objectives		Review operations urgently (and set short-term objectives to improve control or reduce pressures)	
	High				
	Moderate	**Moderate priority** pressures		Low priority pressures	
	Low	Low priority pressures			

In general, a company will want to address high priority and moderate priority pressures. Where the pressure is of very high or high importance, but the company has limited control, the company will need to review its operations and rethink its strategy. An example might be a manufacturing company without information on the source of key raw materials. Tackling a pressure over which the company has little or no control may therefore become a short-term objective for the company. For example, limited control of raw material sourcing may lead to an objective with the ambition of having x% from certified sources.

The theoretical coffee trading or food company might include the following calculations about its farm suppliers:

- Land-use change and pollution associated with agriculture are pressures of high importance. While the company does not have complete control over the farmer, insisting that all suppliers be certified, thereby following best practices, provides moderate control so both pressures of high priority are considered in company goals and objectives.
- The exploitation of wild animals around farms was ranked as moderate importance, but since the trading or food company had low control over such actions it was a low priority and would not be considered for the company biodiversity goals and objectives.

Any pressure that has been identified as impacting a dependency (such as those examples flagged in Table 2), should automatically become a company priority. In this coffee example, the company may have noted that its main dependency not covered by the pressures is the water sources that supply water for the processing of the beans. The company should therefore note the need to factor in the conservation of water sources in its habitat and ecosystem services priorities and its goals and objectives.

More examples of how the level of priority for different pressures might be calculated for different types of company are provided in Table 3.

Table 3. Identifying the pressures a company should prioritise in its corporate-level strategic plan. A selection of examples of how different fictious companies might score the relative importance of pressures based on scope, severity and degree of control. These examples are not exhaustive and are not a comparison of the impacts of different types of company. The logic behind three examples is explained in footnotes.

Company activities	Biodiversity pressures triggered by the activities	Relative importance of the pressures Scope + severity + control	Potential impacts on the state of species, habitats and ecosystem services
Mining, including mine construction, ore processing and transport, as well as deep-sea mining	Land-use change from mining and associated construction	4 + 4 + 3 High priority[2]	Decrease in habitat cover Decrease in distribution of species dependent on the habitat (e.g. forest-dependent birds; sea mount dependent sharks) Decrease of population size of species
	Pollution from discharge of chemicals and wastewater	3 + 2 + 3 Moderate priority	Decrease in the abundance and diversity of species impacted by chemicals (e.g. soil invertebrates, insects) and the species that feed on them (e.g. birds) Decrease in water quality
	Biological resource use: hunting of threatened species along mining roads	3 + 3 + 1[3] Review operations to better control illegal hunting and logging	Decrease in the abundance and diversity of animal species that are hunted (usually larger mammals and birds) and commercially important trees
Farming	Land-use change, converting natural habitats for agriculture	4 + 4 + 2 High priority	Decrease in habitat cover Decrease in distribution of species dependent on the habitat (e.g. forest-dependent birds) Decrease in population size of species Loss of soil fertility and quality Loss of water supplies
	Pollution from use of agrochemicals (pesticides, herbicides, fertiliser)	3 + 3 + 2 High priority	Decrease in species impacted by chemicals (e.g. soil invertebrates, insects) and the species that feed on them (e.g. birds) Decrease in water and/or soil quality Increase in eutrophication (and decreased habitat for local species) Loss of pollinator species (e.g. bees, birds)*
	Biological resource use: exploitation of wild plants & animals on or close to farms	1 + 1 + 2[4] Low priority	Decrease in species abundance
	Air pollution including greenhouse gas emissions from vehicles transporting coffee	1 + 1 + 2 Low priority	Decrease in air quality Climate change

2 The creation of a mine will destroy the habitat immediately at and around the site, meaning the scope and severity are both very high. Given that the company constructs and works the mine, it has high control of the pressures placed on the environment. Some mines are only authorised if the company commits to rehabilitate the site afterwards and that can be factored into the company objectives and key strategies later.

3 Roads built to access mines and transport ore open up remote forests to hunters and loggers. The company may not be directly responsible for building roads to transport ore from the mine and, in this case, it has low control over road construction, but that does not relieve the company of the responsibility for this pressure and it will need to find a way to reduce illegal hunting and logging.

4 The company noted only very isolated incidents of the exploitation of wild animals and plants near the farms in its supply chain so this pressure is considered of low priority to address. However, it may still wish to enforce the related elements of the certification scheme it uses.

Company activities	Biodiversity pressures triggered by the activities	Relative importance of the pressures Scope + severity + control	Potential impacts on the state of species, habitats and ecosystem services
Marine construction, including sediment extraction, transport and deposition	Commercial development such as harbour construction and natural system modifications from dredging (including resultant habitat loss and turbidity)	4 + 4 + 2 High priority	Decrease in distribution of species dependent on the habitat (e.g. corals, algae, fish, benthic invertebrates, etc.) Decrease in population size of species Decrease in fish stocks and potential loss of fisheries
	Noise pollution from ships and construction work causing disturbance to cetaceans and marine turtles (e.g. disruption of foraging, breeding or social behaviour)	2 + 2 + 3 Moderate priority	Decrease in population size of cetaceans and marine turtles
	Shipping lanes causing collisions with marine wildlife and resultant injury or accidental mortality	2 + 2 + 3 Moderate priority	Decrease in population size of cetaceans and marine turtles
	Introduction of alien invasive species that compete with native species	4 + 4 + 3 High priority	Increase in populations of alien invasive species (e.g. molluscs, algae such as Caulerpa taxifolia) Decrease in populations of native species
	Pollution from ship emissions	2 + 2 + 3 Moderate priority	Decrease in habitat quality and habitat cover Reduced species diversity
Leather production	Land-use change, converting natural habitats for: • Livestock farming for leather; • Agriculture to produce cattle feed; • Commercial developments such as factories and outlets; • Pulp and paper production for packaging.	3 + 4 + 2 High priority 3 + 4 + 0[5] Review urgently 1 + 2 + 3 Low priority 3 + 4 + 1 Review urgently	Decrease in habitat cover Increase in habitat fragmentation Decrease in distribution of species dependent on the habitat Decrease in population sizes of species Loss of soil fertility and quality Loss of pollinator species (e.g. bees, birds)
	Pollution from processing products (emission of waste water, agricultural effluent, etc.)	2 + 2 + 2 Moderate priority	Decrease in species impacted by chemicals (e.g. soil invertebrates, insects) and the species that feed on them (e.g. birds) Decrease in water quality
	Air pollution including greenhouse gas emissions from vehicles transporting raw materials and finished products	1 + 1 + 2 Low priority	Decrease in air quality Climate change

5 This fictitious fashion company does not have any control over the source of materials for its packaging and, while it knows animal feed is having an impact on the environment, does not know where its leather supplies access it from. Therefore, these elements of the supply chain need to be explored as a matter of urgency.

1D. Identify priority species, habitats and ecosystem services

In order to be able to develop measurable goals, objectives and indicators (in Stages 2 and 3), it is essential to identify the species, habitats and ecosystem services (or, at the very least, a representative sample or the most commonly encountered) that are relevant enough to the company's operations that they can represent its biodiversity performance as a whole and can form the focus of the biodiversity strategic plan. In other words, a goal aimed broadly at undefined "biodiversity" will be impossible to implement or measure, whereas a goal identifying species, habitats and ecosystem services can be the focus of company strategies and indicators for monitoring.

The choice of priorities should be based on the species, habitats and ecosystem services whose state will likely be affected by the high and moderate priority pressures caused by the company's activities, or upon which the company's activities are dependent, as identified in Step 1C.

This will require the company to identify where its activities triggering high and moderate priority pressures, and its dependencies, are located (the origin of the raw materials, location of the factories, etc.) and to generate spatial information related to those activities. The more specific the spatial information is, the more precise the company can be about the species, habitats and ecosystem services that could be used to define the corporate goals, objectives, strategies and indicators. Furthermore, the company's ambition levels, as well as input from the stakeholders that are consulted, might identify additional priorities. For example, a company wanting to have a net positive impact on biodiversity and contribute to SDG 14 Life Below Water or SDG 15 Life on Land might want to proactively protect or restore threatened species or critical habitats in its corporate scope of biodiversity influence, in addition to those species and habitats impacted by company operations, especially if they are linked to company dependencies.

Note that, only by identifying the specific species, habitats and ecosystem services relevant to the company, can the company develop a credible and coherent corporate-level biodiversity strategic plan that can be implemented across the corporate scope of biodiversity influence. However, while different species, habitats and ecosystem services may be relevant to different parts of the scope of corporate biodiversity influence, corporate-level priorities will be those that are common across its operations and supply chains.

As with the assessment of pressures, companies that do not know the origin of their raw materials will not be able to identify the biodiversity they impact. In this case, before setting goals, objectives and indicators, the company will need to improve the traceability of its supply chain so it can identify what species, habitats and ecosystem services it affects.

Ideally the identification of biodiversity priorities will be conducted in a bottom-up way, with a company assessing biodiversity priorities across its corporate scope of biodiversity influence. However, if the company has complex supply chains, or a large corporate scope of biodiversity influence, it will probably be best to identify priorities common to a representative selection of sites - say, coffee landscapes, in a selection of coffee clusters for a coffee trading or food company or a selection of mines in different countries for a mining company. Then the species, habitats and ecosystem services that are commonly important across all countries can be selected. Consultation with stakeholders will be essential to help identify biodiversity and ecosystem services important to them as well as to the company.

Various tools can be used to help identify priority biodiversity. For example, IBAT [33], the Integrated Biodiversity Assessment Tool (Box 4), provides access to three main global data sets [34-36] that can help generate this information when specific localities for company activities are known. IBAT can generate reports over defined areas (drawn as polygons on a map) to identify threatened species, Key Biodiversity Areas (KBAs) and protected areas within a defined proximity. While this approach is usually used by companies for risk analyses (often as part of broader biodiversity screening), it can also be used to

Box 4. Integrated Biodiversity Assessment Tool (IBAT)

IBAT [33] provides access to data from three major global biodiversity databases to provide assessments of the proximity of a site to threatened species and important conservation places.

World Database on Protected Areas

The World Database on Protected Areas or WDPA [34] is a joint project between UN Environment and the International Union for Conservation of Nature (IUCN), managed by UN Environment World Conservation Monitoring Centre. Data for the WDPA is collected from international convention secretariats, governments and collaborating NGOs. The WDPA uses the IUCN definition of a protected area as the main criteria for entries included in the database.

World Database of Key Biodiversity Areas

Key Biodiversity Areas (KBA) are 'sites contributing significantly to the global persistence of biodiversity', in terrestrial, freshwater and marine ecosystems. Sites qualify as global KBAs if they meet one or more of 11 criteria, clustered into five categories: threatened biodiversity; geographically restricted biodiversity; ecological integrity; biological processes; and, irreplaceability. The World Database of Key Biodiversity Areas is managed by BirdLife International [35] on behalf of the KBA Partnership.

IUCN Red List of Threatened Species™

The IUCN Red List of Threatened Species™ [36], also known as the IUCN Red List, is a rich compendium of information on threats, ecological requirements and habitats of more than 105,000 species; and on conservation actions that can be taken to reduce or prevent extinctions. It is based on an objective system for assessing the risk of extinction of a species based on past, present and projected threats. Species assessments are conducted following a standardised process using the rigorous IUCN Red List Categories and Criteria, ensuring the highest standards of scientific documentation, information management, expert review and justification. IUCN aims to re-evaluate the IUCN Red List category every five to ten years to monitor change. Recent research has demonstrated that the IUCN Red List is a useful tool for business, not only for supporting the monitoring of goals but also "throughout the process of planning and implementing projects, in order to understand and manage potential impacts on biodiversity. It informs screening and impact avoidance, baseline survey design, impact assessment and mitigation, biodiversity action plan development and offset design and implementation" [37].

The Species Threat and Recovery metric (STAR)

STAR [38] is a new tool developed by IUCN with Newcastle University, The Biodiversity Consultancy and other partners using data from the IUCN Red List of Threatened Species™. It is intended to support the development of science-based targets by allowing the calculation of explicit contributions from individual actors towards the post-2020 Global Biodiversity Framework. STAR's scores for particular sites, for which individual actors have responsibility, represent a proportion of the global opportunity to reduce species' extinction risk through threat abatement and restoration. The metric is being built into IBAT and should be available as a planning tool in 2021. In the future the metric could also be used as an indicator of progress towards attaining goals.

IBAT has also started providing composite global layers that can be used to assess the potential materiality of biodiversity impacts in different regions. In particular, IBAT provides a layer of "range-weighted rarity" which combines data on the number of species and the proportion of their range present in each location for a subset of taxa in the terrestrial realm.

proactively identify the species and areas of conservation importance that could be the focus of conservation action. For example, if the situation analysis (steps 1B and 1C) showed that forest cover may be lost through company activities, data from the IUCN Red List of Threatened Species™ could help identify threatened forest-dependant species of flora and fauna to consider as priority species and the KBAs and protected areas in which to protect or restore forests. Other tools that may be useful in identifying biodiversity priorities are listed in Annex 1.

Priority species

In the corporate scope of biodiversity influence where high and moderate priority pressures impact biodiversity, priority species will be one or more of the following:

- Species commonly impacted by company operations and the associated pressure. For example: an energy company might prioritise birds and bats struck and killed by wind turbines or amphibians, fishes and freshwater insects that lose their habitats to a hydropower plant; a food company might prioritise forest-dependent birds or primates whose habitat is cleared for agriculture in its supply chain; a marine services company might prioritise cetaceans and other marine animals struck by vessels or disturbed by noise.
- Threatened species whether or not directly impacted – i.e. species classified as Critically Endangered, Endangered or Vulnerable on the IUCN Red List of Threatened Species™ [36] or species known to be locally threatened (e.g. on a national Red List).
- Species that are unique to (i.e. restricted to) the sites or habitats the company operates in. This may include range-restricted species or biome endemic species, if they can be identified in specific parts of the corporate scope of biodiversity influence through the IUCN Red List of Threatened Species™ or the KBA database (perhaps accessed through IBAT).
- Species that are dependent on priority habitats and may also be indicators of habitat health (e.g. forest-dependent birds in priority forests; fish in priority coastal or wetland habitats).
- Species important for the business's continuity (e.g. species that provide key ecosystem services such as pollination or fisheries).
- Species important for local stakeholders (e.g. species of cultural value to local or indigenous people; species that provide key ecosystem services such as pollination or fisheries).

Although some companies may not put pressure on threatened species, most will have at least some part of their corporate scope of biodiversity influence close to threatened species. Indeed some sectors, such as agribusiness and mining, are disproportionately focused in areas of high biodiversity [39-41].

Priority species can be identified at different taxonomic levels or by different ecological functions, where clustering species by genus or family or by habitat affiliation may be necessary (Box 5), especially for a company working in multiple countries or regions. For example, rather than a named species of bird, a company may wish to focus on forest-dependent birds or the toucan family, if these are common across the corporate scope of biodiversity influence. The company should provide as much detail as it can and name priority species if possible. This will help with goal-setting and also with monitoring. However, in most cases, if working at more than one site, the company will want to summarise the priority at a higher taxonomic level, such as genus or family or order. This also enables, for example, companies to cluster together species that are impacted by similar activities or will benefit from similar conservation strategies.

Examples:

- Bats are known to collide with wind turbines. Depending on the level of knowledge available on the species affected, the company could focus on different taxonomic levels: all bats (Order Chiroptera), certain families (e.g. free-tailed bats in the family Molossidae) or impacted species (e.g. Mexican free-tailed bat, *Tadarida brasiliensis*).

Box 5. Species taxonomy

Scientists classify species into different "clusters" or taxa based on how closely related they are. Two examples are given below for a bird (the keel-billed toucan) and a tree (the cork oak). Taxonomy from IUCN [36]. Companies should choose priorities as low down this list as possible (e.g. choosing a family of birds when several are impacted by company operations is better than just choosing "birds" as it will make it clearer later which species need to be monitored).

Kingdom: Plantae (plants)	Kingdom: Animalia (animals)
Phylum: Tracheophyta (vascular plants)	Phylum: Chordata (vertebrates)
Class: Magnoliopsida (some flowering plants)	Class: Aves (birds)
Order: Fagales (beeches, oaks and other trees)	Order: Piciformes (toucans, woodpeckers and other arboreal birds)
Family: Fagaceae (beeches and oaks)	Family: Ramphastidae (toucans, toucanets and aracaris)
Genus: Quercus (oaks)	Genus: Ramphastos (toucans)
Species: *Quercus suber* (cork oak)	Species: *Ramphastos sulfuratus* (keel-billed toucan)

- Marine construction work can adversely affect cetaceans (as well as other marine species). If the company operates in different locations where various species could be affected, instead of prioritising at the species level (e.g. harbour porpoise, *Phocoena phocoena*), they could prioritise at higher taxonomic levels, such as all porpoises (Phocoenidae) or all toothed whales and porpoises (Odontoceti).
- Many agricultural commodities use land that has been cleared of natural habitats, especially forests and forest-dependent species of animals and plants. The conversion to crops can also impact river systems and wetlands. At the corporate level the company might decide to prioritise forest-dependent birds or freshwater fishes, but at the more local level families and species of birds and fishes can be differentiated.
- A company may depend on services provided by pollinators (bees and birds) if its business requires agricultural raw materials. If the source is in one country or one habitat type, the company may be able to identify the specific species. However, if the supply chain covers multiple countries and habitats it may need to focus on "pollinating birds" and "pollinating bees"; strategies within each country will then need to focus on locally relevant species.

Priority habitats

Habitats for most companies will generally be the most common or the most threatened habitats associated to the high and moderate priority pressures. For some companies this will be obvious – forest habitats converted to agricultural land for coffee, cocoa and palm oil companies; coastal zone habitats (mangroves, seagrass beds, coral reefs, turtle nesting beaches) for marine construction companies. If the company has a large corporate scope of biodiversity influence, especially a long supply chain, it will need to investigate more thoroughly which habitats are affected.

Priority habitats will generally be one or more of the following:

- Habitats commonly impacted by company operations and the associated high and moderate priority pressures. For example:

tropical forests cleared for beef, coffee or sugar production; temperate forests cleared for potato growing; savanna grasslands lost to mining or agriculture; wetlands and river systems impacted by dams or water extraction for irrigation or cooling; reefs and seagrass beds impacted by dredging, construction or shipping lanes.
- Threatened habitats, including those occurring in threatened ecosystems listed in the IUCN Red List of Ecosystems [42], or those in protected and conserved areas.
- Habitats that are unique to (i.e., restricted to) the sites the company operates in, especially those in small but threatened ecoregions (such as Fynbos) or very localised habitats (such as seamounts and coastal upwellings).
- Critical habitats important for threatened species, whether or not directly impacted by company operations.
- Habitats important for business continuity (e.g., those that provide key ecosystem services such as water supplies or protection from erosion).
- Habitats important for local stakeholders (e.g. sites of cultural value to local or indigenous people; habitats that provide key ecosystem services such as water, fish or non-timber forest products).

Even if most of the company's corporate scope of biodiversity influence is heavily degraded there may be natural habitats, and even some critical habitats or key ecosystem services, that need restoring and could form the basis for company biodiversity priorities. For example, a fashion company that sources the cotton for its dresses from Brazil should consider rainforest habitats in Mato Grosso State as a priority, even if the forest was converted to cotton fields many decades ago. Similarly, a company that builds its factory on degraded land in the Highlands of Scotland should consider as a priority the native Caledonian pine woods that originally occurred in the same landscape.

Habitats can be defined broadly (e.g. forests, coastal zones) but where possible they should be more specific (e.g. tropical moist lowland forest; coral reefs and seagrasses). In many countries, the level of detail will be increased by specifying the ecoregion (e.g. Cerrado tropical savanna; Eastern Arc montane forest; Sahelian Upwelling). The IUCN Habitat Classification Scheme [43] and the classifications of the world's ecoregions [44-46] are useful frameworks.

Priority areas important for biodiversity

The identification of areas important for biodiversity within the corporate scope of biodiversity influence could complement the species, habitats and ecosystem services associated to the company's high and moderate priority pressures. Some such areas may not necessarily warrant inclusion in the global priorities if they are unique to a specific site (e.g., a protected area within a wetland when the corporate priority is forests). However, such areas will need to be considered as priorities locally and relevant action taken.

Important areas for biodiversity include protected areas and community reserves [34], World Heritage sites [47], wetlands of global importance [48], Key Biodiversity Areas [35, 49] (including Alliance for Zero Extinction sites [50]), priority ecoregions [44-46], biodiversity hotspots [51] and critical habitats. As per IFC [19], critical habitats are areas of high biodiversity value with habitats important for threatened species (as defined in the IUCN Red List of Threatened Species™ [36]) or for endemic or restricted-range species or for unique or threatened ecosystems (as defined in the IUCN Red List of Ecosystems [42]).

Indeed, if the company is following the mitigation hierarchy [6, 52] or standards such as IFC Performance Standard 6 [19] the identification of such areas will be important. Depending on the size of the company, important areas may be considered beyond the immediate boundary of the corporate scope of biodiversity influence. For example, protected areas or KBAs in the wider landscape within a few kilometres of the farms/mines/factories of a company may offer opportunities for conservation of priority species and habitats. If the company cannot identify or name areas important for biodiversity (e.g. because it conducts its operations through contracts in places it cannot predict in advance) it can at least state which types of areas it will seek to avoid or

to actively conserve (e.g., all KBAs or protected areas within or close to its scope of corporate biodiversity influence).

Priority ecosystem services

Ecosystem services can be seen as nature's contributions to people and have been defined as "*ecosystem processes, goods, and values that provide benefits to human communities and that may be significantly and adversely affected by the project or upon which the project has a significant dependence*" [53]. Ultimately, ecosystem services are derived from healthy, functioning natural habitats that benefit both people and nature. Therefore, a company's choice of priority ecosystem services will be linked to the priority species and habitats it has identified. However, in many cases, the ecosystem service will be seen by the company, and by many local stakeholders, as the most important biodiversity value. This will be the case particularly if the company relies heavily on a specific ecosystem service for its operations or supply chains (Box 3). Most company dependencies should have emerged in the situation analysis in steps 1B and 1C. However, in considering priority ecosystem services in step 1D the company needs to verify that its key ecosystem service dependencies are included in the priorities.

Ecosystem services are often dependencies shared with other stakeholders who may also value and depend on the same natural resources [29]. Therefore, consultation with local stakeholders in a company's corporate scope of biodiversity influence will be particularly important, especially if the value chains are complex, to ensure the company targets ecosystem services perceived as providing most value to its own operations and to other stakeholders.

Ecosystem services can be defined broadly, as by IPBES [4] (e.g. pollination and seed dispersal, water quality, freshwater flows, soil quality, climate regulation), or more specificity can be identified using, for example, the Common International Classification of Ecosystem Services, CICES [54].

Summarising biodiversity priorities

All of the company's biodiversity priorities – species, habitats, areas and ecosystem services – can be summarised as shown in the examples in Table 4. The level of taxonomic details in the priorities will depend on the diversity of biomes and regions covered by the company as well as the level of knowledge. At a minimum, companies should try to identify priority species to Class, habitat types to the first level of the IUCN hierarchy (e.g. forest, wetland) and ecosystem services at least broadly (e.g. water quality). Optimally, a company will have at least some priority species identified to Genus or Species, priority habitats identified to the sub-type in the IUCN hierarchy (e.g. Subtropical/tropical moist lowland forest; permanent rivers) and specific ecosystem services (e.g. provision of groundwater for drinking). Areas important for biodiversity should be named wherever possible (e.g. Juan Castro Blanco National Park; Central Volcanic Cordillera KBA).

Expected outputs

Key outputs from the Guidelines	Stage
Summary of biodiversity pressures caused by company activities in its corporate scope of biodiversity influence	1
List of priority species, habitats, areas and ecosystem services around which company goals and objectives can be focused and against which company biodiversity performance can be measured	1

Table 4. Examples of priority biodiversity options for a selection of company types and scales.

Type and scale of company	Priority taxa	Habitats	Areas important for biodiversity	Ecosystem services
Agricultural commodities: coffee; cocoa Global (Also applicable to extractives companies operating in forested areas or energy company power plants)	Forest birds Freshwater fish Insects: Order Odonata (dragonflies etc.); Order Lepidoptera (butterflies etc.) Soil invertebrates (insect larvae, earthworms) Threatened native trees	Subtropical/ tropical moist lowland and montane forests Subtropical/ tropical moist shrublands Wetlands, including river systems	Protected and conserved areas KBAs within 5 km of the farms (or mines)	Soil quality and stability Watersheds Water quality Pollination Pest regulation Climate regulation Nutrient and carbon sequestration Timber and non-timber forest products (e.g. fruit, nuts, medicines) Income from sale of harvested agroforestry crops
Agricultural commodities: coffee; cocoa National - Costa Rica. (This could be a separate company to the one above or the national branch) (Could also apply to local mining or energy company)	Threatened birds in local KBAs: Great Curassow Keel-billed Motmot Red-fronted Parrotlet Great Green Macaw Bare-necked Umbrellabird Three-wattled Bellbird Tawny-chested Flycatcher Swallowtail butterflies (Genus Battus) Threatened native trees in Class Magnoliopsida	Forests – Subtropical/ tropical moist lowland Wetlands (inland) – Permanent rivers/ streams/ creeks Wetlands (inland) – Freshwater springs	KBAs: Central Volcanic Cordillera; Arenal-Monteverde Protected areas: Rio Grande National Protection Zone; Juan Castro Blanco National Park	Soil quality and stability Provision of groundwater for drinking and surface water for irrigation Pollination Climate regulation Nutrient and carbon sequestration Non-timber forest products (e.g., fruit, nuts) Income from sale of harvested agroforestry crops.
Marine construction company Global	Coral species classified as threatened in IUCN Red List Reef fish Threatened molluscs Seagrasses Marine cetaceans (Balaenopteridae and Odontoceti) Marine turtles Bivalve molluscs and algae impacted by alien invasive species	Marine Neritic – Coral Reef Marine Neritic – Subtidal sandy Seagrass Marine Neritic – Pelagic	Marine protected areas Critical habitats (details will depend on contract sites)	Fisheries Control of coastal erosion Marine food web

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Stage 2: Develop corporate biodiversity vision, goals and objectives and identify key strategies to deliver them

Photo © CHANUN.V / Shutterstock

Outcome Stage 2

The company has a corporate biodiversity vision with goals, objectives and a list of key strategies it will implement.

What the company needs to do

A company cannot measure and manage its biodiversity performance unless it knows what it is setting out to achieve. Therefore, Stage 2 focuses on the development of a corporate vision for biodiversity and measurable goals and objectives to achieve it. Key strategies will be identified that will deliver the goals and objectives. The development of a vision, goals and objectives is most effective, and more likely to be turned into action, if it is conducted in a participatory manner, engaging key stakeholders in the planning process (Section 3, Enabling Factors).

Some companies will already be engaged in biodiversity-related work as part of their sustainability strategy. As a starting point for developing a vision, goals and objectives, the company should look at existing efforts, and any existing goals, to see how they need to be adapted in light of the priority pressures identified in Stage 1 of this process. This retrofitting can be a very useful way of building on existing work. It is possible to conduct goal-setting retroactively, by assessing what the company is currently doing and reconstructing relevant goals. The new dimensions that will likely need to be added include a more precise definition of the species, habitats and ecosystem services to focus on.

As well as choosing goals, objectives and key strategies for mitigating any potential company pressures on biodiversity, this stage should also be used to identify opportunities for more proactive conservation and restoration work. This might include initiatives beyond the corporate scope of biodiversity influence, such as supporting the conservation of protected areas or restoration work in the broader landscapes or seascapes in which the company operates, especially if these are linked to any dependencies. Since companies generally operate at scales that are small, in relation to the scale of their biodiversity priorities, it is important for them to consider strategies across a landscape or seascape wherever possible [29, 55-58]. This may be especially pertinent if the company is striving for a net positive biodiversity gain. A landscape approach also provides more scope for promoting

the connectivity of natural habitats - essential for functioning ecosystems, food security and effective protected area networks [59-61].

2A. Develop a vision

A vision is the beacon in the process of setting new goals; a clearly articulated, results-oriented picture of the future the company intends to create, built around the biodiversity priorities it identified in Stage 1 and taking account of its impacts and dependencies. The goals then become milestones on the journey towards achieving the company vision. Although a company might have a general idea of what its vision should include at the outset, completing Stage 1 first will ensure the vision has a biodiversity focus that is relevant within its scope of corporate biodiversity influence.

The vision can be expressed as a succinct statement that summarises a company's long-term ambitions, what it would like to achieve and what it expects to see happen as a result of its biodiversity work (i.e. what the goals and objectives will lead to). The vision, and the associated goals and objectives, should build on the outcomes of the analysis conducted in Stage 1 and should define how priority pressures will be addressed, as well as any opportunities for proactive conservation. Through the vision the company can capture commitments to have net positive impacts, or no net loss of biodiversity. Some companies may wish to develop a vision associated with, and contributing to, global biodiversity goals (Annex 2).

Examples of visions might include:

- We will achieve a net biodiversity gain as a result of our operations.
- We lead the industry in the development of nature-based solutions to protect and enhance forest and wetland ecosystems.
- We will conserve and restore natural habitats and threatened species around our (sites) and contribute to SDG 15 Life on Land.
- We ensure that critical habitats and threatened species thrive in the places where we operate.
- We maintain ecosystem services in the places we work for the benefit of people and nature.

The vision can be more specific if the company's operations and corporate scope of biodiversity influence allow, perhaps referencing certain species, habitat types or ecosystem services. For example, if the company sources products or raw materials only from tropical forests, the vision could reference those forests or even certain types of species within them (e.g. we ensure that no tropical forests are lost in our supply chain and our products are orang-utan friendly). However, such specificity should not preclude working on, and setting objectives around, other habitats and species identified as priorities, therefore most companies will need to keep the vision broader.

2B. Decide on the relevant aggregation unit for planning and monitoring

This step allows a company to break down its activities into smaller, more manageable units and define and monitor biodiversity goals at a level of granularity relevant to its operations. This is especially important for complex businesses, involved in multiple products or services, that may struggle to identify one common biodiversity goal across all their operations but that can identify such goals for certain elements or units of aggregation. The setting and monitoring of goals might be conducted by product line (e.g. T-shirts, perfumes), by raw materials (e.g. cotton, palm oil), by clusters of suppliers (e.g. Brazilian coffee, Costa Rican coffee), by type of operation (e.g. dredging, farming, construction) or by asset type (e.g. mines, refineries, factories).

The advantages of being able to aggregate company operations include:

- Alignment with corporate management structures to maximise ownership and accountability (potentially to promote internal competition);
- Grouping similar processes or services facilitates adoption of particular practices and technologies (economy of scale, sharing expertise and reduce burden of developing

multiple different standards or operating procedures);
- Grouping similar company pressures and similar biodiversity priorities;
- Facilitating communications with stakeholders.

The choice depends on various factors, such as which of the company's aggregation units has most direct dependence on biodiversity or is responsible for the most important biodiversity pressures identified in Stage 1. In some cases, a company may want to identify the aggregation unit at the outset of the planning process, such as when it wants to test the Guidelines on a specific brand or product. The company will also need to consider the advantages and disadvantages of multiple aggregation units, as more aggregation units will lead to more goals, objectives, strategies and indicators.

2C. Define goals and objectives

Once the vision is defined, the company is ready to establish goals and objectives for its aggregation unit(s). Each unit can have one goal or multiple goals and each goal can have one associated objective or multiple objectives.

Goals generally focus on, and reflect a commitment to, improving the state of biodiversity (species, habitats) or associated benefits to people (ecosystem services). This commitment will then be delivered through the objectives and strategies. The term target is often used as a synonym for goal. Here we define a target as the value within a goal or objective that a company is trying to attain (e.g. the number of hectares of forest it wants to restore by a certain year).

A goal suitable for company use should meet several criteria, such as being measurable, achievable within a specific time period and relevant. To be relevant, goals should contribute to the company biodiversity vision (Step 2A), address the priority pressures and dependencies identified in Stage 1 and be directly associated with one or more of the biodiversity priorities identified in Stage 1. Goals should be as precise as possible in describing the desired state of biodiversity the company wants to see in the long term as a result of its strategies (e.g. an improvement in habitat cover or species abundance or water quality). Weak, vague goals that do not specify what is expected to happen to biodiversity will be difficult to implement and monitor and will not facilitate measurement of corporate biodiversity performance. For that reason, indicators should be drafted against each goal and objective as they are formulated because, if it is difficult or impossible to find suitable indicators, it means a goal or objective is not measurable and needs to be adapted. Checking now how a goal or objective should be measured will save time later.

The corporate-level goals can be used to create a goal hierarchy (Fig. 5) that will provide the basis for the company to report on what it has achieved at multiple levels.

Corporate level goals should be inspired by the company vision and will need to be scalable (i.e. the corporate goal needs to be articulated in a way that can be understood and replicated across the corporate scope of biodiversity influence and monitored with the same indicators). Some companies may wish to develop goals that reflect global societal goals, such as those associated with and contributing to, global biodiversity goals (Annex 2). Most companies should be able to show some contribution to SDG 14 (Life Below Water) or SDG 15 (Life on Land) or the targets within them. In some cases, where a company is present solely or primarily in a given country, national goals as defined in the country's National Biodiversity Strategy and Action Plan could also be considered by the company in defining its corporate goals.

Once goals have been set objectives generally focus on, and reflect a commitment to, reducing the most important pressures identified in Stage 1, whether or not those pressures relate to the company's own activities or its supply chains. An objective should be measurable, feasible and achievable within a specific time period.

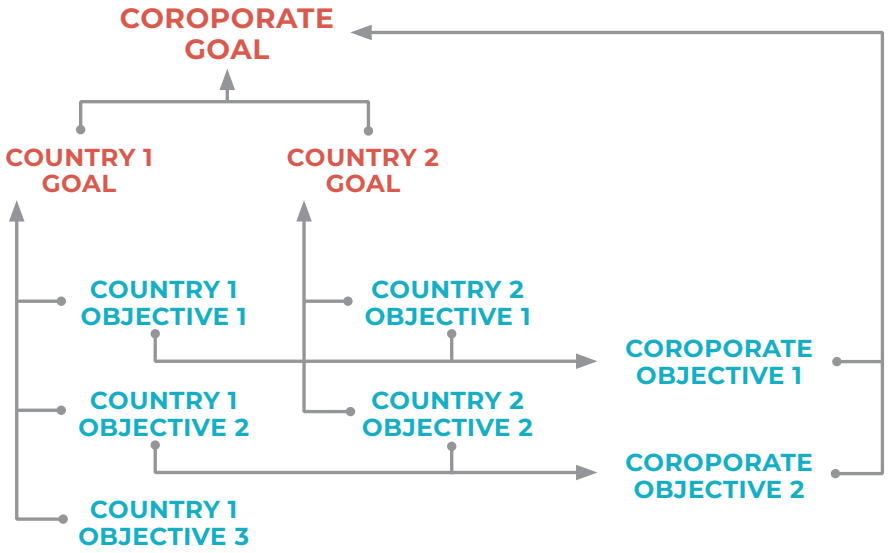
Objectives should address pressures on biodiversity directly and indirectly caused by the company's operations. For example, the company may wish to reduce pollution from its own activities

or help prevent illegal logging in a neighbouring protected area, linked to the construction of a road by the company's supplier. An objective may also capture a positive outcome a company aspires to achieve from conservation actions and strategies unrelated to the mitigation of its pressures (e.g. supporting a protected area beyond its corporate scope of biodiversity influence).

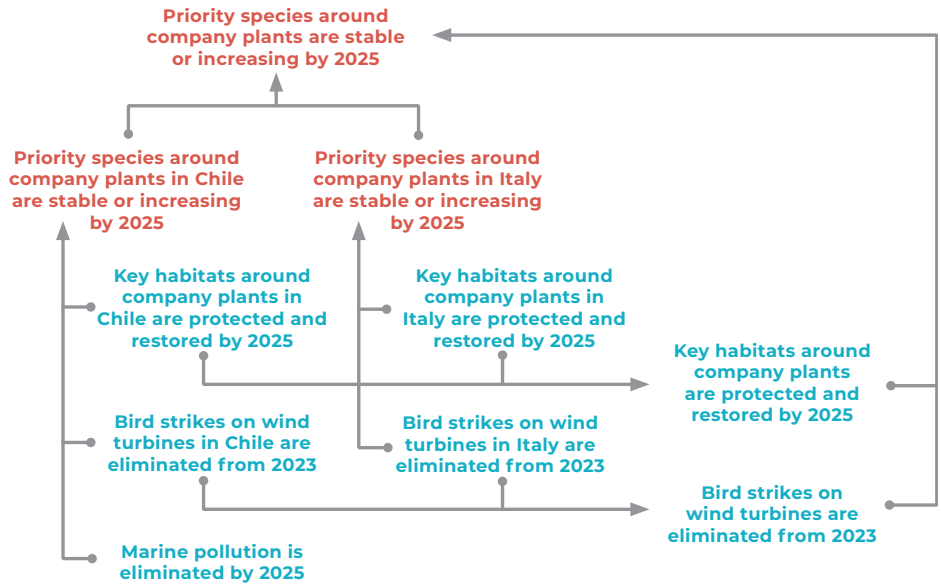
Goals and objectives should state the timeframe involved and, where relevant, also clearly define the baseline (sometimes called benchmark) against which progress will be measured. For example, if the goal is to restore habitat cover, the baseline could be defined as "to 2010 levels" or "to 2000 levels". Such baselines will be familiar to companies that are already using the mitigation hierarchy and committing to no net loss or net gain in biodiversity [52], since the state of biodiversity that is going to be maintained or improved needs to be defined.

Figure 5. Example of a) a goal hierarchy and b) a theoretical example for an energy company. Country is shown as an aggregation unit, but in other companies the unit might be brand, department, product, raw material, or some other management unit.

a)



b)



Source: Stephenson & Carbone, 2021

Note that, since goals and objectives are long term, within these the company may also want to set intermediary results (or targets) that have specified timeframes. For example, if the company goal relates to restoring 500,000 ha of forest habitat by 2030, it may want to set intermediary results in the intervening years (e.g. 100,000 ha by 2022, 250,000 ha by 2025). Objectives often have shorter timeframes than goals and can therefore also demonstrate progress made towards the goal.

Building corporate-level goals and objectives around priority pressures and priority biodiversity identified in Stage 1 will not address all of the environmental impacts associated with the company's activities. Site-level biodiversity action plans (BAPs) or supply-chain-specific action plans will have to deal with the pressures and biodiversity that have been identified at the more local level. The two levels will work in a complementary and synergistic way, as site-level or supply-chain-specific action plans will generate data to feed into the corporate-level strategic plan and support the delivery and measurement of corporate goals and objectives; while corporate-level goals and objectives will provide direction and support for site-level and supply-chain-level strategies.

There are several standards, guidelines and tools that can help companies set goals and objectives, including guidance on developing science-based targets for businesses [62], the Species Threat Abatement and Recovery rating to identify threat abatement and habitat restoration opportunities in particular places [38], Natural Capital supplementary biodiversity guidance to use data in setting biodiversity related goals [63] and many more detailed in Annex 2.

2D. Identify strategies to deliver corporate goals and objectives

Companies need to identify suitable responses to deliver the biodiversity goals and objectives and address the pressures identified in Stage 1. In many cases this will be best done by working with relevant external biodiversity experts (e.g. from universities, NGOs, government agencies). The implementation of these strategies will usually be monitored by response indicators (Stage 3).

The strategies chosen should be:

- Linked to, and able to contribute to, the corporate objectives;
- Feasible, based on the level of effort and resources the company will invest;
- Within the scope of corporate biodiversity influence defined in Stage 1, but wherever possible targeting the broader landscape or seascape;
- Compatible with company scenarios for growth and transformation;
- Aligned with the company's ethos;
- With clear ownership and accountability.

Strategies for delivering different objectives and reducing different pressures vary greatly and will depend on the company's objectives. In order to make them actionable, and in order to be able to identify suitable response indicators to measure them, the company should provide as much detail and granularity as possible.

Some examples of strategies are provided in Table 5. They may relate to protecting natural habitats and species (e.g., adopting no-go policies for protected and conserved areas or critical habitats, helping create protected areas, supporting management of existing protected areas, setting aside land for biodiversity, minimising bycatch through fishing gear modification), or restoring natural habitats. Governance issues might also be addressed (e.g. supporting the equitable engagement of indigenous people, contributing to landscape-level coalitions). The strategies may also involve targeted species recovery actions or research into the ecology and status of species threatened by company activities. In other cases, they may involve strategies associated with adopting and applying standards and certification schemes.

Where the company has limited influence on its supply chains it is less likely to be able to commit to actions on the ground (such as, say, the planting of native trees or avoidance of harmful pesticides); (although in some cases it might be able to do so through working with relevant clients or

partners). In many of these situations, the promotion of sustainability certification schemes to verify its supply chain (e.g. through sourcing raw materials only from certified suppliers) might be the main option.

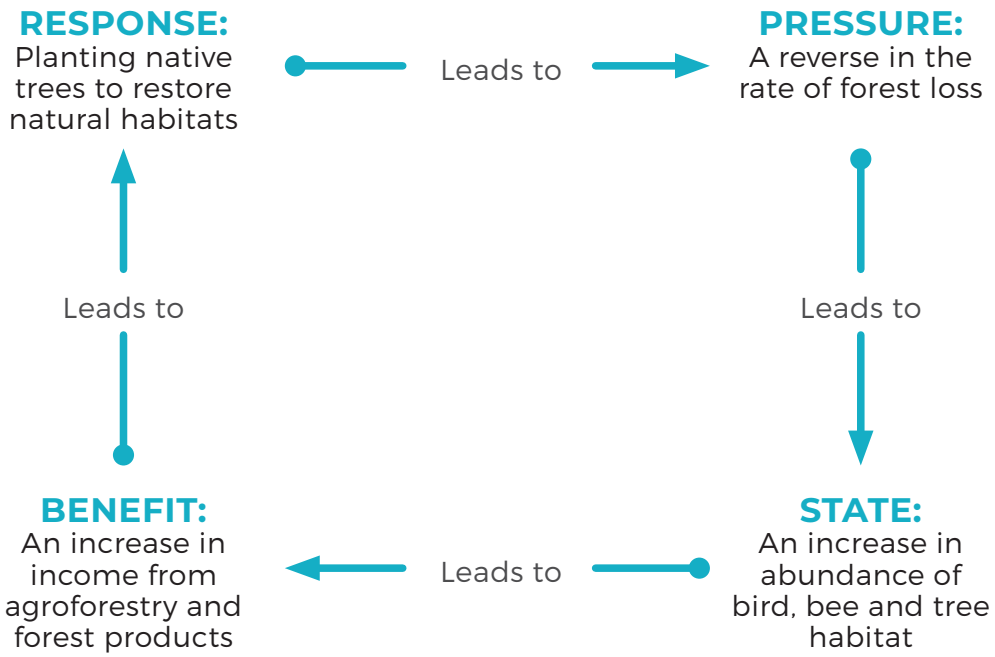
2E. Summarise the results so far

The company may now find it helpful to compile its vision, goals, objectives and strategies, as well as priority pressures and priority biodiversity, into a consolidated table (Table 5). This will help in the next stage of identifying indicators.

Some companies may also wish to describe vision, goals, approaches, as well as important pressures and priority biodiversity with a clear and simple **theory of change** to illustrate the logic behind the system. Use of a theory of change should be iterative and adapted as the feasibility of different strategies and results becomes clearer.

A theory of change is sometimes best explained in diagrammatic form, such as a results chain or a series of results chains [23] (Fig. 6).

Figure 6. An example of a results chain. This is a simple theory of change for a company supporting habitat restoration. The pressure-state-response-benefit model demonstrates how benefits are also expected to encourage more responses. Note that the goal measured by the state indicator is likely to focus on threatened or forest-dependent species. Another benefit directly related to an increase in species diversity might be bird tourism.



Source: Stephenson & Carbone, 2021

Table 5: An example of a summary of a company's outputs after Stage 2. The example describes one of the aggregation units (coffee sourcing) for a food manufacturing company that has decided to organise its strategy around supply chains. The company will have other aggregation units addressing other supply chains. Some companies may wish to place the vision statement at the top of the table.

Important pressures and impacts	**High priority pressures:** Loss, modification and fragmentation of forest habitats and neighbouring waterways; Pollution from use of agrochemicals (pesticides, herbicides, fertiliser)		**Potential impacts:** Decrease in habitat cover Decrease in distribution of species dependent on the habitat (e.g. forest-dependent birds) Decrease of population size of species Decrease in abundance and diversity of species impacted by chemicals (e.g. soil invertebrates, insects) and the species that feed on them (e.g. birds) Decrease in water quality
Priority biodiversity	**Species:** Forest birds Freshwater fish Insects: Order Odonata (dragonflies etc); Order Lepidoptera (butterflies etc.) Soil invertebrates (insect larvae, earthworms) Threatened native trees	**Habitats:** Subtropical/tropical moist lowland and montane forests; Subtropical/tropical moist shrublands; Wetlands, including river systems	**Ecosystem services:** Soil quality and stability Watershed maintenance Water quality Pollination Pest regulation Nutrient and carbon sequestration Timber and non-timber forest products Income from sale of harvested agroforestry crops
Vision: The company leads the coffee industry in the protection and enhancement of forest and wetland biodiversity, contributing towards the Sustainable Development Goals on climate change, life below water and life on land.			
Goals	**Objectives**		**Key strategies**
Biodiversity Goal 1 (Sustainable production): By 2025, native soil invertebrates and native insects such as bees are stable or increasing in farms from which coffee is sourced	Biodiversity Objective 1.1 (Agrochemicals): By 2025, there is zero use of banned agrochemicals (pesticides, herbicides and insecticides) on all farms		Implement coffee certification standards for agrochemicals Train farmers in use of appropriate pest solutions
	Biodiversity Objective 1.2 (Water): By 2025, all farms supplying coffee to the company have wastewater management systems that ensure the quality of freshwater in rivers and streams is maintained at acceptable levels		Implement coffee certification standards for water management Train farmers in water management
Biodiversity Goal 2 (Natural landscapes): By 2030, forests, woodlands, wetlands and rivers in at least 10 coffee landscapes provide safe havens for threatened species and benefits for local people	Biodiversity Objective 2.1 (Habitat restoration): By 2030, at least 10% of each coffee landscape has had natural forests, woodlands, wetlands and rivers restored		Plant native trees to restore natural habitats and increase income from agroforestry Monitor survivorship of planted trees Train farmers and agronomists in forest restoration and agroforestry Remove alien invasive plant species

Expected outputs

Key outputs from the Guidelines	Stage
Summary of biodiversity pressures caused by company activities in its corporate scope of biodiversity influence	1
List of priority species, habitats, areas and ecosystem services around which company goals and objectives can be focused and against which company biodiversity performance can be measured	1
Corporate biodiversity vision	2
Scalable biodiversity goals and objectives	2
Key strategies to deliver goals and objectives	2

Stage 3: Develop a framework of linked core indicators that allows data aggregation at corporate level

Outcome Stage 3

The company has in place an indicator framework that will allow it to aggregate data at the corporate level across its corporate scope of biodiversity influence and assess its biodiversity performance across its activities.

Photo © Giulia Carbone

What the company needs to do

Choosing, defining and using appropriate indicators is critical for companies to be able to make an overall, corporate-level assessment of how they are affecting biodiversity by aggregating data from their activities to come up with measures of corporate biodiversity performance.

Each company needs to select a small set of **core indicators** that can be monitored across the corporate scope of biodiversity influence to show progress against goals and objectives and the delivery of strategies. Using the same core indicators across the company is the main pre-requisite for being able to aggregate data at multiple levels [28, 64] and it is vital if a company wants to gain an understanding of corporate-level impacts and outcomes on biodiversity. In order for this to work effectively, indicators need to be scalable and linked (Section 1.4) and appropriate for measuring progress against the goals and objectives. Goals and objectives that are not measurable, with no obvious indicator, need to be revised.

Monitoring of biodiversity through linked, scalable indicators will:

- Provide data for evidence-based decision-making at multiple levels (e.g., value chain, country, corporate, depending on the aggregation unit selected);
- Engage local and global stakeholders (from farmers to citizen scientists, from governments to international organisations), further raising support and awareness for biodiversity work;
- Answer key questions (e.g. How has the company contributed to global biodiversity goals? How have birds and bees benefitted from conservation work? How many threatened trees are being conserved by the company? How are local communities benefitting from ecosystem services like water and non-timber

forest products provided through the company's support?);
- Provide the narrative to tell stories of successes and lessons.

The development of indicators needs to follow best practices [10, 11, 23, 28, 65] to ensure they are:

- Scientifically credible (e.g. using methods that have been peer-reviewed in the scientific literature);
- Feasible to apply in the company's context (i.e. the company will be able to collect data either directly or through others using identified methods);
- Measurable (in quantitative or qualitative terms);
- Precise (defined the same way by everyone who uses them);
- Consistent (always measuring the same thing);
- Understandable (everyone who is concerned by the results can interpret what they mean);
- Sensitive to changes in the pressure, state, response or benefit being measured.

Key criteria are often described as being: specific, measurable, achievable, relevant and time-bound (SMART).

In selecting core indicators, the following questions are often asked:

- **How many indicators are necessary?** The ideal number of indicators can be defined as "*the minimum number that answers the question: Has the goal or objective been achieved?*" [66].
- **Can existing indicators be used?** Companies do not need to develop new indicators. There are several existing indicators used by conservationists, especially those developed for monitoring Aichi targets and the SDGs [67-71], that can be reviewed and appropriate ones selected. A number of biodiversity indicators have been, and continue to be developed, specifically to help businesses monitor their biodiversity performance [12] and some of these could also be assessed (Annex 3). The key issue it to make sure the indicator measures one of the company's biodiversity goals, objective or strategies.
- **How can a company be sure that the indicators measure only what the company is responsible for?** Some companies will worry that the change measured by an indicator may not be directly or completely as a result of their actions. Other factors may have caused that change. This is not an insurmountable problem and attribution of change should be "considered an aspiration not a hindrance" [28]. The development of scalable goals and indicators, and a clear theory of change that links them, will help demonstrate how the company strategies (monitored with response indicators) are expected to result in concrete outcomes (monitored with pressure indicators) and impacts (monitored with state indicators) which provide a framework to interpret results. Thus, the use of linked core indicators will help determine attribution. In general, response and pressure indicators will be easier to attribute to the company than changes in state.

There is abundant guidance on how to define biodiversity indicators including the Open Standards for Conservation [23], various aid agency guidelines (e.g., [66, 72], general business guidance [22, 73] as well as some sector-specific guidance for example, extractives [65, 74] and agriculture [75]. More details, and examples, are presented in Annex 3.

3A. Define state and benefit indicators against goals

Goals around improving habitats and species will require appropriate state indicators whilst ecosystem services goals will be monitored with benefit indicators. If any indicators are not obvious or feasible, then the goals may need to be revisited. Choosing the indicators therefore needs to focus on whether they demonstrate the company's goals are being delivered. For example, if a goal is about conserving some of the company's priority species, decide what the company needs to know about those species. Is it the abundance of the species? Or the distribution, or diversity or Red List status? If the goal relates to improving natural habitats, what does the company need

to measure to see if the habitats are improving? Is it the area remaining, or the amount restored? These questions can then be answered through the choice of relevant indicators.

The SMART criteria discussed above need to be considered too. For example, a corporate level indicator for a company wishing to support the conservation of threatened bird species in its corporate scope of biodiversity influence might be: *Number of threatened bird species* (recorded in a given period of time). Others might opt for the *Number of forest-dependent bird species* if relevant. Either option could be a suitable indicator if:

- The company uses one of the numerous scientifically credible bird monitoring protocols;
- A local partner can collect data cost effectively;
- The number of birds seen can be counted using binoculars (and maybe acoustic recording devices);
- Different data collectors identify and count bird species in a consistent way;
- Everyone in the company can understand a trend in increasing or decreasing threatened bird species (we have more or less species than before);
- More threatened birds use the land around the company's area of biodiversity influence if their habitat is restored, so the figures will monitor progress.

Note that some indicators, such as those focused on species populations, are usually aggregated as an index (e.g., Living Planet Index, Wild Bird Index, Red List Index) to make it easier to track multiple species at once. For example, if the company is monitoring small populations of mammals but large populations of birds, the relative change over time of all the species monitored is easier to compare using an index (and has an effect similar to tracking percentage population change rather than absolute numbers).

State indicators, especially those around habitat cover and species' populations, are now well tested and widely used by governments and conservation agencies and increasingly by businesses. In several cases, global databases also exist that may be of use (Stage 4). If the company also wants to demonstrate its contribution to global goals, it should check if its indicators are similar to those being used by governments and NGOs for the post-2020 Global Biodiversity Framework or SDGs [15, 68, 71, 76]. There are various ongoing challenges with monitoring ecosystem services [30, 77], nonetheless, there is a growing set of ecosystem service indicators [78-82] for which data are being collected, often through satellite-based remote sensing [83, 84]. Ecosystem services can sometimes be best measured by a combination of state and response indicators [78, 85]. For example, provisioning of water might be measured by a combination of a state indicator like water quality and a response indicator like number of water sources protected.

The key at this stage is for the company to identify at least one or two core state indicators and at least one ecosystem service indicator if relevant, that will demonstrate how well the company is delivering each of its goals. These should be linked to the species and habitats identified as priorities and in order to gain a minimum level of understanding of its biodiversity performance, a company is likely to need a state indicator that monitors natural habitat cover change, at least one indicator of species population abundance and at least one on benefits to people from ecosystem services. A selection of examples of state and benefit indicators is presented in Table 6 and Annex 3.

Table 6. Examples of state and benefit indicators**.** Several of the indicators could demonstrate contributions to SDG targets. Note that benefits are often, but not always, associated with ecosystem services.

Focus of company goal	Common indicator to use across the company	Data collected	Examples of data collection methods
Benefits			
Ecosystems for nature and people	Abundance of species used sustainably by farmers and local communities	Trends in populations of identified species used by people around plant/site	Transect counts (individuals or signs) Acoustic recording devices
	Volume of timber and non-timber forest products harvested	Trends in product volumes (e.g., fruit, nuts, medicines)	Socio-economic surveys
	Fisheries production	Catch volumes	Observers, market surveys
	Income generated from sale of harvested resources (e.g., agroforestry crops, fisheries, etc.)	Trends in income	Socio-economic surveys
	Index of human wellbeing measures	Trends in human wellbeing derived from ecosystem services	Socio-economic surveys
	Water quality	Trends in water quality	Stream Visual Assessment Protocol Chemical analyses
	Social Progress Index	Trends in human wellbeing	Socio-economic surveys
	Income from nature-based tourism	Trends in income from tourism	Socio-economic surveys
	Ecosystem Integrity Index	Trends in integrity	Existing database
State			
Natural habitats	Habitat cover change	Trends in forest loss or restoration	Satellite-based remote sensing
	Species richness and diversity	Trends in numbers of different species	Transect counts Acoustic recording devices
	Population trends (abundance) of key species	Trends in species numbers	Transect counts Acoustic recording devices
	Forest area as a proportion of land area	Trends in relative proportion of KBAs covered by forest	Satellite-based remote sensing and KBA database
	Water quality	Trends in water quality (levels of pollutants, oxygen, etc.)	Stream Visual Assessment Protocol Chemical analyses
	Habitat health	Trends in diversity and abundance of indicator species of habitat health (e.g., pollution-intolerant aquatic species, forest-dependent bird species)	Transect counts Dragonfly Biotic Index Forest Bird Index

Focus of company goal	Common indicator to use across the company	Data collected	Examples of data collection methods
Threatened species	Population trends (abundance) of key species	Trends in species numbers	Transect counts (individuals or signs) Acoustic recording devices
	Wild Bird Index	Trends in relative abundance of birds	Transect counts (individuals or signs) Acoustic recording devices
	Wildlife Picture Index	Trends in abundance and diversity of species identified in camera traps	Camera traps (if and where feasible)
	Red List Index	Trends in status of key species	IUCN Red List (national)
	Green Status Index	Trends in Green Status	IUCN Green Status of Species
	Species Threat Abatement and Restoration metric	Trends in the achieved impact of conservation interventions on extinction risk over time	Red List data Field surveys

In some instances, companies may wish to set thresholds (or milestones) for certain state indicators where the indicator can help them take decisions. This might be an 'early warning' threshold or a 'critical' threshold. For example, if habitat cover or a target species population drops below a certain defined level in a defined area, the company may need to trigger a more concerted response to prevent long-term irreversible loss of biodiversity.

3B. Define pressure and response indicators against objectives and strategies

The company objectives can be best tracked with pressure indicators whilst the strategies will require response indicators such as those shown in Tables 7 and 8. Pressure and response indicators can generally demonstrate change more rapidly than state indicators, are more attributable to company actions and provide the company more options for reporting and demonstrating how it is making a difference. Monitoring pressures is especially key in ensuring the success of species conservation projects [86].

The company therefore needs to identify what needs to be measured in order to determine if the objectives are being delivered. For example, if the objective is about reducing the pollution of rivers and streams, the company must decide what it needs to know about its discharges and level of pollution (e.g., is it the levels of runoff of certain chemicals or overall water quality that the company is trying to change?). Similarly, the company needs to identify what must be measured to determine progress with implementing its strategies. For example, if the aim is to plant native trees as a strategy to restore natural habitat, does the company need to know the number of trees, the number of species planted, the area planted or the survival rate? The choice of indicator should be based on what would best measure what the company is trying to achieve and what is feasible.

Table 7. Examples of pressure indicators.

Focus of the objective	Common indicator to use across the company	Data collected	Examples of data collection methods
Loss of habitats (e.g., forest, wetlands, coral reefs)	Habitat cover change	Trends in habitat loss	Satellite-based remote sensing
	Habitat fragmentation	Trends in fragmentation	Satellite-based remote sensing
Species offtake	Number of incidents of illegal or unsustainable activity (logging, hunting, etc)	Trends in incidents and levels of offtake	Law enforcement records Socio-economic surveys
	Number of animals strikes (e.g., by boats or turbines)	Trends in animal strikes	Company observers Transect counts
Alien invasive species	Populations trends of key invasive species	Trends in species numbers	Transect counts Trapping Acoustic recording devices
Pollution	Water quality	Trends in water quality (levels of pollutants, oxygen, etc)	Stream Visual Assessment Protocol Chemical analyses
	Index of diversity and abundance of pollution-intolerant aquatic species	Trends in diversity and abundance of indicator species of habitat health	Transect counts Dragonfly Biotic Index
Over-use of water	Water levels	Trends in water level in rivers, wetlands and reservoirs	Direct measurement

Table 8. Examples of response indicators

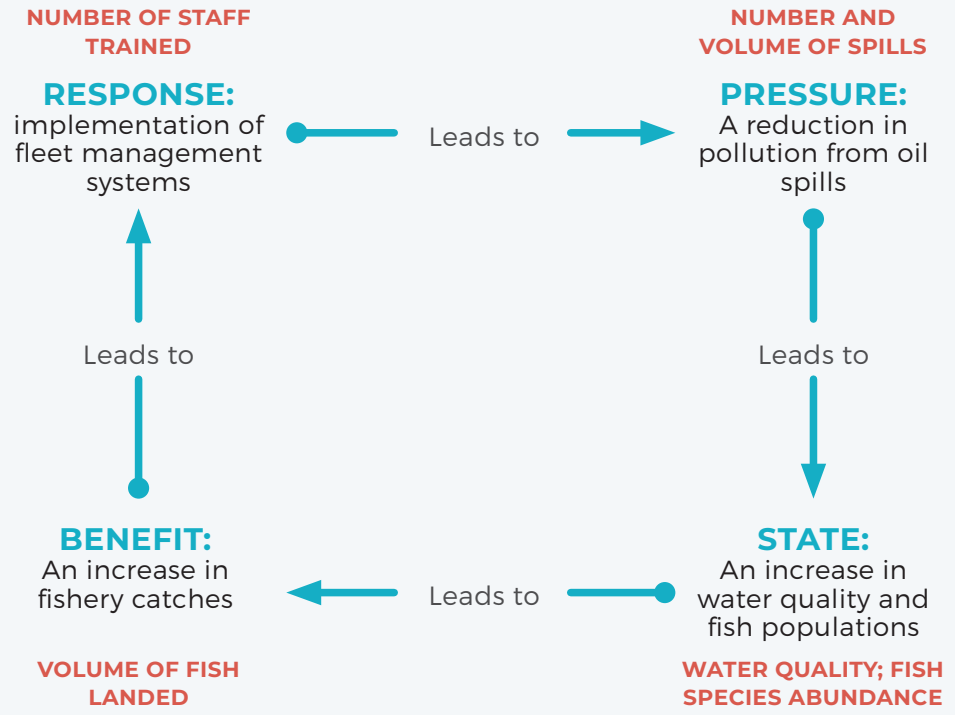
Focus of strategies	Common indicators to use across the company	Data collected	Data collection methods
Establish protected areas	Coverage of protected areas (formal and informal)	Trends in protected area coverage	Satellite-based remote-sensing Official documents Mine/farm maps
Manage protected areas	Protected area management effectiveness	Trends in management effectiveness	Management Effectiveness Tracking Tool
Avoid operating in areas important for biodiversity	Number of protected areas, World Heritage Sites and KBAs the company operates in	Trends in incursions into sensitive areas	Satellite-based remote-sensing Project plans Staff observations and reports
Plant threatened trees to restore forests	Number of trees planted: number surviving; area planted	Trends in tree planting and survival	Direct counts
Restore coral reefs	Number of artificial reefs established: area of coral cover	Trends in reef development	Direct counts
Remove alien invasive species	Number of alien species eradicated	Trends in eradication	Reports from staff or implementing partners (e.g., agronomists, consultants)
Improve soil management practices	Number of farms applying approved techniques	Trends in level of adoption of methods	Reports from staff or implementing partners (e.g., agronomists, consultants)
Improve wastewater management practices	Number of farms applying approved techniques	Trends in level of adoption of methods	Reports from staff or implementing partners (e.g., agronomists, consultants)
Sustainable sourcing	Proportion of products or raw materials from certified sources	Trends in levels of certification	Certification bodies Staff reports Audits
Fund conservation projects	Level of investment in biodiversity	Trends in funding for conservation and restoration	Company accounting Partners' financial reporting

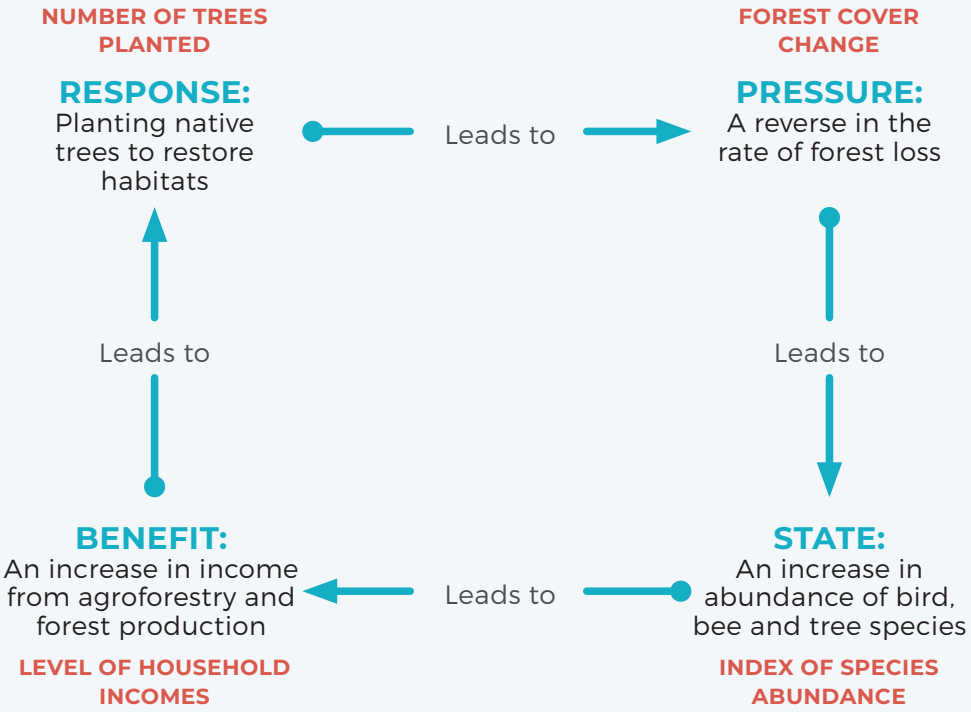
In some instances, companies may wish to set thresholds for certain pressure and response indicators where the indicator can help them take decisions. For example, if the number of incidents of illegal killing of animals or the level of pollution drops below a certain defined level in a defined area, the company will need to trigger a more concerted response to these increased pressures. The same indicators will also be useful at a site level. For example, if the number of birds killed by wind turbines or fish killed by water turbines surpasses a certain limit, the plant will need to shut down for a suitable period. Similarly, if target number of certified suppliers or hectares of restored habitat are significantly lower than planned, efforts will need to be made to address the cause.

Once state, benefit, pressure and response indicators have been defined, the linkages between them will become more apparent as they assist in measure key elements of the theory of change. Examples are presented in Box 6.

Box 6. Indicators along theories of change

The following examples show key results along a theory of change (blue) with associated indicators (red).





Source: Stephenson & Carbone, 2021

3C. Bring together the elements of a biodiversity strategic plan

The company can now complete its summary table (Table 9) to bring together the key elements of its biodiversity strategic plan.

Table 9. Summary of the planning outputs of a food manufacturing company for its coffee sourcing supply chains after applying Stage 3. Indicators are marked as: S (State), B (Benefit), P (Pressure) and R (Response). The precise details of the indicators will be elaborated in the monitoring plan (Stage 4). This example shows an optimal situation, however a company may be able to focus on a smaller number of indicators to get the information it needs to monitor goal and objective delivery. In Version 2 of the Guidelines, we will add an annex with a series of case studies from companies that have applied the stages.

Priority biodiversity	**Species**: • Forest birds • Freshwater fish • Insects: Order Odonata (dragonflies etc); Order Lepidoptera (butterflies etc) • Soil invertebrates (insect larvae, earthworms) • Threatened native trees.	**Habitats:** • Subtropical/tropical moist lowland & montane forests • Subtropical/tropical moist shrublands • Wetlands, including river systems.	**Ecosystem services:** • Soil quality and stability • Watershed maintenance • Water quality • Pollination • Pest regulation • Nutrient and carbon sequestration • Timber and non-timber forest products • Income from sale of harvested agroforestry crops.
Important pressures and impacts	**High priority pressures:** • Loss, modification and fragmentation of forest habitats and neighbouring waterways • Pollution from use of agrochemicals (pesticides, herbicides, fertiliser)	**Potential impacts:** • Decrease in habitat cover • Decrease in distribution of species dependent on the habitat (e.g., forest-dependent birds) • Decrease of population size of species • Decrease in species impacted by chemicals (e.g., soil invertebrates, insects) and the species that feed on them (e.g. birds) • Decrease in water quality.	
Vision: The company leads the coffee industry in the protection and enhancement of forest and wetland biodiversity, contributing towards the Sustainable Development Goals on climate change, life below water and life on land.			
Goals	**Objectives**	**Key strategies**	**Types of Indicators**
Biodiversity Goal 1 (Soil health): By 2025, native soil invertebrates and native insects such as bees are stable or increasing in farms from which coffee is sourced.	**Biodiversity Objective 1.1 (Agrochemicals):** By 2025, there is zero use of banned agrochemicals (pesticides, herbicides and insecticides) on all farms.	• Implement coffee certification standards for agrochemicals • Train farmers in use of appropriate pest solutions	• Abundance and diversity of soil invertebrates, bees and butterflies (S) • Proportion of farms using banned agrochemicals (P) • Number of farmers and agronomists using training (R) • Proportion of coffee sourced from certified farms (R) • Proportion of farms treating wastewater (R).
	Biodiversity Objective 1.2 (Water): By 2025, all farms supplying coffee to the company have wastewater management systems that ensure the quality of freshwater in rivers and streams is maintained at acceptable levels.	• Implement coffee certification standards for water management • Train farmers in water management.	

Biodiversity Goal 2 (Natural landscapes): By 2030, forests, woodlands, wetlands and rivers in at least 10 coffee landscapes provide safe havens for threatened species and benefits for local people.	**Biodiversity Objective 2.1 (Habitat restoration):** By 2030, at least 10% of each coffee landscape has had natural forests, woodlands, wetlands and rivers restored.	• Plant native trees to restore natural habitats and increase income from agroforestry • Monitor survivorship of planted trees • Train farmers and agronomists in forest restoration and agroforestry • Remove alien invasive plant species.	• Area of natural habitat cover (S) • Rate of natural habitat loss (P) • Abundance and diversity of soil invertebrates, trees, bees, butterflies, birds and fish (S) • Abundance and diversity of alien invasive species (P) • Number of trees and number of tree species planted (R) • Proportion of planted trees surviving 5 years (R) • Volume of, and Income from, agroforestry (B) • Volume and quality of water available for people (B).

Expected outputs

Key outputs from the Guidelines	Stage
Summary of biodiversity pressures caused by company activities in its corporate scope of biodiversity influence	1
List of priority species, habitats, areas and ecosystem services around which company goals and objectives can be focused and against which company biodiversity performance can be measured	1
Corporate biodiversity vision	2
Scalable biodiversity goals and objectives	2
Key strategies to deliver goals and objectives	2
A framework of core pressure-state-response-benefit indicators to monitor the company's goals, objectives and strategies	3
The key elements of a biodiversity strategic plan	3

Stage 4: Collect, share and analyse data, learn lessons and adapt

Photo © NatureMetrics

Outcome Stage 4

The company is collecting data on linked indicators and using it to report on biodiversity performance, make adaptive management decisions and learn lessons.

What the company needs to do

The company will need to develop and implement a monitoring plan at the corporate level to monitor the indicators identified in Stage 3. Managers will benefit from seeing data in formats such as maps and dashboards that are easy to interpret and act upon. Systems need to be put in place to collate and share data and to conduct regular reviews to learn lessons and apply adaptive management. Periodic external evaluations are also critical. Lessons learned from monitoring and evaluation systems should be used to adapt company goals, objectives and strategies as necessary. This means there needs to be honesty and reflection around failures and the provision of a culture where there is space to fail and learn.

4A. Develop and implement a monitoring plan and collect data

A monitoring plan will ensure everyone in the company is clear on who collects what data to ensure aggregation works. However, before diving into its development, it is important to determine what level of monitoring effort is required. This needs to be proportional to the ambition.

There are many different templates for monitoring plans, but the key elements of a plan that need to be established are:

- Indicators – "What" the company will measure (the linked indicators developed in Stage 3).
- Methods – "How" the company will measure the indicators.
- Timing/Frequency – "When" the company will measure them.
- Roles and responsibilities – "Who" will measure them. It will be particularly important to distinguish between data collected by local staff and their partners that can be rolled up and data collected by HQ staff and their partners on global indicators.
- Location – "Where" they will be measured.

The priority will then be to collect data to establish baselines against which future trends will be measured.

How and when

Monitoring methods (the "how" in the plan) should be:

- Accurate (with minimal error);
- Reliable (consistently repeatable with minimal variation in results);
- Cost-effective;
- Feasible for the company of its partners to use;
- Appropriate (being relevant for the company's needs and ensuring data are statistically meaningful);
- Precise enough to measure the change monitored and to signal any relevant thresholds identified.

The methods will be similar for similar indicators in similar biomes, so we can identify examples of monitoring methods to be considered for sample indicators. Modern technology is increasingly offering opportunities to collect data remotely [28, 87], using satellite imagery from space [84] and devices such as camera traps [88], drones [89] and acoustic recording devices [90] on or near the ground. Environmental DNA monitoring is also increasingly being used in terrestrial as well as aquatic systems to monitor species diversity [91, 92]. Where appropriate and cost-effective, such technologies can help collect data while minimising the time needed for people on the ground.

Tools for assessing ecosystem services have been developed [93-95] and several useful databases exist [82]. Integrated approaches using field data and remote sensing data will likely be most effective [96].

Wherever possible, methods used should follow established, standardised protocols, to ensure harmonised approaches and to follow best practices for ensuring robust sampling design, statistical power and consistent replication of methods. Some of the protocols that may be relevant to some businesses include Important Bird and Biodiversity Area monitoring [97], Spatial Monitoring and Reporting Tool [98], High Conservation Value Threat Monitoring Protocol [99], Stream Visual Assessment Protocol [100], Protected Area Management Effectiveness Tracking Tool [101] and many more (Annex 4).

Who and where

At the outset, the company will need to decide where an indicator should and can be measured and by whom. In most cases, companies will probably be able to measure some response and pressure indicators themselves, but other indicators including most state indicators, will need to be measured at a selected sub-set of sites, supply chains or areas of operation in their corporate scope of biodiversity influence.

All or most of the company's response indicators will need to be measured throughout the corporate scope of biodiversity influence. However, for many companies, especially those with large, widely dispersed corporate scopes of biodiversity influence, it will often be more feasible to measure at least some indicators (especially state indicators) at a representative subset (or randomly selected sample) of sites, supply chains or operations areas. It will be important to identify a suitable sample size for such a subset to provide statistically valid data. In almost all cases, companies will probably want to rely on academic, NGO or consultant partners to help identify the relevant methods and sampling sizes; in some cases, the company may then prefer to rely on these partners to collect (or help collect) the data. Many companies already use consultants for a range of support roles, from conducting EIAs to collecting or analysing monitoring data. Some will also want to develop partnerships with research institutions or NGOs (Section 3.2). IUCN's work with companies suggests that more than half of core biodiversity indicators could be monitored by specialist partners in a part of the corporate scope of biodiversity influence.

Most indicators will be measured using data collected on the ground (by the company or its partners) within the corporate scope of biodiversity

influence (primary data); some data (secondary data) can be collated from external, third party sources (such as satellite-based remote sensing data from governments or NGOs). There are currently over 145 global sources of biodiversity data, of which more than 85 per cent offer some degree of access, although some charge for corporate use [102]. The company will need to decide which approach is most relevant for each of its indicators, although most response indicators will likely need to be measured with primary data. Primary data have the advantage of being collected to meet specific company needs so are relevant and measured in the precise sites and at the precise scale needed; however, more time and resources are often required to collect them than secondary data. Secondary data may sometimes be cheaper, but they may not be at the scale that is most relevant to the company and, as a result, interpretation and analysis may be more complex. A selection of databases that can provide secondary data of use for measuring indicators at some scales in some companies are presented in Table 10.

Agreements and contracts are likely to be needed with relevant partners helping collect data, from consultancies, universities, NGOs and government departments. Some data sets may require payment. Companies should maximise the use of satellite-based remote sensing data, especially for habitat cover related indicators, as this can be used to monitor all their sites. Although there is a lot of satellite-based remote sensing data freely available, most companies will not see the need to develop internal capacity for analysing such data, so will likely pay for its analysis. If citizen scientists are being used for any data collection, they will also need to be provided with necessary guidance and training. Measuring some indicators outside the company's scope of biodiversity influence will provide counterfactuals (i.e., measures from sites where the company did not support biodiversity) that will allow assessments of the company's impacts.

Table 10. A selection of global databases that may assist companies monitor some of their core indicators at corporate levels. Those marked with a star (*) can be accessed through IBAT. Their use for a given company will depend on the relevance of the data to a company indicator, as well as the timeframe and level of resolution. More examples at national, regional and global levels and an explanation of how they could be used, are presented in Annex 4.

Indicator type	Database	Link
Habitat cover	Global Forest Watch	http://www.globalforestwatch.org/
Conservation status of species (*)	IUCN Red List of Threatened Species™	https://www.iucnredlist.org/
Abundance of species	Living Planet Index	https://livingplanetindex.org/home/index
Presence of species	Global Biodiversity Information System	http://www.gbif.org/
Ecosystem state	Ecoregion intactness	https://espace.library.uq.edu.au/view/UQ:f51cace
	IUCN Red List of Ecosystems	https://iucnrle.org/assessments/
Important areas for biodiversity (*)	World Database on KBAs	http://www.keybiodiversityareas.org/home
	Protected Planet: World Database on Protected Areas	https://www.protectedplanet.net/

Any existing or historical baselines, especially for species populations, natural habitat cover data or ecosystem services, should also be identified as a matter of urgency. The company should then start as quickly as possible, to establish baselines for all the indicators in its monitoring plan. Not only will this provide a benchmark necessary for measuring any future changes over time, but it

will also test the feasibility of the methods. If a baseline cannot be collected within the first year of its use, the indicator or its methods of data collection need to be adapted accordingly.

It will be important for the company to test its indicators and assess the data being collected early on to ensure the system is providing adequate information. Even the most experienced experts will sometimes be unable to implement monitoring plans as expected due to unforeseen challenges. Monitoring schemes should therefore be adapted over time to take account of emerging issues and changing circumstances [103]. Good monitoring plan design, ensuring data can answer all the key questions asked by decision makers, as well as adequate resourcing, are key pre-requisites of effective monitoring. But by following an adaptive monitoring approach a company recognises that the monitoring plan, data collection, analysis and interpretation are iterative steps and will need to be adapted in response to new information or new emerging questions [104]. Companies should establish management systems to regularly review the data collected and adapt the monitoring plan as required to address problems or emerging issues. Tweaks may be needed from time to time to improve the flow of useful data.

4B. Share data in formats that facilitate interpretation and decision-making

The company will need to develop internal systems for collecting, collating, sharing and analysing data. This will include adapting any existing monitoring and reporting systems and integrating new data into existing knowledge management systems and sustainability reporting mechanisms. This system should have the capacity to generate relevant data products, especially maps and dashboards.

The spatial presentation of data in map form is often a powerful way to understand what is happening, where. Many biodiversity data portals have mapping functions that can be reviewed to assess what a company wants to do with its own data. Examples include Aqua Maps [105], the Digital Observatory for Protected Areas [106], Global Forest Watch [107], Global Pollution Map [108], MapX [109] and the World Database on Key Biodiversity Areas [35]. Useful maps a company might want to generate include: area of habitat restored; hotspots of illegal or unsustainable offtake of plants and animals; protected areas supported; hotspots of pollution.

Dashboards that present data in various graphic forms are also very popular (Box 7) and have been proposed as tools to visualise biodiversity data delivering on global and institutional goals [5, 15, 110, 111]. Many businesses have also adopted this approach [112, 113]. If senior management identifies why they need information and what questions they want data to answer, it will help them to decide how they would like the data presented. In this way, data management systems can then be used to produce appropriate data products of value to the end users.

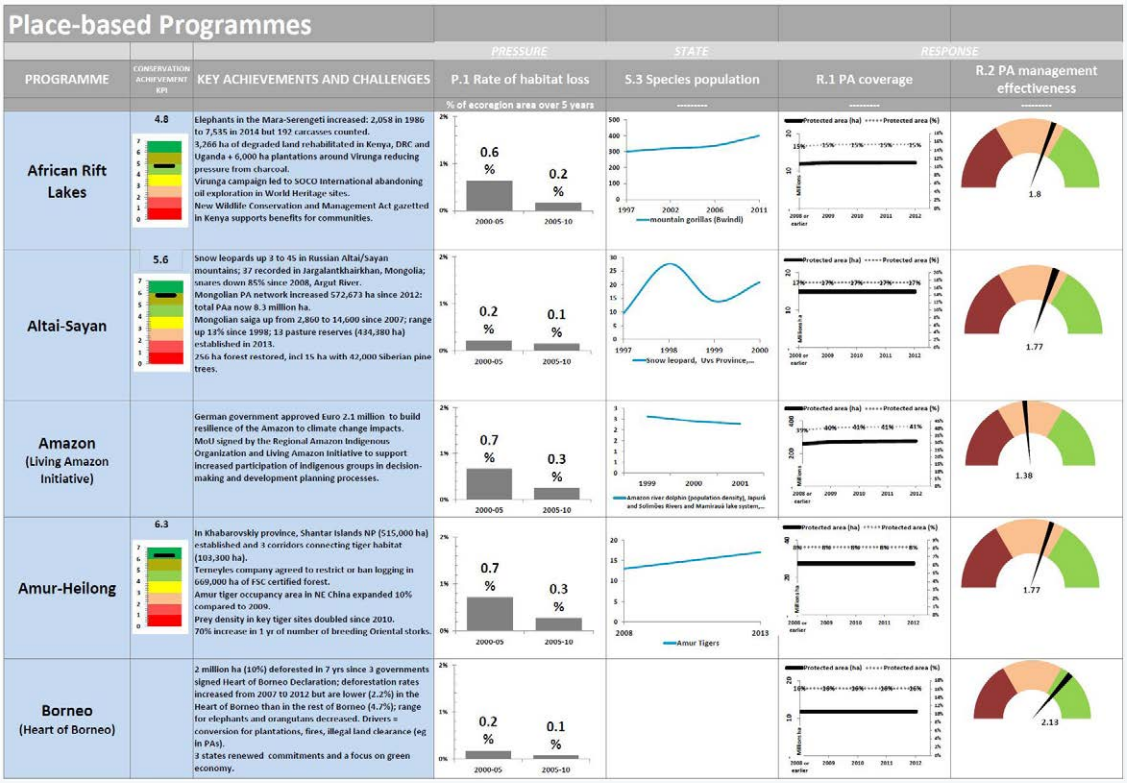
Data generated through the corporate biodiversity performance system can also be used in corporate sustainability reports, supporting the external, non-financial disclosure encouraged by many standards and reporting frameworks, such as the Global Reporting Initiative [22], ISO26000 [114], Integrated Reporting [115], OECD guidelines [116] and others. Companies will be able to present the data gathered in the context of the company biodiversity vision and its goals and objectives to demonstrate progress.

Furthermore, recognising that many different stakeholders could greatly benefit from additional biodiversity data at multiple levels, companies should publicly share as much of the raw data they collect as possible with relevant database managers at national, regional and global levels so that their data can be integrated into those databases (Annex 4). Data could be added to, for example eBird [117], GBIF [118], the Living Planet Index [119], the Global Database on Protected Area Management Effectiveness [120] and many more and used to update species assessments in the IUCN Red List of Threatened Species™ [36] and in future also the IUCN Green Status of Species [121]. In this way, the company can contribute directly to broader global monitoring efforts around the CBD and the SDGs.

Box 7. Dashboards

Many companies and organisations use dashboards to present data in an appropriate easy-to-interpret format and it has proven to be effective in biodiversity monitoring. A system developed by WWF [15,111] summarised project data in rows: a performance KPI score (showing delivery of annual goals), a summary of achievements and challenges (putting data into context) and then a suite of common linked pressure-state-response-benefit indicators. By aligning the common indicators across programmes, reading down columns allowed managers to identify outliers – either high or low performing programmes – for each measure. This facilitated the identification of priorities and decision-making. An example is presented below (from [15]).

Figure 7. An example of a biodiversity dashboard (adapted from Stephenson et al. [15]).



4C. Conduct periodic evaluations and assessments and encourage learning and continued improvement

A key step in the conservation project management cycle is to use monitoring data to reflect on experiences and to adapt strategies as necessary and to take account of changing circumstances or take on board lessons from action that are working well or less well [23]. Every company should schedule a process whereby staff review incoming data, compare against thresholds and expected results and respond as necessary.

Following the stages and steps outlined above, a company will have planned, implemented and monitored a coherent biodiversity programme in its corporate scope of biodiversity influence. By following a stepwise, results-based management approach, companies will be able to disclose their quantifiable impact on biodiversity and report on their biodiversity performance and how well they have fared on delivering their corporate goals. Managers and staff will also have evidence against which to take decisions and answer key questions, namely: What is working well and needs to be continued or expanded? What is working less well and needs changing? For example, if restoration efforts have led to increased forest cover in one country, but to no improvement in another, what lessons from the first country can be used to improve the performance of restoration work in the second? Similarly, if the diversity and abundance of priority species have increased in one landscape but not another, a company can look at what factors are affecting performance.

Learning will need to be mainstreamed into company management systems. This can be as simple as ensuring that when the latest results come in from an office or a site, that managers review and discuss them together. A meeting can be scheduled at regular points in the year specifically to review incoming data. Peer review is also an important way of learning. Companies should ensure people responsible for biodiversity across their operations have opportunities for information sharing and collective learning. These efforts should not be kept within a company; staff should also engage with other companies bilaterally or in fora and partnerships to increase opportunities for learning and continued improvement.

While ongoing monitoring and peer review can enhance learning, periodically companies will need to conduct formal, external evaluations to assess progress and understand the underlying factors affecting performance. These evaluations could be conducted at different scales on different elements of the biodiversity work, from looking at the whole biodiversity programme to focusing on specific goals or objectives or strategies.

Numerous evaluation guidelines exist for projects and programmes and most focus on reviewing key issues around:

- relevance and quality of design
- efficiency (of delivery of outputs)
- effectiveness (of delivery of results and outcomes)
- impact (on conservation targets)
- sustainability (of progress, benefits and impact realised)
- adaptive capacity (monitoring, evaluation, adaptation, learning).

Companies will also need to plan, budget and implement impact evaluations (to measure the intended and unintended causal effects of conservation interventions, with emphasis on long-term impacts) and systematic reviews (to review research findings and assess evidence on the impacts of conservation interventions) [28, 122]. If applied in an appropriate way, methods such as a before-after-control-impact (BACI) approach [123, 124] can also use counterfactual measures from control sites to assess a company's impact. By using counterfactuals, impact evaluations provide the ultimate method of establishing whether a project had a significant influence on the state of biodiversity or a reduction in threats. They can also facilitate learning and promote accountability.

4D. Review biodiversity priorities and goals

While a company should be able to use data from monitoring systems and periodic evaluations to adapt and improve, occasionally it will also need to review its goals, objectives and strategies. Maybe a goal did not have the right ambition level. Perhaps the company set itself a target it achieved within a year and needs to increase its expectations; or maybe it was unable to deliver any progress using a strategy that has proven to be difficult to apply for reasons not foreseen in the planning stage. Whatever the case, while companies should try to maintain priorities, goals, objectives and strategies for long enough (probably at least five years) to ensure consistency of messaging and reporting, if any elements are not working and cannot be corrected, they must be changed. This may require a slight tweak that can be led by a small team, or it may need some elements of Stages 1 to 4 to be reapplied. In any case, after about five years, all companies should conduct a major review and set goals and objectives for the next five to ten years.

Expected outputs

Key outputs from the Guidelines	Stage
Summary of biodiversity pressures caused by company activities in its corporate scope of biodiversity influence	1
List of priority species, habitats, areas and ecosystem services around which company goals and objectives can be focused and against which company biodiversity performance can be measured	1
Corporate biodiversity vision	2
Scalable biodiversity goals and objectives	2
Key strategies to deliver goals and objectives	2
A framework of core pressure-state-response-benefit indicators to monitor the company's goals, objectives and strategies	3
The key elements of a biodiversity strategic plan	3
A monitoring plan describing the linked indicators to be used and mapping out how data will be collected, when, how, where and by whom	4
A database of relevant data on indicators	4
Monitoring and reporting systems that ensure data are provided in a standardised format that can be displayed in appropriate data products, such as maps and dashboards, to meet decision-makers' needs at each level of the company	4

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3. Enabling factors

A number of factors will support the successful implementation of the four stages, such as the engagement of stakeholders, the development of internal capacity and partnerships and governance systems that link company operations to corporate performance.

3.1 Stakeholder engagement

Stakeholder engagement can provide an important source of information and an effective way to secure external validation and buy-in. Most importantly, it also ensures the alignment of company ambitions with the expectations of its stakeholders.

Deciding who to engage with can be helped by a stakeholder analysis, following an existing format [19, 21]. Key stakeholders might include suppliers, staff, shareholders, etc. Staff closer to operations on the ground should be involved since they can help provide local insights into identifying feasible goals. Partners who can help with implementing or monitoring biodiversity (e.g., government agencies, local communities, NGOs, academic institutions) should also be engaged from the outset, as should any collaborating companies who share similar supply chains, production methods or sites. Various tools exist for engaging local and indigenous communities and integrating their knowledge and issues into conservation planning [125] which is also a key criterion for applying Nature-based Solutions [126].

Stage 2 of the Guidelines, the development of a vision, goals and objectives, for example, will likely be more effective, and more likely to be turned into action, if it is conducted in a participatory manner, engaging key stakeholders in the planning process. A workshop of stakeholders to review findings from Stage 1 and develop goals and objectives would be appropriate in most instances. Note that various business standards, including those for offsets, already encourage consultation with stakeholders and qualified experts [19, 21, 62, 127]. Furthermore, biodiversity conservation standards and practices [23, 128] include engagement with stakeholders from the outset in the planning, implementation, monitoring and evaluation of projects, with engagement approaches ranging from communicating with stakeholders to fully collaborative partnerships [129].

3.2 Capacity and partnership development

Working with partners is also key for biodiversity monitoring, as it can contribute to the company's ability and capacity to collect, analyse and aggregate data to monitor biodiversity performance. Appropriate capacity is a key enabling condition for monitoring biodiversity [28]. In many cases, partners such as academic institutions, NGOs, international organisations, community groups and other companies can help provide the capacity needed.

In a company, capacity for monitoring the delivery of the new biodiversity goals needs to be developed within a core team (most likely the sustainability or CSR team) at headquarters and then appropriate hubs within country offices and within landscapes in the corporate scope of biodiversity influence. A simple capacity assessment should list what is required and identify key gaps that need filling.

Each company will need to decide its needs, but key capacities required will include:

- Co-ordination of planning processes and goal development;
- Development and implementation of monitoring plans;
- Data management, analysis and reporting.

Based on the capacity assessment, a simple plan should be developed for how to build company capacity to deliver its biodiversity ambitions, including the upskilling and training of staff. Training of trainers in regional or national offices should also be considered where relevant and feasible. Within the corporate scope of biodiversity influence, staff or the people they work with (suppliers, farmers, etc.) will need to be supported in monitoring biodiversity indicators. Not all capacity needs to be new. Companies should use and build on existing systems, tools, data and staff as much as possible.

In some larger companies, it may be possible to build national or regional hubs of expertise and have these staff plan local work and collect data locally, as well as helping other staff and the people they work with. The hubs could in turn be linked to a global team which in turn could be linked to a community of practice of staff from other companies, along the lines of what the Conservation Coaches Network [130] does for conservation agencies. Several business fora already exist for developing communities of practice in certain sectors or across sectors [131-134] and these could be used more for providing mutual support for biodiversity work. As many companies find on the ground, identifying appropriate and diverse champions, sponsors and changemakers can be key to success in bringing in new ideas which can be harnessed through the communities of practice.

There are numerous potential advantages for companies to develop sustainability partnerships [135] and working with others will be key to ensuring the company can deliver its biodiversity commitments. The partnerships needed will vary depending on the company and its corporate scope of biodiversity influence but might include local communities (who can help implement and monitor activities), companies operating in the same area of influence or in the same sector (especially for lesson sharing, harmonising approaches and joint data collection and sharing), certification bodies, consultancy firms who can support implementation and monitoring and consumers who can provide feedback. There are already numerous examples of NGOs or other civil society organisations as well as universities and other research institutions helping companies plan and monitor biodiversity work; some examples are provided in the case studies in Annex 5.

Potential advantages to working with partners are numerous and include:

- Collaboration on sustainability initiatives including certification schemes;
- Advice on biodiversity work not familiar to the company or its staff;
- Joint research, such as on the testing of assumptions (e.g., biodiversity impacts of certification);
- Generating and sharing data, including access to data collected by others that may also be seen as more independent by stakeholders;
- Lessons learning and sharing (including in sector-wide or sector-specific fora and consortia);
- Fundraising for joint biodiversity projects;
- Enhanced communications.

Successful partnerships and collaborations involve stakeholders bringing key attributes to the table such as power, capacity, motivation, mandate and synergy [136]. Partners need to define a clear purpose for collaborative processes at the outset, articulate specific roles and ensure transparency. Advantages are likely to outweigh any disadvantages, but challenges in partnerships can include differing expectations or ambition-levels among partners, incompatible data or reporting frameworks, lack of willingness to openly share results or data and insufficient capacity for partnership management.

3.3 Governance systems for linking company operations to corporate performance

To support the implementation and monitoring of a corporate biodiversity strategic plan, it is essential to clearly allocate responsibilities at different levels and in different management units. Such a strategic plan can only be implemented successfully with the support of the relevant team dispersed throughout the company and which should have clear and standardised terms of references guiding them. This is particularly important for monitoring, as the collection of data on core indicators at the corporate levels will build on the collaboration of site level actors (from the company or partners). Furthermore, the approaches selected at the corporate level will have to be implemented locally and therefore full alignment will be needed between the corporate-level staff in charge of the strategic plan and site or supply chain level leads. Repercussions for a company's operations throughout its corporate scope of biodiversity influence vary between stages.

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4. Conclusions: from corporate planning to site-level action

These guidelines outline the steps required to plan and monitor biodiversity performance at the corporate level. However, only by acting at the site level (at the company's operational sites or at sites from which its raw materials are generated), can the biodiversity strategic plan be implemented. Each stage will therefore have repercussion for a company's operations throughout its corporate scope of biodiversity influence.

In Stage 1, once priority pressures and priority species, habitats and ecosystem services have been identified at corporate level, priorities across the corporate scope of biodiversity influence will need to become more detailed and specific. For example, if the corporate priorities relate to threatened birds, critical forests and catchment services, the company will need to identify the bird species (or perhaps the bird families), the forest types and the specific catchments throughout the corporate scope of biodiversity influence.

In Stage 2, throughout a company's corporate scope of biodiversity influence – at sites such as mines, plants, factories and farms, along supply chains and across areas of operation – the global goals and objectives will need to be translated into local goals and objectives. In some cases, this goal-setting will be part of the development of a local biodiversity action plan. Many business standards [e.g. 24, 137] require the development of BAPs at the site or project level to describe how risks will be mitigated. The vision, goal, objectives and strategies identified at corporate level will now need to be translated into local goals, objectives and strategies and described in one or more BAPs for the relevant aggregation units. At this stage, local stakeholders such as company partners and clients, consultants, scientists and local communities should also be consulted (Section 3.1). For example: if the company strategy for tackling pollution is to implement improved wastewater management systems, the local strategies in the BAP might be to develop and use improved wastewater management systems. If the corporate goal relates to restoring critical habitats, the company will need to define which habitats will be restored and how many hectares will be restored in different parts of its corporate scope of biodiversity influence. If the company strategy for tackling loss of natural habitats is to establish protected areas and set aside land, the local strategies in the BAP might be to identify critical habitats for conservation and establish and manage protected areas. The biodiversity goals, objectives and strategies will also need to be embedded in any relevant CSR and health, safety and environment systems in the company.

In Stage 3, at least some of the core corporate biodiversity indicators will need to be adopted during planning at the local level across the corporate scope of biodiversity influence for the relevant aggregation unit and included in relevant BAPs. As part of aggregation unit monitoring, additional indicators will also need to be developed that measure local goals, objectives and strategies and, while these are important for local decision-making, they do not need to be aggregated. Examples might include number of injured birds rehabilitated and re-released, number of chicks reared in nest boxes, abundance of water shrews in rehabilitated wetland habitat and number of beehives installed per farm cluster, etc.

In Stage 4, the company will need to collect data on some of the core indicators at a local level (e.g., at a site or in a supply chain) so, perhaps as part of local BAPs, the core indicators will need to be integrated into local monitoring plans. At the local level, more detail can be given in defining relevant methods and deciding who collects the data, when it is collected and where. Data

collected locally will need to be fed into the company's database or knowledge management system, to allow aggregation and analysis at the corporate level. Management systems will also need to be in place to review and act on the data collected and to conduct periodic evaluations.

Every economic sector will have to deal with different challenges and within each sector every company will have a different corporate culture and a different level of maturity in addressing its relationship with biodiversity. What is important is to move forward, with small steps if needed. Adopting the approach in these guidelines even partially will help companies to start to familiarize themselves with the concepts as well as discover and overcome the challenges.

Each stage of the Guidelines can be implemented to different degrees within the company. While it familiarises itself with the process, the company might decide to focus at first on one aspect of the biodiversity strategic plan before expanding to cover the rest. For example, it might start by focusing on only one specific raw material, process or product rather than its complete set of activities; or on planning and monitoring for only its highest priority pressure or one biodiversity priority. The key is to continuously improve the implementation of the framework and to be transparent on how choices are made.

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References

1. United Nations (UN) (1992). *Convention on Biological Diversity*. New York, USA and Geneva, Switzerland: UN.

2. Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-being: Opportunities and Challenges for Business and Industry.* Washington, DC, USA: World Resources Institute (WRI).

3. The Economics of Ecosystems and Biodiversity (TEEB) (2012). *The Economics of Ecosystems and Biodiversity in Business and Enterprise*. Edited by Joshua Bishop. London, UK and New York, USA: Earthscan.

4. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2019). *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. S. Díaz, J. Settele, E. S. Brondízio E.S., H. T. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera et al. (eds.): Bonn, Germany: IPBES Secretariat.

5. Secretariat of the Convention on Biological Diversity (2014). *Global Biodiversity Outlook 4*. Montréal, Canada: Secretariat of the Convention on Biological Diversity.

6. Business and Biodiversity Offsets Programme (BBOP) (2012a). *Standard on Biodiversity Offsets*. Washington, DC, USA: BBOP.

7. United Nations (UN)(2020a). *Sustainable Development Goals Knowledge Platform* [website] https://sustainabledevelopment.un.org/ (Accessed 20 February 2020).

8. Conservation Measures Partnership (CMP) and International Union for Conservation of Nature (IUCN) (2016a). *Conservation Measures Partnership Direct Threats Classification Version 2.0.*[website]. Available at: https://www.ccnetglobal.com/resource/6e-cmp-direct-threats-classification-2-0/ (Accessed 6 January 2021).

9. European Commission (2020). *Non-financial reporting* [website]. Available at: https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/non-financial-reporting_en (Accessed 15 December 2020).

10. International Union for Conservation of Nature (IUCN) (2018). *The Development and Use of Biodiversity Indicators in Business: An Overview.* Gland, Switzerland: IUCN.

11. Addison, P.F.E., Stephenson, P.J., Bull, J.W., Carbone, G., Burgman, M., Burgass, M. et al. (2020). 'Bringing sustainability to life: A framework to guide biodiversity indicator development for business performance management'. *Business Strategy and the Environment* 29 3303-3313. Available at: https://doi.org/10.1002/bse.2573

12. EU Business @ Biodiversity Platform (2019). *Assessment of Biodiversity Measurement Approaches for Businesses and Financial Institutions. Update Report 2.* EU. Brussels, Belgium: Business @ Biodiversity Platform.

13. Sparks, T. H., Butchart, S. H. M., Balmford, A., Bennun, L., Stanwell-Smith, D., Walpole, M. et al. (2011). Linked indicator sets for addressing biodiversity loss. *Oryx,* 45: 411–419. Available at: https://doi.org/10.1017/S003060531100024X

14. Tittensor, D.P., Walpole, M., Hill, S.L., Boyce, D.G., Britten, G.L., Burgess, N.D. et al. (2014). A mid-term analysis of progress toward international biodiversity targets. *Science,* 346(6206): 241-244. Available at: https://doi.org/10.1126/science.1257484

15. Stephenson, P.J., Burgess, N.D., Jungmann, L., Loh, J., O'Connor, S., Oldfield, T. et al. (2015). Overcoming the challenges to conservation monitoring: integrating data from in situ reporting and global data sets to measure impact and performance. *Biodiversity*, 16 (2-3): 68-85. Available at: https://doi.org/10.1080/14888386.2015.1070373

16. Navarro, L.M., Fernández, N., Guerra, C.A., Guralnick, R., Kissling, W.D., Londono, M.C. et al. (2017) Monitoring biodiversity change through effective global coordination. *Current Opinion in Environmental Sustainability,* 29: 158–169. Available at: https://doi.org/10.1016/j.cosust.2018.02.005

17. United Nations Environment Programme- World Conservation Monitoring Centre (UNEP-WCMC) (2020). *Corporate biodiversity indicators* [website]. Available at: https://www.unep-wcmc.org/featured-projects/corporate-biodiversity-indicators (Accessed 20 November 2020).

18. European Union (EU) (2020). *EU Business @ Biodiversity Platform* [website]. Available at: https://ec.europa.eu/environment/biodiversity/business/index_en.htm (Accessed 17 November 2020).

19. International Finance Corporation (IFC) (2012a). *Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources*. Washington DC, USA: IFC.

20. British Standards Institution (BSI) (2015). *BS EN ISO 14001: Environmental Management Systems*. London, UK: BSI.

21. Natural Capital Coalition (NCC) (2016). *Natural Capital Protocol*. London, UK: NCC. www.naturalcapitalcoalition.org/protocol

22. Global Reporting Initiative (GRI) (2018). *GRI 304: Biodiversity 2016*. Amsterdam, The Netherlands: GRI.

23. Conservation Measures Partnership (2020). *Open Standards for the Practice of Conservation. Version 4*. Bethesda, USA: CMP. Available at: https://conservationstandards.org/download-cs/#downloadcs

24. International Finance Corporation (IFC) (2012b). *Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts*. Washington DC, USA: IFC.

25. Ecological Footprint Network (2020). *Ecological Footprint* [website] Available at: https://www.footprintnetwork.org/our-work/ecological-footprint/ (Accessed 11 December 2020).

26. Food and Agriculture Organisation of the United Nations (FAO) (1997). *Land Quality Indicators and Their Use in Sustainable Agriculture and Rural Development*. Rome, Italy: FAO.

27. Organisation For Economic Co-Operation And Development (OECD) (2001). *OECD Environmental Indicators. Towards Sustainable Development*. Paris, France: OECD.

28. Stephenson, P.J. (2019). The Holy Grail of biodiversity conservation management: monitoring impact in projects and project portfolios. *Perspectives in Ecology and Conservation,* 17(4): 182-192. Available at: https://doi.org/10.1016/j.pecon.2019.11.003

29. International Finance Corporation (IFC) (2020). *Using Natural Capital Approaches to Manage Shared Dependencies: Delivering Sustainable Development and Enhanced Resilience*. Washington DC, USA: IFC.

30. Global Reporting Initiative (GRI) (2011). *Approach for Reporting on Ecosystem Services: Incorporating Ecosystem Services into an Organization's Performance Disclosure*. Amsterdam, The Netherlands: GRI.

31. The Biodiversity Consultancy (TBC) (2017). *Biodiversity Screening. Industry Briefing Note*. The Biodiversity Consultancy, Cambridge, UK: TBC.

32. World Resources Institute (WRI), World Business Council for Sustainable Development (WBCSD) & Meridian Institute (2012a). *The Corporate Ecosystem Services Review: Guidelines for Identifying Business Risks and Opportunities Arising from Ecosystem Change. Version 2.0*. Washington DC, USA: WRI; Geneva, Switzerland: WBCSD, Dillon CO, USA: Meridian Institute.

33. Integrated Biodiversity Assessment Tool (IBAT) (2020). *Integrated Biodiversity Assessment Tool* [website]. Available at: https://www.ibat-alliance.org/ (Accessed 5 February 2020).

34. United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC) (2020). *Protected Planet: The World Database on Protected Areas* [website]. Available at: https://www.protectedplanet.net/ (Accessed 15 July 2020).

35. Birdlife International (2020a). *The World Database of Key Biodiversity Areas Developed by the Key Biodiversity Areas Partnership* [website]. Available at: http://www.keybiodiversityareas.org/ (Accessed 7 April 2020).

36. International Union for Conservation of Nature (IUCN) (2020a). *The IUCN Red List of Threatened Species. Version 2020-1* [website]. Available at: https://www.iucnredlist.org (Accessed 10 July 2020).

37. Bennun, L., Regan, E. C., Bird, J., van Bochove, J. W., Katariya, V., Livingstone, S. et al. (2018). The value of the IUCN Red List for business decision-making. *Conservation Letters,* 11(1): e12353. Available at: https://doi.org/10.1111/conl.12353

38. International Union for Conservation of Nature (IUCN) (2020c). *Species Threat Abatement and Recovery metric* [website]. Available at: https://www.iucn.org/regions/washington-dc-office/our-work/species-threat-abatement-and-recovery-star-metric (Accessed on 23 November 2020).

39. Donald, P.F. (2004). Biodiversity impacts of some agricultural commodity production systems. *Conservation Biology,* 18(1): 17-38. Available at: https://doi.org/10.1111/j.1523-1739.2004.01803.x

40. Murguía, D.I., Bringezu, S. & Schaldach, R. (2016). Global direct pressures on biodiversity by large-scale metal mining: spatial distribution and implications for conservation. *Journal of Environmental Management,* 180: 409-420. Available at: https://doi.org/10.1016/j.jenvman.2016.05.040

41. Miller, K.A., Thompson, K.F., Johnston, P. & Santillo, D. (2018). An overview of seabed mining including the current state of development, environmental impacts, and knowledge gaps. *Frontiers in Marine Science,* 4: 418. Available at: https://doi.org/10.3389/fmars.2017.00418

42. International Union for Conservation of Nature (IUCN)- Commission on Ecosystem Management (CEM) (2016). *The IUCN Red List of Ecosystems. Version 2016-1* [website] Available at: http://iucnrle.org (Accessed 10 October 2020).

43. International Union for Conservation of Nature (IUCN) (2020b). *Habitat Classification Scheme. Version 3.1* [website]. Available at: https://www.iucnredlist.org/resources/habitat-classification-scheme (Accessed 6 January 2021).

44. Olson, D. M., & Dinerstein, E. (2002). The Global 200: Priority ecoregions for global conservation. *Annals of the Missouri Botanical Garden*, 89(2): 199-224. Available at: https://doi.org/10.2307/3298564

45. Spalding, M.D., Fox, H.E., Allen, G.R., Davidson, N., Ferdaña, Z.A., Finlayson, M. et al. (2007). Marine ecoregions of the world: a bioregionalization of coastal and shelf areas. *BioScience*, 57(7): 573-583. Available at: https://doi.org/10.1641/B570707

46. Abell, R., Thieme, M.L., Revenga, C., Bryer, M., Kottelat, M., Bogutskaya, N. et al. (2008). Freshwater ecoregions of the world: a new map of biogeographic units for freshwater biodiversity conservation. *BioScience*, 58(5): 403-414. Available at: https://doi.org/10.1641/B580507

47. United Nations Educational, Scientific and Cultural Organization (UNESCO) (2020). *World Heritage List* [website]. Available at: https://whc.unesco.org/en/list/ (Accessed 23 November 2020).

48. Ramsar Convention (2020). *Wetlands of International Importance* [website]. Available at: https://www.ramsar.org/sites-countries/wetlands-of-international-importance (Accessed 20 November 2020).

49. International Union for Conservation of Nature (IUCN) (2016). *A Global Standard for the Identification of Key Biodiversity Areas, Version 1.0.* Gland, Switzerland: IUCN. Available at: https://portals.iucn.org/library/node/46259

50. Alliance for Zero Extinction (2020). *Alliance for Zero Extinction* [website]. Available at: https://zeroextinction.org/ (Accessed 20 February 2020).

51. Myers, N., Mittermeier, R.A., Mittermeier, C.G., Da Fonseca, G.A. & Kent, J. (2000). Biodiversity hotspots for conservation priorities. *Nature*, 403(6772): 853-858. Available at: https://doi.org/10.1038/35002501

52. Arlidge, W.N., Bull, J.W., Addison, P.F., Burgass, M.J., Gianuca, D., Gorham, T.M. et al. (2018). A global mitigation hierarchy for nature conservation. *BioScience*, 68(5): 336-347. Available at: https://doi.org/10.1093/biosci/biy029

53. Inter-American Development Bank (IDB) (2015). *Guidance for Assessing and Managing Biodiversity Impacts and Risks in Inter-American Development Bank Supported Operations*. Washington DC, USA: IDB.

54. Haines-Young, R. and M.B. Potschin (2018). *Common International Classification of Ecosystem Services (CICES) V5.1 and Guidance on the Application of the Revised Structure (CICES).* Nottingham, UK: Fabis Consulting. Available at: https://cices.eu/content/uploads/sites/8/2018/01/Guidance-V51-01012018.pdf

55. Fremier, A.K., DeClerck, F.A., Bosque-Pérez, N.A., Carmona, N.E., Hill, R., Joyal, T. et al. (2013). Understanding spatiotemporal lags in ecosystem services to improve incentives. *BioScience*, 63(6): 472-482. Available at: https://doi.org/10.1525/bio.2013.63.6.9

56. Milder, J.C., Hart, A.K., Dobie, P., Minai, J. & Zaleski, C. (2014). Integrated landscape initiatives for African agriculture, development, and conservation: a region-wide assessment. *World Development*, 54: 68-80. Available at: https://doi.org/10.1016/j.worlddev.2013.07.006

57. Tscharntke, T., Milder, J.C., Schroth, G., Clough, Y., DeClerck, F., Waldron, A. et al. (2015). Conserving biodiversity through certification of tropical agroforestry crops at local and landscape scales. *Conservation Letters*, 8(1): 14-23. Available at: https://doi.org/10.1111/conl.12110

58. Landscale (2019). *LandScale Assessment Framework and Guidelines: A New Approach for Assessing and Communicating Sustainability Performance at Landscape Scale*. Rainforest Alliance, Verra and CCBA.

59. World Business Council for Sustainable Development (WBCSD) (2017). *Landscape Connectivity: A call to action.* World Business Council for Sustainable Development, Geneva, Switzerland: WBCSD).

60. Garibaldi, L.A., Oddi, F.J., Miguez, F.E., Bartomeus, I., Orr, M.C., Jobbágy, E.G. et al. (2020). Working landscapes need at least 20% native habitat. *Conservation Letters,* e12773. Available at: https://doi.org/10.1111/conl.12773

61. Hilty, J. et al. (2020). *Guidelines for conserving through ecological networks and corridors.* Best Practice Protected Area Guidelines Series No. 30. Gland Switzerland: IUCN. Available at: https://doi.org/10.2305/IUCN.CH.2020.PAG.30.en

62. Science-based Targets Network (SBTN) (2020). *Science-Based Targets For Nature: Initial Guidance for Business.* Science-based Targets Network [website]. Available at: https://sciencebasedtargetsnetwork.org/resources/guidance/ (Accessed 6 January 2021).

63. Capitals Coalitions & Cambridge Conservation Initiative (CCI) (2020d). *Integrating Biodiversity into Natural Capital Assessments: Application Guidance.* Cambridge, UK: Capitals Coalitions and CCI.

64. Badalotti, A., van Galen, L., Vié, J.-C., & Stephenson, P.J. (2021). Improving the monitoring of conservation programmes: lessons from a grant-making initiative for threatened species. To be published in *Oryx*.

65. United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC) (2018). *Biodiversity Indicators for Extractive Companies. Draft Methodology.* Cambridge, UK: UNEP-WCMC.

66. World Bank (2004). *Ten Steps to a Results-Based Monitoring and Evaluation System: A Handbook For Development Practitioners.* (Kusek, J.Z. & Rist, R.C.). Washington DC, USA: World Bank.

67. Biodiversity Indicators Partnership (2011). *Guidance for National Biodiversity Indicator Development and Use.*, Cambridge, UK: UNEP World Conservation Monitoring Centre.

68. Biodiversity Indicators Partnership (2020). *Biodiversity Indicators Partnership* [website]. Available at: https://www.bipindicators.net (Accessed 20 January 2020).

69. Pereira, H.M., Ferrier, S., Walters, M., Geller, G.N., Jongman, R.H.G., Scholes, R.J. et al. (2013). Essential biodiversity variables. *Science*, 339(6117): 277-278. Available at: https://doi.org/10.1126/science.1229931

70. GEO BON (2020). *Essential Biodiversity Variables* [website]. Available at: https://geobon.org/ebvs/what-are-ebvs/ (Accessed 19 March 2020).

71. United Nations (2020b). *SDG Indicators [website]*. Available at: https://unstats.un.org/sdgs/indicators/indicators-list/ (Accessed 5 January 2020).

72. United Nations Development Programme (UNDP) (2009). *Handbook on Planning, Monitoring and Evaluating for Development Results.* New York, USA: UNDP.

73. Capitals Coalitions and Cambridge Conservation Initiative (CCI) (2020c). *Integrating Biodiversity into Natural Capital Assessments: Measuring and Valuing Guidance.* Cambridge, UK: Capitals Coalitions and CCI.

74. United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC), Conservational International (CI) and Fauna & Flora International (FFI) (2020). *Biodiversity Indicators for Site-based Impacts. Methodology v3.2.* Cambridge, UK: UNEP-WCMC, CI, FFI.

75. EU Life Programme (2020). *Biodiversity Performance Tool and Monitoring System* [website] Available at: https://www.business-biodiversity.eu/en/biodiversity-performance-tool (Accessed 24 November 2020).

76. Brooks, T.M., Butchart, S.H.M., Cox, N.A., Heath, M., Hilton-Taylor, C., Hoffmann, M. et al. (2015) Harnessing biodiversity and conservation knowledge products to track the Aichi Targets and Sustainable Development Goals. *Biodiversity*, 16: 157-174. Available at: https://doi.org/10.1080/14888386.2015.1075903

77. Geijzendorffer, I.R. & Roche, P.K (2013). Can biodiversity monitoring schemes provide indicators for ecosystem services? *Ecological Indicators,* 33: 148-157. Available at: https://doi.org/10.1016/j.ecolind.2013.03.010

78. Brown, C., Reyers, B., Ingwall-King, L., Mapendembe, A., Nel, J., O'Farrell, P. et al. (2014). *Measuring Ecosystem Services: Guidance on developing ecosystem service indicators.* Cambridge, UK: UNEP-WCMC.

79. Tallis, H., Mooney, H., Andelman, S., Balvanera, P., Cramer, W., Karp, D. et al. (2012). A global system for monitoring ecosystem service change. *Bioscience*, 62(11): 977-986. Available at: https://doi.org/10.1525/bio.2012.62.11.7

80. Thapa, I., Butchart, S.H., Gurung, H., Stattersfield, A.J., Thomas, D.H. & Birch, J.C. (2016). Using information on ecosystem services in Nepal to inform biodiversity conservation and local to national decision-making. *Oryx*, 50(1): 147-155. Available at: https://doi.org/10.1017/S0030605314000088

81. Avtar, R., Kumar, P., Oono, A., Saraswat, C., Dorji, S. & Hlaing, Z. (2017). Potential application of remote sensing in monitoring ecosystem services of forests, mangroves and urban areas. *Geocarto International,* 32(8): pp.874-885. Available at: https://doi.org/10.1080/10106049.2016.1206974

82. Balvanera, P., Quijas, S., Karp, D.S., Ash, N., Bennett, E.M., Boumans, R. et al. (2017). Ecosystem services. Pp. 39-78 in M. Walters & M. Scholes (eds.), *The GEO Handbook On Biodiversity Observation Networks.* Springer International Publishing, Cham, Switzerland. Available at: https://doi.org/10.1007/978-3-319-27288-7_3

83. de Araujo Barbosa, C.C., Atkinson, P.M. & Dearing, J.A. (2015). Remote sensing of ecosystem services: a systematic review. *Ecological Indicators,* 52: 430-443. Available at: https://doi.org/10.1016/j.ecolind.2015.01.007

84. Geller, G.N., Halpin, P.N., Helmuth, B., Hestir, E.L., Skidmore, A., Abrams, M.J. et al. (2017). Remote sensing for biodiversity. Pp 187-210 in Walters, M. & Scholes, R.J. (eds.), *The GEO Handbook on Biodiversity* Observation Networks. Springer International Publishing, Cham, Switzerland. Available at: https://doi.org/10.1007/978-3-319-27288-7_8

85. United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC) (2011). *Developing Ecosystem Service Indicators: Experiences and lessons learned from sub-global assessments and other initiatives. CBD Technical Services No. 58.*, Montreal, Canada: Secretariat of the Convention on Biological Diversity.

86. Crees, J.J., Collins, A.C., Stephenson, P.J., Meredith, H.M.R., Young, R.P., Howe, C. et al. (2016). A comparative approach to assess drivers of success

in mammalian conservation recovery programs. *Conservation Biology*, 30(4): 694-705. Available at: https://doi.org/10.1111/cobi.12652

87. Stephenson, P.J. (2020). Technological advances in biodiversity monitoring: applicability, opportunities and challenges. *Current Opinion in Environmental Sustainability,* 45: 36-41. Available at: https://doi.org/10.1016/j.cosust.2020.08.005

88. Rovero, F. & Zimmermann, F. (2016). *Camera Trapping for Wildlife Research.* Exeter, UK: Pelagic Publishing.

89. Wich, S.A. & Koh, L.P. (2018). *Conservation Drones: Mapping and Monitoring Biodiversity.* Oxford, UK: Oxford University Press. Available at: https://doi.org/10.1093/oso/9780198787617.001.0001

90. Sugai, L.S.M., Silva, T.S.F., Ribeiro Jr, J.W. & Llusia, D. (2019). Terrestrial passive acoustic monitoring: review and perspectives. *BioScience*, 69(1): 15-25. Available at: https://doi.org/10.1093/biosci/biy147

91. Deiner, K., Bik, H.M., Mächler, E., Seymour, M., Lacoursière-Roussel, A., Altermatt, F. et al. (2017). Environmental DNA metabarcoding: Transforming how we survey animal and plant communities. *Molecular Ecology,* 26(21): 5872-5895. Available at: https://doi.org/10.1111/mec.14350

92. Stephenson, P.J., Ntiamoa-Baidu, Y. & Simaika, J.P. (2020). The use of traditional and modern tools for monitoring wetlands biodiversity in Africa: challenges and opportunities. *Frontiers in Environmental Science,* 8: 61. Available at: https://doi.org/10.3389/fenvs.2020.00061

93. Kettunen, M., Bassi, S., Gantioler, S. & ten Brink, P. (2009). Assessing Socio-economic *Benefits of Natura 2000 – a Toolkit for Practitioners* (September 2009 Edition). Brussels, Belgium: Institute for European Environmental Policy (IEEP).

94. BirdLife International (2020b). The Toolkit for Ecosystem Service Site-based Assessment (TESSA). [website] Available at: https://www.birdlife.org/worldwide/science/assessing-ecosystem-services-tessa (Accessed 10 July 2020).

95. Stanford University (2020). InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs). [website] Available at: https://naturalcapitalproject.stanford.edu/software/invest (Accessed 10 July 2020).

96. Rosa, M.F., Bonham, C.A., Dempewolf, J. & Arakwiye, B. (2017). An integrated approach to monitoring ecosystem services and agriculture: implications for sustainable agricultural intensification in Rwanda. *Environmental Monitoring and Assessment,* 189(1): 15. Available at: https://doi.org/10.1007/s10661-016-5607-6

97. BirdLife International (2006). *Monitoring Important Bird Areas: a global framework. Version 1.2.* Cambridge, UK: BirdLife International.

98. SMART (Spatial Monitoring and Reporting Tool) (2020). *Spatial Monitoring and Reporting Tool* [website] Available at: http://smartconservationsoftware.org (Accessed 10 June 2020).

99. Zoological Society of London (ZSL) (2013). *High Conservation Value Threat Monitoring Protocol.* London, UK: ZSL. Available at: https://hcvnetwork.org/library/hcv-threat-monitoring-protocol/.

100. Bjorkland, R., Pringle, C.M. & Newton, B. (2001). A stream visual assessment protocol (SVAP) for riparian landowners. *Environmental Monitoring and Assessment,* 68(2): 99-125. Available at: https://doi.org/10.1023/A:1010743124570

101. World Wide Fund for Nature (WWF) (2007). *Management Effectiveness Tracking Tool: Reporting Progress at Protected Area Sites. Second edition.* Gland, Switzerland: WWF International.

102. Stephenson, P.J. & Stengel, C. (2020). An inventory of biodiversity data sources for conservation monitoring. *PLoS ONE,* 15(12): e0242923. Available at https://doi.org/10.1371/journal.pone.0242923

103. Likens, G. & Lindenmayer, D. (2018). *Effective Ecological Monitoring.* CSIRO Publishing, Clayton South, Australia. Available at: https://doi.org/10.1071/9781486308934

104. Lindenmayer, D.B. & Likens, G.E. (2009). Adaptive monitoring: a new paradigm for long-term research and monitoring. *Trends in Ecology & Evolution,* 24(9): 482-486. Available at: https://doi.org/10.1016/j.tree.2009.03.005

105. Kaschner, K., K. Kesner-Reyes, C. Garilao, J. Segschneider, J. Rius-Barile, T. Rees, & Froese, R. (2016). *AquaMaps: Predicted range maps for aquatic species* [website] Available at: http://www.aquamaps.org (Accessed October 2019).

106. Joint Research Centre (JRC) (2020). *Digital Observatory for Protected Areas* [website] Available at: https://dopa.jrc.ec.europa.eu/en (Accessed 20 July 2020).

107. Global Forest Watch (2020). *Global Forest Watch* [website]. Available at: https://www.globalforestwatch.org/ (Accessed 20 July 2020).

108. Global Alliance on Health and Pollution (GAHP) (2020). *Global Pollution Map* [website]. https://www.pollution.org/ (Accessed 20 July 2020).

109. MapX (2020). *MapX* [website]. Available at: https://www.mapx.org/ (Accessed 20 July 2020).

110. Han, X., Smyth, R.L., Young, B.E., Brooks, T.M., de Lozada, A.S., Bubb, P. et al. (2014). A biodiversity indicators dashboard: Addressing challenges to

monitoring progress towards the Aichi biodiversity targets using disaggregated global data. *PLoS One,* 9(11): e112046. Available at: https://doi.org/10.1371/journal.pone.0112046

111. Stephenson, P.J. & Reidhead, W. (2018). Portfolio management: Measuring short and long-term results in WWF. Pp. 535-538 in H.R. Kerzner, *Project Management Best Practices: Achieving Global Excellence.* Fourth Edition. Hoboken, New Jersey, USA: Wiley & Sons.

112. Eckerson, W.W. (2010). *Performance Dashboards: Measuring, Monitoring and Managing Your Business. Second Edition.* Hoboken, New Jersey, USA: John Wiley & Sons.

113. Kerzner, H. (2013). *Project Management: Metrics, KPIs and Dashboards.* Hoboken, New Jersey, USA: Wiley & Sons. Available at: https://doi.org/10.1002/9781118826751

114. International Organization for Standardization (ISO) (2010). *ISO26000* [website]. Available at: https://www.iso.org/iso-26000-social-responsibility.html (Accessed 20 November 2020).

115. International Integrated Reporting Council (2020). *Integrated Reporting* [website]. Available at: https://integratedreporting.org/ (Accessed 9 November 2020).

116. Organisation for Economic Co-operation and Development (OECD) (2011). *OECD Guidelines for Multinational Enterprises.* Paris, France: OECD.

117. Cornell Lab of Ornithology (2020). *eBird* [website]. Available at: https://ebird.org/home (Accessed 20 July 2020).

118. Global Biodiversity Information Facility (GBIF) (2020). *Global Biodiversity Information Facility* [website]. http://www.gbif.org/ (Accessed on 20 July 2020).

119. Zoological Society of London (ZSL) (2020): *Living Planet Index* [website]. Available at: www.livingplanetindex.org (Accessed on 20 July 2020).

120. United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC) (2020). *World Database on Protected Area Management Effectiveness* [website]. Available at: https://pame.protectedplanet.net/ (Accessed 20 July 2020).

121. Akçakaya, H.R., Bennett, E.L., Brooks, T.M., Grace, M.K., Heath, A., Hedges, S. et al. (2018). Quantifying species recovery and conservation success to develop an IUCN Green List of Species. *Conservation Biology,* 32: 1128-1138. Available at: https://doi.org/10.1016/j.tree.2009.03.005

122. Mascia, M. B., Pailler, S., Thieme, M. L., Rowe, A., Bottrill, M. C., Danielsen, F. et al. (2014). Commonalities and complementarities among approaches to conservation monitoring and evaluation. *Biological Conservation,* 169: 258-267. Available at: https://doi.org/10.1016/j.biocon.2013.11.017

123. Smith, E.P., Orvos, D.R. & Cairns, J., Jr (1993). Impact assessment using the before-after-control-impact (BACI) model: Concerns and comments. *Canadian Journal of Fisheries and Aquatic Sciences,* 50: 627–637. Available at: https://doi.org/10.1139/f93-072

124. Wauchope, H.S., Amano, T., Geldmann, J., Johnston, A., Simmons, B.I., Sutherland, W.J. & Jones, J.P. (2020). Evaluating impact using time-series data. *Trends in Ecology & Evolution.* Available at: https://doi.org/10.1016/j.tree.2020.11.001

125. Lynam, T., De Jong, W., Sheil, D., Kusumanto, T. & Evans, K (2007). A review of tools for incorporating community knowledge, preferences, and values into decision making in natural resources management. *Ecology and Society,* 12(1): 5. Available at: https://doi.org/10.5751/ES-01987-120105

126. International Union for Conservation of Nature (IUCN) (2020c). *Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS.* First edition. Gland, Switzerland: IUCN. Available at: https://doi.org/10.2305/IUCN.CH.2020.08.en

127. World Bank (2017). *World Bank Environmental and Social Framework.* International Bank for Reconstruction and Development. Washing to DC, USA: The World Bank.

128. Dickson, I.M., Butchart, S.H.M., Dauncey, V., Hughes, J., Jefferson, R., Merriman, J.C. et al. (2017). *PRISM – Toolkit for Evaluating the Outcomes and Impacts of Small/Medium-Sized Conservation Projects. Version 1.* Cambridge Conservation Initiative, Cambridge, UK. Available at: https://doi.org/10.17011/conference/eccb2018/107856

129. Sterling, E.J., Betley, E., Sigouin, A., Gomez, A., Toomey, A., Cullman, G. et al. (2017). Assessing the evidence for stakeholder engagement in biodiversity conservation. *Biological Conservation*, 209: 159-171. Available at: https://doi.org/10.1016/j.biocon.2017.02.008

130. Conservation Coaches Network (CCNET) (2020). *Conservation Coaches Network* [website]. Available at: https://www.ccnetglobal.com/.

131. Act4Nature (2020). *Act4Nature* [website]. Available at: http://www.act4nature.com/ (Accessed 19 January 2020).

132. Business For Nature (2020). *Business For Nature* [website] Available at: https://businessfornature.org/ (Accessed 19 January 2020).

133. International Platform for Insetting (IPI) (2020). *International Platform for Insetting* [website]. Available at: http://www.insettingplatform.com/ (Accessed 14 January 2020).

134. Sustainable Rice Platform (SRI) (2020). *Sustainable Rice Platform* [website] http://www.sustainablerice.org/ (Accessed 14 January 2020).

135. Steger, U., Ionescu-Somers, A., Salzmann, O. & Mansourian, S. (2009). *Sustainability Partnerships*. Basingstoke, UK: Palgrave Macmillan. Available at: https://doi.org/10.1057/9780230594685

136. Kretser, H.E., Beckmann, J.P. & Berger, J. (2018). A retrospective assessment of a failed collaborative process in conservation. *Environmental Management*, 62(3): 415-428. Available at: https://doi.org/10.1007/s00267-018-1045-2

137. Aluminium Stewardship Initiative (ASI) (2017). *ASI Performance Standard. Version 2. December 2017*. East, Australia: ASI.

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Annex 1: Stage 1 (priorities) – supplementary material

Standards, guidelines and tools of use in applying Stage 1

Examples in this list are comprehensive but not exhaustive. Inclusion in the list should not be interpreted as a recommendation or endorsement by IUCN or indicate any view on the quality or relative usefulness of each standard, guideline or tool. This list will be updated regularly and posted on the IUCN Global Business & Biodiversity Programme website. Please contact the authors if you have any corrections or additions to propose. Note that some tools can be used for multiple steps; here we highlight the main use of each tool.

Standards, guidelines and tools of potential use in Stage 1			Could help companies...
Type	**Sectors**	**Details, Developers, References**	
Steps 1A-1D			
Guidance	Multiple	**Natural Capital Protocol** [1]	To conduct natural capital assessments as part of their biodiversity planning
Guidance	Multiple	**Natural Capital Protocol framing guidance** [2]	To understand why biodiversity is important and how it affects business
Guidance	Finance	**Natural Capital Protocol finance supplement** [3]	To understand why biodiversity is important and how it affects finance companies
Standard	Multiple	**Global Reporting Initiative reporting standards** [4]	To adopt appropriate stakeholder inclusiveness in planning
Tools	Multiple	**Compass for footprinting tools** [5]	To identify appropriate tools (mostly for Stage 1)
Step 1A - Define the corporate scope of biodiversity influence and identify which company operations affect or depend on biodiversity ***Steps 1B and 1C - Identify the pressures associated with company operations and prioritize the pressures on biodiversity the company will tackle***			
Guidance	Multiple		To define scope of influence
Guidance	Multiple	**Science-based Targets guidance** [7]	To provide an overview on spheres of control and influence for direct operations and value chains
Guidance	Agricultural commodities	**IFC guidance on managing environmental risks in agro-commodity supply chains** [8]	To assess scope of influence
Tool	Agricultural commodities	**Agrobiodiversity Index** [10]	To assess risks in agriculture (and also to monitor progress)
Tool	Multiple	**Aqueduct tools to assess water risk** [11]	To assess water risks and pressures on biodiversity and ecosystem services
Tools	Multiple	**Natural Capital Toolkit** WBCSD & Natural Capital Coalition	To find the right tool to measure and value natural capital

Standards, guidelines and tools of potential use in Stage 1			Could help companies...
Type	**Sectors**	**Details, Developers, References**	
Tool Data	Multiple	**World Economic Forum Intelligence Tool** World Economic Forum	To identify pressures and issues to address by country or theme
Guidance	Multiple	**Guidelines for identifying business risks from ecosystem change** [12]	To assess dependencies and risks through an ecosystems services review
Tool Data	Multiple	**InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) models** [13]	To map and value the goods and services from nature and to identify areas for investment in natural capital
Tool	Multiple	**OPAL - Offset Portfolio Analyzer and Locator software tool** [13]	To quantify the impacts of development on biodiversity and ecosystem services and identify potential offsets
Tool	Agriculture	**Cool Farm Tool** Cool Farm Alliance	To calculate the biodiversity footprint of products and supply chains
Tool	Multiple	**Product Biodiversity Footprint** i care	To calculate the biodiversity footprint of products and supply chains
Tool	Multiple	**Biological Diversity Protocol** Biodiversity Disclosure Project hosted by Endangered Wildlife Trust	To identify, measure, manage and report on biodiversity impacts
Tool	Finance	**ENCORE tool (Exploring Natural Capital Opportunities, Risks and Exposure)** [14]	To assess environmental risks (for financial institutions such as banks, investors and insurance firms)
Tool	Multiple	**Impact World+ Life Cycle Impact Assessment methodology** [15]	To conduct life cycle impact assessments
Tool	Finance	**Biodiversity Footprint for Financial Institutions** [16]	To assess the negative and the positive impacts of investment portfolios on biodiversity
Tool	Horticulture	**Hortifootprint tool** Wageningen University	To calculate an environmental footprint of horticultural products (ornamentals and fruit & vegetables)
Tool	Multiple	**Green Infrastructure Support Tool** The Earth Genome	To identify potential impacts on watersheds
Tool	Multiple	**Briefing note on assessing biodiversity risk** [17]	To conduct a biodiversity risk screening to identify pressures
Tool	Multiple	**A concise summary of critical habitat**[18]	To understand how to identify critical habitats
Tool (in prep)	Finance	**Financial disclosures reporting frameworks (under development)** Task Force on Nature-related Financial Disclosures	To understand risks, dependencies and impacts on nature to support reporting, metrics and data needs
Tool	Agriculture	**Biodiversity impact metric** [19]	To identify their supply chain risks associated with agricultural commodities
Tool	Multiple	**Environmental Profit and Loss methodology** [20]	To assess environmental footprint along a supply chain
Tool	Multiple	**ReCiPe methodology** [21]	To conduct lifecycle impact assessments (using 18 indicators)
Tool	Multiple	**Global Biodiversity Score** [22]	To measure or audit footprint using mean species abundance

Standards, guidelines and tools of potential use in Stage 1			Could help companies...
Type	**Sectors**	**Details, Developers, References**	
Tool	Multiple	**LIFE Key web management tool** LIFE Institute	To evaluate impacts on biodiversity and mitigation, compensation and conservation options
Tool	Multiple	**BioScope - Biodiversity Input-Output for Supply Chain & Operations Evaluation** Platform BEE (NL)	To identify the most important impacts on biodiversity arising from supply chains
Guide	Finance	**IDB guidance on risks** [23]	To assess risks and pressures
Guide	Multiple	**IFC cumulative impact assessment** [24]	To assess potential impacts and pressures
Guide	Finance	**Natural Capital Protocol's Supplement to the Finance Sector** [3]	To identify, measure and value material risks and opportunities as a means of informing financial decision-making
Tool Data	Agricultural commodities	**Trase Earth tool** Stockholm Environment Institute & Global Canopy	To trace company supply chains
Guidance	Oil & gas	**Biodiversity and ecosystem services guidance for the oil and gas industry** [25]	To address impacts on biodiversity and ecosystem services
Tool	Multiple	**IAIA best practices for impact evaluation** [26]	To assess impacts and plan biodiversity goals
Tool (in prep)	Finance	**Benchmark for Nature frameworks** (in development) Interdisciplinary Centre for Conservation Science, Oxford University	To assess investor impacts on nature
Guidance	Sports industry	**Guidelines for sports events** [27]	To understand pressures that need to be mitigated
Tool	Multiple	**CMP/IUCN Direct Threats categories**[28]	To categorize pressures placed on biodiversity
Tool (in prep)	Multiple	**Biodiversity Guidance Navigation tool (in development)** Natural Capital Coalition	To determine pressures on biodiversity across the value chain
Step 1D - Identify priority species, habitats and ecosystem services			
Tool Data	Multiple	**IBAT – Integrated Biodiversity Assessment Tool** IBAT Alliance: Birdlife International, Conservation International, IUCN and UNEP-WCMC	To identify proximity to threatened species, protected areas and KBAs and relative priorities for reducing threats through STAR
Tool	Multiple	**Species Threat Abatement and Recovery metric** [29]	To prioritise habitats by identifying specific threat abatement and habitat restoration opportunities in particular places, which could reduce species extinction risk
Tool	Multiple	**Framework for Implementing biodiversity offsets using Marxan** [30]	To identify priority habitats or areas important for biodiversity
Tool Data	Multiple	**Natural Habitat Layer**[31].	To identify natural habitat in corporate scope of biodiversity influence
Tool	Multiple	**Tools for monitoring ecosystem services** [32]	To identify relevant tools for assessing the ecosystem services provided by protected areas and KBAs supported (for both planning and monitoring)

Standards, guidelines and tools of potential use in Stage 1			Could help companies...
Type	Sectors	Details, Developers, References	
Tool	Multiple	**Assessing ecosystem services in protected areas** [33]	To identify ecosystem services provided by protected areas supported (especially Natura 2000 sites)
Tool Data	Multiple	**GLOBIO model** PBL Netherlands Environmental Assessment Agency	To calculate local biodiversity intactness, expressed by the mean species abundance (MSA) indicator, to help prioritise
Tool	Multiple	**Biodiversity Indicators for Site-based Impacts Methodology** (Figure 10; page 27) [34]	To identify priority species
Tool	Multiple	**Framework for ecosystem services** [35]	To understand the importance of ecosystem services to business and choose suitable priorities
Tool	Multiple	**IUCN Habitat Classification Scheme** [36]	To classify types of habitat priority

References cited in Annex 1

1. Natural Capital Coalition (NCC) (2016). *Natural Capital Protocol.* London, UK: NCC. Available at: www.naturalcapitalcoalition.org/protocol
2. Capitals Coalitions (CC) and Cambridge Conservation Initiative (CCI) (2020a). Integrating Biodiversity into Natural Capital Assessments: Framing Guidance. Cambridge, UK: CC and CCI.
3. Natural Capital Coalition (NCC), Natural Capital Finance Alliance (NCFA) and Dutch Association of Investors for Sustainable Development (VBDO) (2018). *Connecting Finance and Natural Capital: A Supplement to the Natural Capital Protocol* [online document]. Available at: https://naturalcapitalcoalition.org/wp-content/uploads/2018/04/Connecting-Finance-and-Natural-Capital_Supplement-to-the-Natural-Capital-Protocol-1.pdf (Accessed 7 January 2021).
4. Global Reporting Initiative (GRI) (2016). *Consolidated Set of GRI Sustainability Reporting Standards 2016.* Amsterdam, The Netherlands: GRI.
5. International Union for Conservation of Nature (IUCN) (2020). *A Compass for Navigating the World of Biodiversity Footprinting Tools: an introduction for companies and policy makers.* Amsterdam, The Netherlands: IUCN National Committee of the Netherlands. Available at: https://www.iucn.nl/en/updates/iucn-nl-publishes-report-on-biodiversity-measurement
6. Capitals Coalitions (CC) and Cambridge Conservation Initiative (CCI) (2020b). *Integrating Biodiversity into Natural Capital Assessments: Scoping Guidance.* Cambridge, UK: CC and CCI.
7. Science-based Targets Network (SbTN) (2020). *Science-based Targets for Nature. Interim Guidance v1.0.* Science-based Targets Network [online document]. Available at: Guidance for companies – Science Based Targets Network (Accessed 7 January 2021).
8. International Finance Corporation (IFC) (2013b). *Good Practice Handbook: Assessing and Managing Environmental and Social Risks in an Agro-Commodity Supply Chain.* Washington DC, USA: IFC.
9. Bioversity International (2019) *Agrobiodiversity Index Report 2019: Risk and Resilience.* Rome, Italy: Bioversity International.
10. 1Bioversity International (2020). *The Agrobidioversity Index* [website]. Available at: https://www.bioversityinternational.org/abd-index/ (Accessed 23 November 2020).
11. World Resources Institute (WRI) (2020). *Aqueduct tools* [website] Available at: https://www.wri.org/aqueduct (Accessed 23 November 2020).
12. World Resources Institute (WRI), World Business Council on Sustainable Development (WBCSD) and Meridian Institute (2012a). *The Corporate Ecosystem Services Review: Guidelines for Identifying Business Risks and Opportunities Arising from Ecosystem Change. Version 2.0.* Washington DC, USA: WRI; Geneva, Switzerland: WBCSD and Dillon CO, USA: Meridian Institute.
13. Stanford University (2020). *InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs)* [website]. Available at: https://naturalcapitalproject.stanford.edu/software/invest (Accessed 10 July 2020).
14. United Nations Environment Programme (UNEP), UNEP Finance Initiative and Global Canopy (2020). *Beyond 'Business as Usual': Biodiversity targets and finance. Managing biodiversity risks across business sectors.* Cambridge, UK: UNEP-WCMC.

15. Bulle, C., Margni, M., Patouillard, L., Boulay, A.M., Bourgault, G., De Bruille, V. et al. (2019). IMPACT World+: a globally regionalized life cycle impact assessment method. *The International Journal of Life Cycle Assessment*, 24(9): 1653-1674. Available at: https://doi.org/10.1007/s11367-019-01583-0

16. CREM, PRé Sustainability, Dutch Ministry of Agriculture, Nature and Food Quality (2020). *Positive Impacts In The Biodiversity Footprint Financial Institutions*. Amsterdam: The Netherlands: Dutch Ministry of Agriculture, Nature and Food Quality. Available at https://www.government.nl/documents/reports/2019/09/25/report-positive-impacts-in-the-biodiversity-footprint-financial-institutions

17. The Biodiversity Consultancy (2017). *Biodiversity Screening. Industry Briefing Note*. Cambridge, UK: The Biodiversity Consultancy.

18. The Biodiversity Consultancy (2012). *Critical Habitats: a concise summary*. Cambridge, UK: The Biodiversity Consultancy.

19. University of Cambridge Institute for Sustainability Leadership (CISL) (2020). *Measuring Business Impacts on Nature: A framework to support better stewardship of biodiversity in global supply chains.*, Cambridge, UK: CISL.

20. Kering (2020). *Environmental Profit and Loss methodology* [website]. Available at: https://www.kering.com/en/sustainability/environmental-profit-loss/what-is-an-ep-l/ (Accessed 10 November 2020).

21. Pré Sustainability (2020). *ReCiPe* [website]. Available at: https://pre-sustainability.com/articles/recipe/ (Accessed 23 November 2020).

22. CDC Biodiversité (2018). *Global Biodiversity Score: a tool to establish and measure corporate and financial commitments for biodiversity. 2018 technical update.*, Paris, France: CDC Biodiversité.

23. Inter-American Development Bank (IDB) (2015). *Guidance for Assessing and Managing Biodiversity Impacts and Risks in Inter-American Development Bank Supported Operations*. Washington DC, USA: IDB.

24. International Finance Corporation (IFC) (2013a). *Good Practice Handbook: Cumulative Impact Assessment and Management - Guidance for the Private Sector in Emerging Markets.* Washington DC, USA: IFC.

25. International Petroleum Industry Environmental Conservation Association (IPIECA)-International Association of Oil & Gas Producers (IOGP) (2016). *Biodiversity and ecosystem services fundamentals: Guidance document for the oil and gas industry*. London, UK: IPIECA and IOGP.

26. Brownlie, S. & Treweek, J. (2018). *Biodiversity and Ecosystem Services in Impact Assessment. Special Publication Series No. 3.* Fargo, USA: International Association for Impact Assessment.

27. Brownlie, Susie, Bull, Joseph W. and Stubbs David (2020). *Mitigating biodiversity impacts of sports events*. Gland, Switzerland: IUCN. Available at: https://doi.org/10.2305/IUCN.CH.2020.04.en

28. Conservation Measures Partnership (CMP) and International Union for Conservation of Nature (IUCN) (2016a). *Conservation Measures Partnership Direct Threats Classification Version 2.0* [website]. Available at: https://www.ccnetglobal.com/resource/6e-cmp-direct-threats-classification-2-0/ (Accessed 7 January 2021).

29. International Union for Conservation of Nature (IUCN) (2020c). *Species Threat Abatement and Recovery metric* [website]. Available at: https://www.iucn.org/regions/washington-dc-office/our-work/species-threat-abatement-and-recovery-star-metric (Accessed 23 November 2020).

30. Kiesecker, J.M., Copeland, H., Pocewicz, A., Nibbelink, N., McKenney, B., Dahlke, J. et al. (2009). A framework for implementing biodiversity offsets: selecting sites and determining scale. *BioScience*, 59(1): 77-84. Available at: https://doi.org/10.1525/bio.2009.59.1.11

31. Gosling, J., Jones, M.I., Arnell, A., Watson, J.E., Venter, O., Baquero, A.C. & Burgess, N.D. (2020). A global mapping template for natural and modified habitat across terrestrial Earth. *Biological Conservation,* 250: 108674. Available at: https://doi.org/10.1016/j.biocon.2020.108674

32. Neugarten, R.A. et al. (2018). *Tools for measuring, modelling, and valuing ecosystem services: Guidance for Key Biodiversity Areas, natural World Heritage Sites, and protected areas.* Best Practice Protected Area Guidelines Series No. 28. Gland, Switzerland: IUCN. Available at: https://doi.org/10.2305/IUCN.CH.2018.PAG.28.en

33. Institute for European Environmental Policy (IEEP) (2009). *Assessing Socio-Economic Benefits of Natura 2000: A Toolkit For Practitioners.* Brussels, Belgium: IEEP.

34. United Nations Environment Programme (UNEP)-World Conservation Monitoring Centre (WCMC), Conservational International and Fauna & Flora International (2020). *Biodiversity Indicators for Site-based Impacts. Methodology v3.2*. UNEP-WCMC, CI, FFI, Cambridge, UK.

35. United Nations Global Compact (UNGC) and International Union for Conservation of Nature (IUCN) (2012). *A Framework for Corporate Action on Biodiversity and Ecosystem Services.* Gland, Switzerland: UNGC and IUCN. Available at: https://portals.iucn.org/library/node/10174

36. International Union for Conservation of Nature (IUCN) (2020b). *Habitat Classification Scheme. Version 3.1* [website]. Available at: https://www.iucnredlist.org/resources/habitat-classification-scheme (Accessed 7 January 2021).

Annex 2: Stage 2 (ambitions) – supplementary material

Standards, tools and guidelines of use in applying stage 2

Examples in this list are comprehensive but not exhaustive. Inclusion in the list should not be interpreted as a recommendation or endorsement by IUCN or indicate any view on the quality or relative usefulness of each standard, guideline or tool. This list will be updated regularly and posted on the IUCN Global Business & Biodiversity Programme website. Please contact the authors if you have any corrections or additions to propose. Note that some tools can be used for multiple steps; here we highlight the main use of each tool.

Standards, guidelines and tools of potential use in Stage 1			Could help companies...
Type	**Sectors**	**Details, Developers, References**	
Steps 2 A-D			
Guidance	Multiple	**Open Standards for the Practice of Conservation** [1]	To work through the process of setting a vision, goals, objectives and strategies
Guidance	Multiple	**Guidelines for planning species conservation** [2]	To plan species conservation work
Step 2A. Develop a vision; Step 2C. Define goals and objectives, with draft indicators			
Guidance	Multiple	**Guidance for business on science-based targets** [3]	To set goals for biodiversity
Guidance	Multiple	**Guidelines for conserving connectivity through ecological networks and corridors** [4]	To factor in connectivity to landscape level planning
Guidance	Multiple	**BBOP roadmap for planning for biodiversity** [5]	To develop goals around biodiversity net gain and the broader mitigation hierarchy
Guidance	Multiple	**Guide for Implementing the Mitigation Hierarchy** [6]	To plan in the context of the mitigation hierarchy
Guidance	Multiple	**Ensuring no net loss for people and biodiversity** [7]	To ensure social issues are factored into planning around the mitigation hierarchy
Guidance	Agriculture & Forestry	**Guidelines on NNL/NPI** [8]	To develop NNL or NPI goals for commercial agriculture and forestry
Guidance	Fashion	**A primer for biodiversity planning in the fashion industry** [9]	To develop a strategic plan for biodiversity (including assessing scope of influence)
Guidance	Finance	**Guidance on biodiversity targets and finance** [10]	To help finance companies identify suitable goals
Step 2D. Identify actions and strategies to deliver corporate goals and objectives			
Guidance	Multiple	**Natural Capital Protocol application guidance** [11]	To find examples of actions taken as a result of natural capital assessments

Standards, guidelines and tools of potential use in Stage 1			Could help companies...
Type	Sectors	Details, Developers, References	
Guidance	Multiple	**Overview of standards and labels for biodiversity-friendly production and commercialization** [12]	To understand how existing standards and labels can promote biodiversity-friendly production and commercialization
Guidance	Mining	**Good practice guidance for mining and biodiversity** [13]	To identify best practices and strategies for mining and biodiversity
Guidance	Multiple	**Guidelines for forest landscape restoration** [14]	To understand how to plan forest landscape restoration
Tool	Multiple	**CMP/IUCN Conservation Actions categories** [15]	To identify and categorize actions to conserve biodiversity
Standard	Multiple	**Criteria for nature-based solutions** [16]	To identify policies to adopt when choosing actions and strategies

How companies can contribute towards global biodiversity goals

There are two main sets of related global biodiversity goals:

Post-2020 Global Biodiversity Framework: Almost all of the world's governments have rallied around the Convention on Biological Diversity (CBD) Global Strategic Plan for Biodiversity 2011–2020 and its twenty Aichi Biodiversity Targets ([17,18,19,20]. Governments produce National Biodiversity Strategy and Action Plans to demonstrate their contributions to Aichi Targets and delivery against a common set of indicators is monitored and reported on regularly, with results synthesized globally [21]. The UN is now developing a new set of goals for the post-2020 period [22], which will influence the biodiversity work of not only governments but also civil society, indigenous groups and business. Although still under development, the draft framework is structured around high-level goals for species (extinction risk, abundance), ecosystems (extent and condition, integrity) and ecosystem services (nature's contributions to people).

The Sustainable Development Goals: The SDGs were adopted by the UN Member States in 2015 [20] as part of the 2030 Agenda for Sustainable Development. The 17 SDGs are "*an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality and spur economic growth – all while tackling climate change and working to preserve our oceans and forests*" [20]. Two of the goals are focused on the environment - SDG 14 (Life Below Water) and SDG 15 (Life on Land) – though other goals relevant to business also directly affect biodiversity and ecosystem services, including SDG 6 (Clean water and sanitation), SDG 12 (Responsible production and consumption) and SDG 13 (Climate action), among others.

Businesses can demonstrate their contribution towards global biodiversity goals if they frame their own goals in a similar manner and use the same indicators. Efforts are being made by several stakeholders, such as the Science-based Targets Network [3], to develop ways of helping businesses go about this alignment. The SDG targets are quite broad so offer wide scope for a company to link its vision. The key, however, is to ensure the contribution is measured by a suitable indicator.

Say, for example, a company working in marine habitats wanted to contribute to SDG 14 Life Below Water. Goal 14 is "Conserve and sustainably use the oceans, seas and marine resources for sustainable development". Of the targets designed to address the goal, the ones on pollution and conserving coastal and marine areas might seem most appropriate.

> 14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities,

> including marine debris and nutrient pollution.
>
> 14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

The company could therefore set its own goals around quantifiable reductions in pollution and on contributing to the conservation of coastal areas. Relevant indicators are 14.1.1 Index of coastal eutrophication and floating plastic debris density and 14.5.1 Coverage of protected areas in relation to marine areas. This means that if the company actions and strategies were aimed at reducing eutrophication or plastic waste then monitoring the level in its scope of influence could help directly. If it supported marine protected areas, the area covered by those areas could be measured as a palpable contribution.

Similarly, a company working in a forest biome may wish to contribute to SDG 15 Life On Land. Goal 15 is "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss". The company's goals or objectives could be geared towards target 15.1 on conservation and restoration or 15.5 on reducing habitat degradation and species loss.

> 15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.
>
> 15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

Company indicators could then mirror the relevant SDG indicators:

> 15.1.1 Forest area as a proportion of total land area
>
> 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type
>
> 15.5.1 Red List Index.

In turn, in countries where companies have large scopes of biodiversity influence, national priorities, as defined in each relevant National Biodiversity Strategy and Action Plan, can be used as a reference. Most companies should be able to show some contribution to SDG 14 (Life Below Water) or 15 (Life on Land) or the targets within them.

References cited in Annex 2

1. Conservation Measures Partnership (CMP) (2020). *Open Standards for the Practice of Conservation. Version 4*. Bethesda, USA: (CMP).
2. IUCN – SSC Species Conservation Planning Sub-Committee. (2017). *Guidelines for Species Conservation Planning*. *Version 1.0.* Gland, Switzerland: IUCN. Available at: https://doi.org/10.2305/IUCN.CH.2017.18.en
3. Science-based Targets Network (SBTN) (2020). *Science-Based Targets For Nature: Initial Guidance for Business* [online resource]. Available at: https://sciencebasedtargetsnetwork.org/resources/guidance/
4. Hilty, J. et al. (2020). *Guidelines for conserving through ecological networks and corridors.* Best Practice Protected Area Guidelines Series No. 30. Gland, Switzerland: IUCN. Available at: https://doi.org/10.2305/IUCN.CH.2020.PAG.30.en
5. Business and Biodiversity Offsets Programme (BBOP) (2018). *Business Planning for Biodiversity Net Gain: a Roadmap.* Washington DC, USA: Forest Trends.

6. Ekstrom, J., Bennun, L. & Mitchel, R. (2015). *A Cross-Sector Guide for Implementing the Mitigation Hierarchy*. Cambridge, UK: Cross Sector Biodiversity Initiative and The Biodiversity Consultancy.

7. Bull, J.W., Baker, J., Griffiths, V.F., Jones, J.P.G., & Milner-Gulland, E.J. (2018). *Ensuring No Net Loss for People and Biodiversity: good practice principles.* Oxford, UK: University of Oxford. Available at: https://doi.org/10.31235/osf.io/4ygh7

8. Aiama D., Edwards S., Bos G., Ekstrom J., Krueger L., Quétier F., Savy C., Semroc B., Sneary M. and Bennun L. (2015). *No Net Loss and Net Positive Impact Approaches for Biodiversity: exploring the potential application of these approaches in the commercial agriculture and forestry sectors*. Gland, Switzerland: IUCN. Available at: https://portals.iucn.org/library/node/45105

9. Sinclair, S., Burgess, M., Tayleur, C. & Cranston, G. (2020). *Developing a Corporate Biodiversity Strategy: A primer for the fashion industry*. Cambridge, UK: University of Cambridge Institute for Sustainability Leadership & Kering.

10. United Nations Environment Programme (UNEP), UNEP Finance Initiative and Global Canopy (2020). *Beyond 'Business as Usual': Biodiversity targets and finance. Managing biodiversity risks across business sectors.* Cambridge, UK: United Nations Environment Programme - World Conservation Monitoring Centre.

11. Capitals Coalitions & CCI (2020d). *Integrating Biodiversity into Natural Capital Assessments: Application Guidance.* Capitals Coalitions and Cambridge Conservation Initiative, Cambridge, UK.

12. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (2017). *Standards and labels for the promotion of biodiversity-friendly production and commercialization. An overview.* Bonn, Germany: GIZ [online document]. Available at: https://ec.europa.eu/environment/biodiversity/business/assets/pdf/2017_Standards_and_labels_study-GIZ.pdf (Accessed 7 January 2021).

13. International Council for Mining and Metals (ICMM) (2016). *Good Practice Guidance for Mining and Biodiversity.* London, UK: ICMM.

14. International Tropical Timber Council (ITTO) (2020). *Guidelines for Forest Landscape Restoration in the Tropics: Policy Brief.* Yokohama, Japan: ITTO.

15. Conservation Measures Partnership (CMP) and International Union for Conservation of Nature (IUCN) (2016a). *Conservation Measures Partnership Direct Threats Classification Version 2.0* [website]. Available at: https://www.ccnetglobal.com/resource/6e-cmp-direct-threats-classification-2-0/ (Accessed 7 January 2021).

16. International Union for Conservation of Nature (IUCN) (2020c). *Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS.* First edition. Gland, Switzerland: IUCN. Available at: https://doi.org/10.2305/IUCN.CH.2020.08.en

17. Convention on Biodiversity (CBD) (2010). *COP 10 decision X/2, the strategic plan for biodiversity 2011–2020 and the Aichi Biodiversity Targets,* Nagoya, Japan, 18 to 29 October 2010 [website]. Available at: http://www.cbd.int/decision/cop/?id=12268 (Accessed 7 January 2021).

18. Secretariat of the Convention on Biological Diversity (2014). *Global Biodiversity Outlook 4*. Montréal, Canada: Secretariat of the Convention on Biological Diversity.

19. Convention on Biodiversity (CBD) (2020). *Zero Draft of the Post-2020 Global Biodiversity Framework.* CBD/WG2020/2/3. Open-ended Working Group on the Post-2020 Global Biodiversity Framework, Montreal, Canada: CBD.

20. Secretariat of the Convention on Biological Diversity (2020). *Global Biodiversity Outlook 5.* Montréal, Canada: Secretariat of the Convention on Biological Diversity.

21. Tittensor, D.P., Walpole, M., Hill, S.L., Boyce, D.G., Britten, G.L., Burgess, N.D. et al. (2014). A mid-term analysis of progress toward international biodiversity targets. *Science*, 346(6206): 241-244. Available at: https://doi.org/10.1126/science.1257484

22. United Nations (2020a). *Sustainable Development Goals Knowledge Platform* [website]. Available at: https://sustainabledevelopment.un.org/ (Accessed 20 February 2020).

Annex 3: Stage 3 (indicators) – supplementary material

Systems, standards, tools and guidelines of use in applying Stage 3

Examples in this list are comprehensive but not exhaustive. Inclusion in the list should not be interpreted as a recommendation or endorsement by IUCN or indicate any view on the quality or relative usefulness of each standard, guideline or tool. This list will be updated regularly and posted on the IUCN Global Business & Biodiversity Programme website. Please contact the authors if you have any corrections or additions to propose. Note that some tools can be used for multiple steps; here we highlight the main use of each tool.

Standards, guidelines and tools of potential use in Stage 3			Could help companies...
Type	**Sectors**	**Details, Developers, References**	
Step 3A. Define state and benefit indicators against goals and Step 3B. Define pressure and response indicators against objectives and actions			
Guidance	Multiple	**Business case for biodiversity measurement** [1]	To understand the business case for biodiversity indicators
Tool	Multiple	**SDG Indicators** [2]	To identify existing indicators that might be of use (especially if contributing to global biodiversity goals)
Tool	Multiple	**Biodiversity Indicators Partnership indicators** [3]	
Tool	Multiple	**Indicator guidance** [4]	
Tool	Multiple	**Essential Biodiversity Variables.** [5]	
Tool	Multiple	**OECD Environmental Indicators** [6]	
Tool	Multiple	**UK national biodiversity indicators** [7]	
Guidance	Multiple	**Monitoring guidelines** [8]	To set suitable biodiversity indicators
Guidance	Multiple	**Natural Capital Protocol measuring and valuing guidance** [9]	To identify ways that impacts and dependencies can be measured and valued
Tools	Multiple	**Guidance on indicators and data available for NBSAPs** [10]	To identify suitable indicators and data sets
Tools	Multiple	**Lessons on developing ecosystem services indicators** [11]	To identify suitable ecosystem services indicators
Guidance	Multiple	**Approach for reporting on ecosystem services** [12]	To identify suitable ecosystem services indicators
Tools	Multiple	**Guidance on developing ecosystem services indicators** [13]	To identify suitable ecosystem services indicators
Tools	Multiple	**Development and use of biodiversity indicators** [14]	To understand the business applications of various indicator types
Tools	Multiple	**Biodiversity measurement approaches for businesses** [15]	To assess the relative usefulness of different business indicators

Standards, guidelines and tools of potential use in Stage 3			Could help companies...
Type	Sectors	Details, Developers, References	
Tool	Food	**Biodiversity Performance tool** EU LIFE Food & Biodiversity	To assess indicators for food production
Tool	Food	**Biodiversity Monitoring System -** EU LIFE Food & Biodiversity	To monitor the biodiversity performance of certified farms and/ or supplying farmers

Examples – Indicators designed specifically for businesses

Examples of cross-sectoral indicators include:

- Biodiversity Estimated Impact Value (LIFE Institute)
- Biodiversity Footprint Calculator (Plans Up et al.)
- Biodiversity Impact Metric (CISL, Cambridge University)
- Bioscope (Platform BEE – Dutch government)
- Earth Dividend (Earth Capital)
- Global Biodiversity Score (CDC Biodiversité)
- Global Reporting Initiative indicators (Global Sustainability Standards Board)
- Healthy Ecosystem metric (CISL, Cambridge University)
- Product Biodiversity Footprint (I CARE)
- Species Threat Abatement and Recovery Metric (IUCN)

Sector-specific examples include:

- Agrobiodiversity Index (Bioversity International: agriculture/food)
- Biodiversity Ecosystem Services Index (Swiss Re Institute; insurance industry)
- Biodiversity Footprint Approach (ASN Bank; for finance sector)
- Biodiversity Indicator and Reporting System (IUCN; for cement and aggregates)
- Biodiversity indicators for companies (UNEP-WCMC; for extractives).

Note that available indicator frameworks for business are generally rigorous, replicable and consistent, covering most parts of the value chain. However, none of the approaches covers all types of business applications in all types of biome and most of them:

- are under development and being tested; data are still scarce, so their validity and usefulness is hard to assess;
- rely on secondary data and modelling to estimate impacts rather than direct measurement (assumptions made may not be accurate);
- are based on the same underlying models (e.g. for linking pressures to impacts);
- use the same data sets which themselves have some limitations and gaps;
- use one blunt metric (e.g. mean species abundance) that does not reflect complex differences between ecosystems and species.

For further review and discussion, see Lammerant et al. (2019).

References cited in Annex 3

1. United Nations Environment Programme (2020). *Towards nature-positive business: The case for biodiversity indicators.* Cambridge, UK: United Nations Environment Programme - World Conservation Monitoring Centre. Available at https://www.unep-wcmc.org/system/comfy/cms/files/files/000/001/791/original/Towards_nature_positive_business_UNEP-WCMC_FINAL.pdf
2. United Nations (2020b). SDG Indicators [website] https://unstats.un.org/sdgs/indicators/indicators-list/ (Accessed 5 January 2020).
3. Biodiversity Indicators Partnership (2020). *Biodiversity Indicators Partnership* [website]. Available at: https://www.bipindicators.net (Accessed 20 January 2020).

4. Biodiversity Indicators Partnership (2011). *Guidance for National Biodiversity Indicator Development and Use*. Cambridge, UK: United Nations Environment Programme - World Conservation Monitoring Centre.

5. Group on Earth Observations Biodiversity Observation Network (GEO BON) (2020). *Essential Biodiversity Variables* [website]. Available at: https://geobon.org/ebvs/what-are-ebvs/ (Accessed 19 March 2020).

6. Organisation For Economic Co-Operation And Development (OECD) (2001). *OECD Environmental Indicators. Towards Sustainable Development*. Paris, France: OECD. Available at: https://doi.org/10.1787/9789264193499-en

7. Joint Nature Conservation Committee (JNCC) (2019). *UK Biodiversity Indicators 2019 Revised*. London, UK: Department for Environment, Food and Rural Affairs. Available at: https://data.jncc.gov.uk/data/1d064484-d758-4494-84ec-efa09e16e999/UKBI-2019.pdf

8. United States Agency for International Development (USAID) (2016). Defining Outcomes and Indicators for Monitoring, Evaluation, and Learning in USAID Biodiversity Programming. Washington SC, USA: USAID.

9. Capitals Coalitions Cambridge Conservation Initiative (CCI) (2020c). *Integrating Biodiversity into Natural Capital Assessments: Measuring and Valuing Guidance*. Cambridge, UK: Capitals Coalitions and CCI.

10. Bowles-Newark, N.J., Despot-Belmonte, K., Misrachi, M. & Chenery, A (2015). *Using Global Biodiversity Indicators and Underlying Data to Support NBSAP Development and National Reporting: Roadmap to Support NBSAP Practitioners*. UNEP-WCMC, Cambridge, UK.

11. United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC) (2011). *Developing Ecosystem Service Indicators: Experiences and lessons learned from sub-global assessments and other initiatives. CBD Technical Services No. 58.* Montreal, Canada: Secretariat of the Convention on Biological Diversity.

12. Global Reporting Initiative (GRI) (2011). *Approach for Reporting on Ecosystem Services: Incorporating Ecosystem Services into an Organization's Performance Disclosure*. Amsterdam, The Netherlands: GRI.

13. Brown, C., Reyers, B., Ingwall-King, L., Mapendembe, A., Nel, J., O'Farrell, P. et al. (2014). *Measuring Ecosystem Services: Guidance on developing ecosystem service indicators*. Cambridge, UK: United Nations Environment Programme- World Conservation Monitoring Centre.

14. Addison, P. F. E., Carbone, G., McCormick, N. (2018). *The development and use of biodiversity indicators in business: an overview*. Gland, Switzerland: IUCN. Available at: https://portals.iucn.org/library/node/47919

15. Lammerant J., Grigg, A., Dimitrijevic, J., Leach, K., Brooks, S., Burns, A. et al. (2019). *Assessment of Biodiversity Measurement Approaches for Businesses and Financial Institutions. Update Report 2*. Brussels, Belgium: EU Business @ Biodiversity Platform.

Annex 4: Stage 4 (implementation) – supplementary material

Systems, standards, tools and guidelines of use in applying Stage 4

Examples in this list are comprehensive but not exhaustive. Inclusion in the list should not be interpreted as a recommendation or endorsement by IUCN or indicate any view on the quality or relative usefulness of each standard, guideline or tool. This list will be updated regularly and posted on the IUCN Global Business and Biodiversity Programme website. Please contact the authors if you have any corrections or additions to propose. Note that some tools can be used for multiple steps; here we highlight the main use of each tool.

Standards, guidelines and tools of potential use in Stage 4			Could help companies...
Type	**Sectors**	**Details, Developers, References**	
Step 4A. Develop and implement a monitoring plan and collect data			
Guidance	Multiple	**Open Standards for the Practice of Conservation** [1]	To develop a monitoring plan around goals, objectives, action and strategies
Guidance	Multiple	**Ten steps for monitoring and evaluation** [2]	To develop a monitoring plan
Guidance	Multiple	**Handbook on Planning, Monitoring and Evaluating for Development Results** [3]	
Guidance	Multiple	**Monitoring and evaluation approaches** [4].	
Tool Data	Multiple	**A summary of biodiversity databases** [5]	To identify sources of secondary data of potential use in monitoring
Guidance	Multiple	**Guidance on indicators and data available for NBSAPs** [6]	To identify suitable indicators and data sets
Guidance	Multiple	**Good practice for collecting baseline data** [7]	To collect biodiversity baseline data (especially for financial institutions in the context of Environmental and Social Impact Assessments)
Tool	Agriculture	**Threat monitoring protocol** [8]	To monitor threats, especially to high conservation value areas in agricultural (especially palm oil) landscapes
Tool	Multiple	**Protected Area Management Effectiveness tracking tool** [9]	To monitor PA management
Tool	Multiple	**Spatial Monitoring and Reporting Tool** [10]	To monitor threats to biodiversity, especially from direct exploitation

Standards, guidelines and tools of potential use in Stage 4			Could help companies...
Type	**Sectors**	**Details, Developers, References**	
Step 4B. Share data in formats that facilitate interpretation and decision-making			
Guidance	Multiple	**Performance dashboards** [11]	To establish suitable dashboards
Guidance	Multiple	**Project management dashboards** [12]	To establish suitable dashboards
Tool	Multiple	**Integrated Reporting framework** IIRC	To implement integrated reporting approaches
Step 4C. Conduct periodic evaluations and assessments and encourage learning and continued improvement			
Guidance	Multiple	**Impact evaluation guidelines** [13]	To evaluate projects
Guidance	Multiple	**Evaluation manual** [14]	To evaluate projects
Tool	Multiple	**PRISM toolkit for evaluating small projects** [15]	To evaluate small to medium size biodiversity interventions
Guidance	Multiple	**Social impact evaluations** [16]	To conduct social impact evaluations for biodiversity projects
Guidance	Multiple	**Assessing the impacts of standards** [17]	To conduct impact evaluations of social and environmental standards

Examples – links to key BIP indicators linked to global databases of potential use to companies

From Biodiversity Indicators Partnership [18].

Area of forest under sustainable management: total FSC and PEFC forest management certification
Biodiversity Habitat Index
Climatic impacts on European and North American birds
Coverage by protected areas of important sites for mountain biodiversity
Cumulative Human Impacts on Marine Ecosystems
Forest area as a proportion of total land area
Live Coral Cover
Living Planet Index
- Living Planet Index (farmland specialists)
- Living Planet Index (forest specialists)
- Living Planet Index (trends in target and bycatch species)

Marine Trophic Index
MSC Certified Catch
Ocean Health Index[6]
Proportion of fish stocks within biologically sustainable levels
Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type
Proportion of land that is degraded over total land area
Proportion of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction
Protected area coverage
- Protected Area Coverage of Ecoregions
- Protected Area Coverage of Key Biodiversity Areas
- Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type

Protected Area Connectedness Index (PARC-Connectedness)
Protected Area Representativeness Index (PARC-Representativeness)
Protected Areas Management Effectiveness
Red List Index
- Red List Index (forest specialist species)
- Red List Index (impacts of fisheries)
- Red List Index (impacts of invasive alien species)
- Red List Index (impacts of pollution)

6 A Freshwater Health Index has also been proposed (Vollmer et al., 2018) [19].

Red List Index (pollinating species)
Red List Index (reef-building corals)
Red List Index (species used for food and medicine)
Red List Index (wild relatives of domesticated animals)
Trends in invasive alien species vertebrate eradications
Trends in Loss of Reactive Nitrogen to the Environment
Trends in Nitrogen Deposition
Trends in the numbers of invasive alien species introduction events
Water Quality Index for Biodiversity
Wetland Extent Trends Index
Wild Bird Index (forest & farmland specialist birds)
Wildlife Picture Index
Wildlife Picture Index in tropical forest protected areas

Guidelines - principles to be considered during monitoring and data collection

There are a range of considerations to take into account in planning and implementing biodiversity monitoring. Many of these are most relevant at site level where data are being collected, but if they are not taken into account then the data aggregated at corporate level will not be robust enough.

Key principles for data collection (e.g. [20,21]) include:

- Use standardized methodologies, following established protocols (see below).
- Integrate satellite-based and ground-based remote sensing methods with in situ observations.
- Choose appropriate statistical approaches to allow correct inferences about change, including independent sampling and random transect selection.
- Account for differing detectability of different species in different habitats, using appropriate software as necessary (e.g., DISTANCE for distance sampling, PRESENCE for occupancy, SPECRICH for species richness).
- Choose appropriate monitoring frequencies based on the target species. Note that "for a rare species it is more efficient to survey more sampling units less intensively, while for a common species fewer sampling units should be surveyed more intensively". [22]
- Apply adaptive monitoring, improving indicators as necessary and altering methods or the timing of data collection to take account of lessons learned as the monitoring work advances.
- Ensure monitoring is applied for a long enough period of time to see long-term change in the metrics.

Guidelines and tools – a selection of existing monitoring protocols and methods

Companies committed to monitoring their corporate biodiversity performance indicators will need to collect some data at site level to aggregate to corporate level. If the company has a large corporate scope of biodiversity influence, this is likely to occur at a random subset of sites. Monitoring methods and protocols are numerous. Here we present a small selection to demonstrate the diversity of tools available to the companies and their partners as they plan data collection.

Mammals and birds:

- Important Bird and Biodiversity Area monitoring [23],
- Line transects for direct observations of mammals and birds [24, 25, 26],
- Camera trapping for mammals and birds [27, 28],
- TEAM Wildlife Monitoring Solution for camera trapping vertebrates [29],
- Monitoring small mammals: bats, rodents and insectivores [30].

Amphibians and reptiles:

- Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians [31],
- Reptile Biodiversity. Standard Methods for Inventory and Monitoring [32].

Invertebrates

- Guidelines for Standardised Global Butterfly Monitoring [33],
- Dragonfly Biotic Index [34],
- COBRA protocol for spiders and beetles [35].

Plants and habitats

- Satellite-based remote sensing of habitat cover [36, 37],
- Sampling of plants through counts, quadrats, transects and other methods [26],
- BRYOLAT protocol for ferns and bryophytes [38].

Threats

- Spatial Monitoring and Reporting Tool for ranger-based monitoring of illegal activity [10],
- HCV Threat Monitoring Protocol – designed to standardise the monitoring of anthropogenic threats to High Conservation Value (HCV) areas within oil palm landscapes [7],
- Camera trapping for illegal activity [39].

Protected areas

- Guidelines for biodiversity assessment and monitoring for protected areas [40],
- Monitoring the condition of natural resources in national parks [41],
- Protected Area Management Effectiveness Tracking Tool [7].

Water quality and freshwater habitats

- Stream Visual Assessment Protocol [42],
- Environmental flows for river systems [43],
- Environmental DNA monitoring to assess species richness in wetland and river habitats [44, 45, 46, 47].

Using technology

- Acoustic monitoring of birds, amphibians and insects [48, 49, 50, 51],
- Drones and blimps for large vertebrates: [52, 53, 54, 55].

Examples – links to global databases of potential use to companies

A more comprehensive list (based on Stephenson & Stengel, 2020) is available at: https://www.speciesmonitoring.org/data-sources.html.

Indicator type	Database	Link	Example of Use
Habitat cover	Global Forest Watch	http://www.globalforestwatch.org/	Monitor forest cover changes in the company's priority habitats
	Wetland Extent Trends (WET) Index	https://www.bipindicators.net/indicators/wetland-extent-trends-index	Show trends in wetland area over time in priority habitats
Conservation status of species	IUCN Red List of Threatened Species™	https://www.iucnredlist.org/	Create a Red List Index for priority habitats or track the status of priority species
Abundance of species	Living Planet Index	https://livingplanetindex.org/home/index	Create an index of trends in vertebrate populations in priority habitats or track the population levels of priority species
	International Waterbird Census Database	http://wpe.wetlands.org/	Show trends in waterbird populations in priority habitats

Presence of species	Global Biodiversity Information System	http://www.gbif.org/	Show historical trends in the occurrence of priority species to set baselines
Ecosystem state	Ecoregion intactness	https://espace.library.uq.edu.au/view/UQ:f51cace	Show trends in intactness of priority habitats
	IUCN Red List of Ecosystems	https://iucnrle.org/assessments/	
Protected area coverage and management	World Database on KBAs	http://www.keybiodiversityareas.org/home	Map KBAs in the corporate scope of biodiversity influence and overlay with protected areas and threatened species distributions to identify areas important for biodiversity
	Protected Planet: World Database on Protected Areas	https://www.protectedplanet.net/	Map protected areas of interest and overlay species data
	Global Database on Protected Area Management Effectiveness	https://pame.protectedplanet.net/	Monitor the effective-ness of protected areas, showing improvements over time as a result of company support
Fisheries	FAO Fisheries and aquaculture	http://www.fao.org/fishery/statistics/collections/en	Monitor fisheries offtake in any priority habitats or marine areas of interest or for any priority fish species.

References cited in Annex 4

1. Conservation Measures Partnership (CMP) (2020). *Open Standards for the Practice of Conservation. Version 4*. Bethesda, USA: CMP.
2. World Bank (2004). *Ten Steps to a Results-Based Monitoring and Evaluation System: A Handbook for Development Practitioners.* (Kusek, J.Z. & Rist, R.C.). Washington DC, USA: World Bank.
3. United Nations Development Programme (UNDP) (2009). *Handbook on Planning, Monitoring and Evaluating for Development Results.* New York, USA: UNDP.
4. Foundations of Success (FOS) (2019). *Designing Monitoring and Evaluation Approaches for Learning. An FOS How-To Guide.* Bethesda, USA: FOS.
5. Stephenson, P.J. & Stengel, C. (2020). An inventory of biodiversity data sources for conservation monitoring. *PLoS ONE,* 15(12): e0242923. Available at: https://doi.org/10.1371/journal.pone.0242923
6. Bowles-Newark, N.J., Despot-Belmonte, K., Misrachi, M. & Chenery, A (2015). *Using Global Biodiversity Indicators and Underlying Data to Support NBSAP Development and National Reporting: Roadmap to Support NBSAP Practitioners.* Cambridge, UK: United Nations Environment Programme - World Conservation Monitoring Centre.
7. Gullison, R.E., Hardner, J., Anstee, S. & Meyer, M. (2015). *Good Practices for the Collection of Biodiversity Baseline Data*. Prepared for the Multilateral Financing Institutions Biodiversity Working Group.
8. Zoological Society of London (ZSL) (2013). *High Conservation Value Threat Monitoring Protocol.* London, UK: ZSL. Available at https://hcvnetwork.org/library/hcv-threat-monitoring-protocol/
9. World Wide Fund for Nature (WWF) (2007). *Management Effectiveness Tracking Tool: Reporting Progress at Protected Area Sites. Second edition.* Gland, Switzerland: WWF.
10. Spatial Monitoring and Reporting Tool (SMART) (2020). *Spatial Monitoring and Reporting Tool* [website]. Available at: http://smartconservationsoftware.org (Accessed 10 June 2020).
11. Eckerson, W.W. (2010). *Performance Dashboards: Measuring, Monitoring and Managing Your Business. Second Edition.* Hoboken, New Jersey, USA: John Wiley & Sons.
12. Kerzner, H. (2013). *Project Management: Metrics, KPIs and Dashboards.* Hoboken, New Jersey, USA: Wiley & Sons. Available at: https://doi.org/10.1002/9781118826751

13. Gertler, P.J., Martinez, S., Premand, P., Rawlings, L.B. & Vermeersch, C.M. (2016). *Impact Evaluation in Practice. Second Edition.* Washington DC, USA: The World Bank. Available at: https://doi.org/10.1596/978-1-4648-0779-4

14. United Nations Environment Programme (UNEP) (2008). *Evaluation Manual.* Evaluation Unit, Nairobi, Kenya: UNEP.

15. Dickson, I.M., Butchart, S.H.M., Dauncey, V., Hughes, J., Jefferson, R., Merriman, J.C. et al. (2017). *PRISM – Toolkit for Evaluating the Outcomes and Impacts of Small/Medium-Sized Conservation Projects. Version 1.* Cambridge, UK: Cambridge Conservation Initiative. Available at: https://doi.org/10.17011/conference/eccb2018/107856

16. Woodhouse, E., de Lange, E., & Milner-Gulland, E.J. (2016). Evaluating the impacts of conservation interventions on human wellbeing. Guidance for practitioners. London, UK: International Institute for Environment and Development. Available at: https://doi.org/10.1017/S0030605316001423

17. ISEAL (2014). *Assessing the Impacts of Social and Environmental Standards Systems. ISEAL Code of Good Practice Version 2.0.* London, UK: ISEAL Alliance.

18. Biodiversity Indicators Partnership (2020). *Biodiversity Indicators Partnership* [website]. Available at: https://www.bipindicators.net (Accessed 20 January 2020).

19. Vollmer, D., Shaad, K., Souter, N.J., Farrell, T., Dudgeon, D., Sullivan, C.A. et al. (2018). Integrating the social, hydrological and ecological dimensions of freshwater health: The Freshwater Health Index. *Science of the Total Environment*, 627: 304-313. Available at: https://doi.org/10.1016/j.scitotenv.2018.01.040

20. Lindenmayer, D.B. & Likens, G.E. (2009). Adaptive monitoring: a new paradigm for long-term research and monitoring. *Trends in Ecology & Evolution,* 24(9): 482-486. Available at: https://doi.org/10.1016/j.tree.2009.03.005

21. Jones, J.P., Collen, B., Atkinson, G., Baxter, P.W., Bubb, P., Illian, J.B. et al. (2011). The why, what, and how of global biodiversity indicators beyond the 2010 target. *Conservation Biology,* 25: 450-457. Available at: https://doi.org/10.1111/j.1523-1739.2010.01605.x

22. MacKenzie, D. I. & Royle, J. A. (2005). Designing occupancy studies: general advice and allocating survey effort. *Journal of Applied Ecology,* 42(6): 1105-1114. Available at: https://doi.org/10.1111/j.1365-2664.2005.01098.x

23. BirdLife International (2006). *Monitoring Important Bird Areas: a global framework. Version 1.2.* Cambridge, UK: BirdLife International.

24. Wilson, D.E., Cole, F.R., Nichols, J.D., Rudran, R. & Foster, M.S. (1996). *Measuring and Monitoring Biological Diversity: Standard Methods for Mammals.* Washington DC, USA: Smithsonian Institution Press.

25. Gilbert, G., Gibbons, D. W., & Evans, J. (1998). *Bird Monitoring Methods.* Sandy, UK: Royal Society for the Protection of Birds.

26. Sutherland W.J. (2006). *Ecological Census Techniques.* 2nd Edition. Cambridge, UK: Cambridge University Press. Available at: https://doi.org/10.1017/CBO9780511790508

27. Rovero, F. & Zimmermann, F. (2016). *Camera Trapping for Wildlife Research.* Exeter, UK: Pelagic Publishing.

28. Gray, T.N.E. (2018). Monitoring tropical forest ungulates using camera-trap data. *Journal of Zoology,* 305(3): 173-179. Available at: https://doi.org/10.1111/jzo.12547

29. Beaudrot, L., Ahumada, J.A., O'Brien, T., Alvarez-Loayza, P., Boekee, K., Campos-Arceiz, A., Eichberg, D., Espinosa, S. et al. (2016) Standardized assessment of biodiversity trends in tropical forest protected areas: The end is not in sight. *PLoS Biology*, 14: e1002357. Available at: https://doi.org/10.1371/journal.pbio.1002357

30. Davies, G. & Howell, K. 2002. Small mammals: bats, rodents and insectivores. Pp 45-68 in G. Davies (ed.), *African Forest Biodiversity: A Field Survey Manual for Vertebrates*. Oxford, UK: Earthwatch.

31. Heyer, W.R., Donnelly, M.A., Foster, M. & McDiarmid, R.W. (eds.) (2014). *Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians.* Washington DC, USA: Smithsonian Institution.

32. McDiarmid, R.W., Foster, M.S., Guyer, C., Whitfield Gibbons, J. & Chernoff, N. (eds.) (2012). *Reptile Biodiversity. Standard Methods for Inventory and Monitoring*. Berkeley, USA: University of California Press. Available at: https://doi.org/10.1525/9780520952072

33. Van Swaay, C., Regan, E., Ling, M., Bozhinovska, E., Fernandez, M., Marini-Filho, O.J., Huertas, B., Phon, C.-K. et al. (2015). *Guidelines for Standardised Global Butterfly Monitoring.* GEO BON Technical Series 1. Leipzig, Germany: Group on Earth Observations Biodiversity Observation Network.

34. Samways MJ, Simaika JP (2016) *Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index*. Pretoria, South Africa: South African National Biodiversity Institute (SANBI).

35. Cardoso, P. (2009) Standardization and optimization of arthropod inventories – the case of Iberian spiders. Biodiversity and Conservation, 18, 3949-3962. Available at: https://doi.org/10.1007/s10531-009-9690-7

36. Hansen, M. C., Potapov, P. V., Moore, R., Hancher, M., Turubanova, S. A., Tyukavina, A., et al. (2013). High-resolution global maps of 21st-century

forest cover change. *Science,* 342(6160): 850-853. Available at: https://doi.org/10.1126/science.1244693

37. Turner, W., Rondinini, C., Pettorelli, N., Mora, B., Leidner, A.K., Szantoi, Z., Buchanan, G. et al. (2015). Free and open access satellite data are key to biodiversity conservation. *Biological Conservation,* 182: 173–176. . Available at: https://doi.org/10.1016/j.biocon.2014.11.048

38. Gabriel R, Coelho MMC, Henriques DSG, Borges PAV, Elias RB, Kluge J, Ah-Peng C (2014) Long-term monitoring across elevational gradients to assess ecological hypothesis: a description of standardized sampling methods in oceanic islands and first results. *Arquipélago* 31:45–67.

39. Hossain, A.N.M., Barlow, A., Barlow, C.G., Lynam, A.J., Chakma, S. and Savini, T. (2016). Assessing the efficacy of camera trapping as a tool for increasing detection rates of wildlife crime in tropical protected areas. *Biological Conservation,* 201: 314-319. Available at: https://doi.org/10.1016/j.biocon.2016.07.023

40. Tucker, G., Bubb, P., de Heer, M., Miles, L., Lawrence, A., van Rijsoort, J., Bajracharya, S.B., Nepal, R.C. et al. (2005). *Guidelines for Biodiversity Assessment and Monitoring for Protected Areas.* Kathmandu, Nepal: The King Mahendra Trust for Nature Conservation Nepal and Cambridge, UK: United Nations Environment Programme - World Conservation Monitoring Centre.

41. Fancy, S.G., Gross, J.E., & Carter, S.L. (2009). Monitoring the condition of natural resources in US national parks. *Environmental Monitoring and Assessment,* 151: 161-174. Available at: https://doi.org/10.1007/s10661-008-0257-y

42. United States Department of Agriculture United States Department of Agriculture (USDA) (1998). *Stream Visual Assessment Protocol. National Water and Climate Center Technical Note 99–1.* Washington DC, USA: USDA.

43. King, A. J., Gawne, B., Beesley, L., Koehn, J. D., Nielsen, D. L. & Price, A. (2015). Improving ecological response monitoring of environmental flows. *Environmental Management*, 55(5): 991-1005. Available at: https://doi.org/10.1007/s00267-015-0456-6

44. Bohmann, K., Evans, A., Gilbert, M.T.P., Carvalho, G.R., Creer, S., Knapp, M., Douglas, W.Y. & De Bruyn, M. 2014. Environmental DNA for wildlife biology and biodiversity monitoring. *Trends in Ecology & Evolution*, 29(6): 358-367. Available at: https://doi.org/10.1016/j.tree.2014.04.003

45. Olds, B. P., Jerde, C. L., Renshaw, M. A., Li, Y., Evans, N. T., Turner, C. R. et al. (2016). Estimating species richness using environmental DNA. *Ecology and Evolution*, 6(12): 4214-4226. Available at: https://doi.org/10.1002/ece3.2186

46. Thomsen, P. F., & Willerslev, E. (2015). Environmental DNA – An emerging tool in conservation for monitoring past and present biodiversity. *Biological Conservation, 183:* 4-18. Available at: https://doi.org/10.1016/j.biocon.2014.11.019

47. Valentini, A., Taberlet, P., Miaud, C., Civade, R., Herder, J., Thomsen, P.F., et al. 2016. Next-generation monitoring of aquatic biodiversity using environmental DNA metabarcoding. *Molecular Ecology,* 25: 929–942. Available at: https://doi.org/10.1111/mec.13428

48. Blumstein, D.T., Mennill, D.J., Clemins, P., Girod, L., Yao, K., Patricelli, G., et al. (2011). Acoustic monitoring in terrestrial environments using microphone arrays: applications, technological considerations and prospectus. *Journal of Applied Ecology,* 48: 758-767. Available at: https://doi.org/10.1111/j.1365-2664.2011.01993.x

49. Towsey, M., Wimmer, J., Williamson, I. & Roe, P. (2014). The use of acoustic indices to determine avian species richness in audio-recordings of the environment. *Ecological Informatics,* 21: 110-119. Available at: https://doi.org/10.1016/j.ecoinf.2013.11.007

50. Alvarez-Berríos, N., Campos-Cerqueira, M., Hernández-Serna, A., Delgado, C.J.A., Román-Dañobeytia, F. & Aide, T.M. (2016). Impacts o f small-scale gold mining on birds and anurans near the Tambopata Natural Reserve, Peru, assessed using passive acoustic monitoring. *Tropical Conservation Science,* 9(2): 832-851. Available at: https://doi.org/10.1177/194008291600900216

51. Deichmann, J.L., Hernández-Serna, A., Campos-Cerqueira, M. & Aide, T.M. (2017). Soundscape analysis and acoustic monitoring document impacts of natural gas exploration on biodiversity in a tropical forest. *Ecological Indicators,* 74: 39-48. Available at: https://doi.org/10.1016/j.ecolind.2016.11.002

52. Martin, J., Edwards, H.H., Burgess, M.A., Percival, H.F., Fagan, D.E., Gardner, B.E. et al. (2012). Estimating distribution of hidden objects with drones: from tennis balls to Manatees. *PLoS ONE,* 7: e38882. Available at: https://doi.org/10.1371/journal.pone.0038882

53. Christie, K.S., Gilbert, S.L., Brown, C.L., Hatfield, M. & Hanson, L. (2016). Unmanned aircraft systems in wildlife research: current and future applications of a transformative technology. *Frontiers in Ecology and the Environment*, 14: 241-251. Available at https://doi.org/10.1002/fee.1281

54. Oliveira, J.S.F., Georgiadis, G., Campello, S., Brandão, R.A. and Ciuti, S. (2017). Improving river dolphin monitoring using aerial surveys. *Ecosphere*, 8(8): e01912. Available at: https://doi.org/10.1002/ecs2.1912

55. Wich, S.A. & Koh, L.P. (2018). *Conservation Drones: Mapping and Monitoring Biodiversity*. Oxford, UK: Oxford University Press. Available at: https://doi.org/10.1093/oso/9780198787617.001.0001

Annex 5: Enabling factors

Guidance – planning for capacity

The Conservation Measures Partnership (2020) recommends building the required capacity for planning and monitoring into a project's operational plan. Ideas relevant to the development of a business capacity development plan include:

A key component of an operational plan includes *"human capacity, skills, and other non-financial resources required to implement your project and what you need to do to develop those resources, including cultivating partnerships. Again, you can use your theories of change and activities to develop high-level time estimates and to identify the skills required to implement your strategies and the associated monitoring. You may also want to refer back to your early work on identifying your team and the key skills and skill gaps within your team"* (Conservation Measures Partnership, 2020).

Examples – guidance for capacity building in biodiversity

Appleton, M. R. (2015). *Capacity Development Needs and Priorities for Nature Conservation in South-Eastern Europe*. Gland, Switzerland and Belgrade, Serbia: IUCN Regional Office for Eastern Europe and Central Asia (ECARO). Available at: https://portals.iucn.org/library/node/45924

International Union for Conservation of Nature (IUCN) (2015). *Strategic framework for capacity development in protected areas and other conserved territories 2015-2025*. Gland. Switzerland: IUCN. Available at: https://portals.iucn.org/library/node/45827

O'Connell, M. J., Nasirwa, O., Carter, M., Farmer, K. H., Appleton, M., Arinaitwe, J. et al. (2019). Capacity building for conservation: problems and potential solutions for sub-Saharan Africa. *Oryx*, 53(2): 273-283. Available at: https://doi.org/10.1017/S0030605317000291 (Accessed 7 January 2021).

United Nations Development Programme (UNDP) (2011). *Practitioner's Guide: Capacity Development for Environmental Sustainability*. New York, USA: UNDP. Available at: https://sustainabledevelopment.un.org/content/documents/954017_UNDP_Practitioner_Guide_CD for Sustainability.pdf

Whittle S., Colgan A. & Rafferty M. (2012). *Capacity Building: What the literature tells us*. Dublin, Ireland: The Centre for Effective Services.

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