INTEGRATING BIODIVERSITY INTO NATURAL CAPITAL ASSESSMENTS

A series of Biodiversity Guidance to accompany
the Natural Capital Protocol

CAPITALS COALITION

CambridgeConservation**Initiative**

Contents

This Guidance is an output of the Integrating Biodiversity into Natural Capital Assessments project run in collaboration between the Cambridge Conservation Initiative and the Capitals Coalition. The Cambridge Conservation Initiative is the focal point of research and advice on biodiversity issues for the Coalition.

Developing this guidance has been a collaborative effort, with many partners involved in workshops and activities around the world. UNEP-WCMC has led the final stages to formalize this guidance and the Cambridge Conservation Initiative partners that have contributed to this project include:

The project team would like to extend our thanks to the Project Steering Group for their review and input into this Guidance. For a full list of individuals and organizations who have contributed to this Guidance please see the Acknowledgements.

This publication reflects only the author's view and the European Commission is not responsible for any use that may be made of the information it contains.

Frame stage

Scope stage

Measure and Value stage

Apply stage

Foreword

Businesses are beginning to recognise there is a clear competitive advantage to understanding the value of their impact and dependency on nature, and in integrating their relationships with biodiversity into decision-making.

Once considered a separate issue to climate change, biodiversity loss is now regarded as an equally urgent crisis, and its connection to climate adaptation and mitigation are increasingly understood. Biodiversity builds resilience against climate change, supports communities and livelihoods, and fundamentally underpins our broader society and global economy. However, a lack of consistent tools and frameworks to effectively integrate its value into internal corporate decision making has hampered efforts to date.

This new biodiversity guidance to the Natural Capital Protocol aims to address this vital component of natural capital, through biodiversity-inclusive natural capital assessments. It provides a practical way for organisations to navigate the available approaches and to help them understand and operationalise their relationships with biodiversity in their internal decision-making. It also marks an important milestone towards further standardisation of measurement approaches.

To ensure this additional information is robust, practical and fit for purpose across organisations around the world, a global, cross-sector collaborative process was undertaken. We would like to thank all of those who contributed to its development by participating in workshops, consultations and drafting as well as our partners who funded this project over the last three years. Special thanks to those businesses that piloted the Guidance and dedicated significant resources to ensure that their peers will understand and benefit from this work. This Guidance would not have been possible without the tireless efforts of the project team, who stayed the course despite COVID-19 during the final stages.

Today, the need to halt and reverse biodiversity loss – for our own well-being and the health of the planet - has never been greater. We hope this Guidance will enable users across businesses, financial institutions, policy makers and beyond to bring the value of biodiversity to the forefront, and help them to accelerate their sustainable journey.

The Co-chairs of the Biodiversity Guidance Steering Group

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INTRODUCTION

0.1 Orientation

The Natural Capital Protocol (the Protocol) is a decision making framework that enables organizations to identify, measure and value their direct and indirect impacts and dependencies on natural capital. The Protocol Framework covers four Stages, "Why" (Frame), "What" (Scope), "How" (Measure and Value), and "What Next" (Apply). These Stages contain specific questions to be answered when integrating natural capital concepts into organizational processes.

Through the development and launch of the Protocol in 2016, it became obvious that the complexity of biodiversity meant further guidance was required to ensure that biodiversity and its role in delivering the benefits we derive from nature could be more easily reflected in corporate natural capital assessments.

In recognition of these challenges, the Cambridge Conservation Initiative (CCI) has led a Capitals Coalition project to address gaps and develop guidance for completing a biodiversity-inclusive natural capital assessment.

This Guidance does not replace the Protocol, but is meant to be used alongside it. The Protocol can be found at www.naturalcapitalcoalition.org/protocol. For financial institutions it will also be useful to have a copy of the Connecting Finance and Natural Capital supplement which can be found at www.naturalcapitalcoalition.org/finance.

0.2 Why is biodiversity important?

Biodiversity describes the variety of life and is the living component of what can be thought of as natural capital stocks. It plays an important role in the provision of the services we receive from nature. The terms "capital" and "stocks" are used as metaphors to help describe the role of nature within the economy. The presence of, and interactions between, natural capital stocks generate a flow of goods and services; these goods and services create value through the benefits they provide to business and society. Biodiversity is an integral part of natural capital and underpins the goods and services that natural capital generates. It is important to note that biodiversity is not an asset, rather a descriptive feature of assets we call natural capital.

Biodiversity includes the variety of all living things, from genes through species and populations to habitats and ecosystems. Many of the flows of benefit from natural capital come directly from the interactions within and between biodiversity and non-living resources. The interactions that generate these benefits are vast, complex, and often poorly understood.

Sometimes values can be measured, for example the value a specific insect species provides in pollinating a crop, or the value a forest ecosystem may provide in watershed maintenance. Many values, particularly those related to underlying ecosystem function, resilience to change, or the intrinsic values of nature, can be hidden or missed altogether if your natural capital assessment is solely focused on final ecosystem services.

Natural capital approaches provide a holistic framework for understanding business and societal relationships with nature, but assessments focused on natural capital can struggle to capture the values of biodiversity. We have therefore developed this Biodiversity Guidance to accompany the Protocol; enabling businesses to better incorporate biodiversity into natural capital assessments and decision-making.

Further discussion on the links between natural capital and biodiversity, why biodiversity may be missed from natural capital assessments, and why this is relevant to business can be found within the **Framing Guidance.**

0.3 Audience

The intended audience of this Guidance is the same as the Protocol, covering all business sectors, including finance and accountancy. It is targeted primarily at managers from sustainability, environment, health and safety, and operations departments.

The Guidance is written for businesses and financial institutions who already recognize the importance of natural capital and wish to ensure their assessments incorporate biodiversity, as well as businesses and financial institutions who are managing their relationship with biodiversity and want to expand those considerations to a broader natural capital perspective. The Guidance is appropriate for terrestrial, freshwater, and marine realms.

The Guidance also aims to help civil society, government, multi-stakeholder organizations, standard setters, disclosure organizations, and academia to engage with business in support of efforts to embed the value of nature into decision-making.

0.4 Biodiversity Guidance structure

The Biodiversity Guidance builds on the Protocol. It consolidates existing materials rather than seeking to create new tools or methods. As well as an overarching Biodiversity Guidance Navigation Tool, additional guidance has been produced for each Stage of the Protocol to allow the completion of a biodiversity-inclusive natural capital assessment.

Navigation Tool
Using a series of questions, the **Navigation Tool** will guide you through the Frame, Scope, Measure and Value, and Apply Stages of the Protocol and Biodiversity Guidance in order to carry out a biodiversity-inclusive natural capital assessment. It follows the Steps outlined in the Protocol and suggests a number of biodiversity-specific tools and methodologies along the way. The content of the Guidance will be linked to as you go through the **Navigation Tool**. Ultimately, the **Navigation Tool** will be added as an additional resource of the Natural Capital Protocol Toolkit and linked to the MIT SHIFT website (a platform where you can find and compare various sustainability frameworks and environmental, social, and governance tools).

Framing Guidance
The **Framing Guidance** helps you to establish why you would need to conduct a natural capital assessment that incorporates biodiversity. It covers the concept of biodiversity, how biodiversity relates to natural capital, why biodiversity may be missed from natural capital assessments, and why this is relevant to business (Step 01).

Scoping Guidance
The **Scoping Guidance** describes how to set and incorporate biodiversity-inclusive objectives and define the scope of your assessment (Steps 02–04). This includes aligning natural capital assessments with existing corporate biodiversity commitments or policies and key technical considerations when defining the scope of an assessment that considers biodiversity.
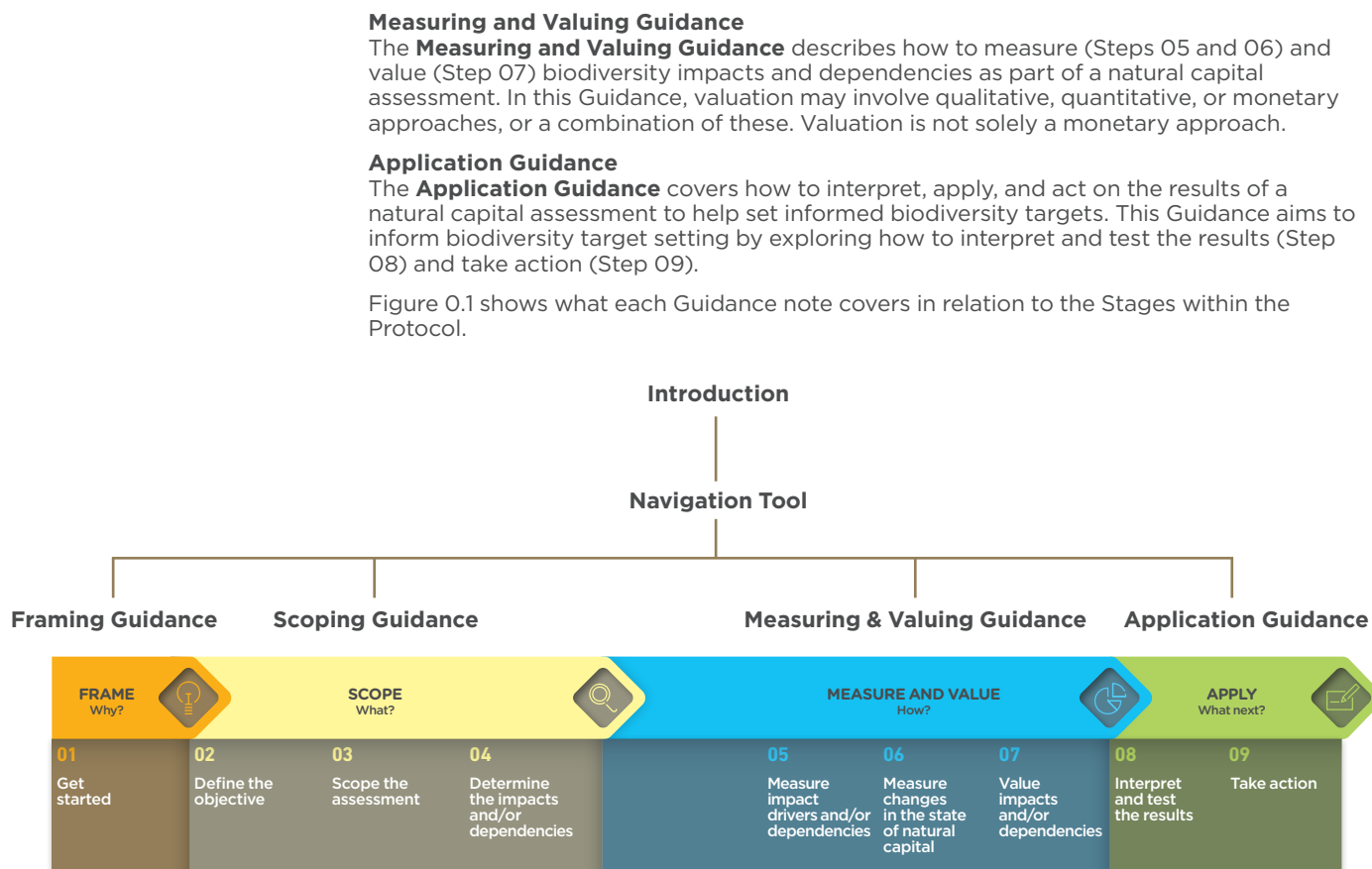
Measuring and Valuing Guidance
The **Measuring and Valuing Guidance** describes how to measure (Steps 05 and 06) and value (Step 07) biodiversity impacts and dependencies as part of a natural capital assessment. In this Guidance, valuation may involve qualitative, quantitative, or monetary approaches, or a combination of these. Valuation is not solely a monetary approach.

Application Guidance
The **Application Guidance** covers how to interpret, apply, and act on the results of a natural capital assessment to help set informed biodiversity targets. This Guidance aims to inform biodiversity target setting by exploring how to interpret and test the results (Step 08) and take action (Step 09).

Figure 0.1 shows what each Guidance note covers in relation to the Stages within the Protocol.

Figure 0.1:
Biodiversity Guidance and the corresponding Protocol Steps

Please note:

- The Stages and Steps above are iterative, and you should expect to revisit previous Steps as necessary. For example, after identifying your most material biodiversity impacts and dependencies in Step 04 you may need to go back and change the objective or scope of your assessment in Steps 02 and 03.

- The Biodiversity Guidance follows the overarching Protocol Framework and does not introduce any additional Stages or Steps.

- Each Step in the Guidance contains additional biodiversity-specific guidance that will help your business complete the actions within that Step and navigate through the Protocol Framework. For some actions, additional biodiversity-specific guidance may not be appropriate. At the beginning of each Stage and Step, the Guidance outlines the actions for which additional biodiversity-specific guidance is provided.

- To help bring biodiversity-specific Business Applications to life, this Guidance includes real-life and hypothetical examples to describe how your business could complete each of the Stages.

Useful definitions of key terms are provided when they are first introduced. For a complete glossary, please refer to the Protocol.

FRAME STAGE

Key messages

- This Guidance, aimed at businesses and financial institutions, explains why biodiversity requires additional consideration when you conduct a natural capital assessment using the Natural Capital Protocol.

- Natural capital is the stock of renewable and non-renewable natural resources (e.g., plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people. Biodiversity refers to the variety within and between the living parts of this stock.

- All businesses impact and depend upon biodiversity. This leads to costs and benefits for your business and also for wider society.

- In general, higher levels of biodiversity generate a greater quantity and quality of goods and services, and more resilience to change.

- Integrating biodiversity values into a natural capital assessment allows you to identify risks and opportunities for your business or financial institution that might otherwise be hidden or missed.

- Failing to consider biodiversity values can result in your business's impact and dependencies on biodiversity being underappreciated. This can lead to inadequate business responses to the results of your natural capital assessment.

FRAME STAGE

What is the Frame Stage?

The **Framing Guidance** helps you to establish why you should conduct a **natural capital** assessment that incorporates biodiversity. This includes providing clarity on the links between natural capital and **biodiversity**, why biodiversity may be missed from natural capital assessments, and why this is relevant to business.

This Guidance also helps you to identify and describe biodiversity-related impacts/ dependencies and risks/opportunities relevant to your business. To prepare for the Scope Stage of your assessment, the Frame Stage ends with guidance on identifying potential Business Applications for your assessment results. It helps to identify the decision you are attempting to inform and how your business may benefit from better information on natural capital and biodiversity.

What additional biodiversity guidance is provided for the Frame Stage?

Table F.1 provides an overview of the questions and actions under Step 01 of the Frame Stage in the Protocol that relate to why you should undertake a natural capital assessment. It also outlines the actions for which the Biodiversity Guidance provides additional information.

This Guidance has been developed to explain **why you should conduct a natural capital assessment that incorporates biodiversity**.

Table F.1:
Key questions addressed and their relation to the Natural Capital Protocol

Protocol Step		Questions this Step will answer	Protocol Actions		Additional biodiversity guidance included?
01	Get Started	**Why should you conduct a natural capital assessment that incorporates biodiversity?**	1.2.1	Familiarize yourself with the basic concepts of natural capital [and biodiversity]	**Yes** See action 1.2.1
			1.2.2	Apply these concepts to your business context	**Yes** See action 1.2.2
			1.2.3	Prepare yourself for a natural capital assessment	**Yes** See action 1.2.3

01 Step 01 Guidance: Get started

1.2.1 Familiarize yourself with the basic concepts of natural capital [and biodiversity]

a. What is biodiversity and how does it relate to natural capital?
Natural capital is a concept used for describing our relationship with nature. The presence of, and interactions between, **natural capital stocks** generates a flow of goods and services. These goods and services create **value** through the benefits they provide to business and society (Natural Capital Coalition 2016).

The flows of benefits from ecosystems to people are often described as **ecosystem services** (MA 2005). Ecosystem services result from **ecosystem function**, which describes the flow of energy and materials through ecosystems (IPBES 2019), and is the process by which ecosystems maintain their integrity (MA 2005).

Businesses and financial institutions often already evaluate environmental risk from specific issue perspectives (e.g., energy use, waste, pollution, climate change, natural resource use, and biodiversity). Natural capital encompasses all of these environmental issues and helps to describe how they are interrelated. The application of a natural capital approach builds on the **environmental, social, and governance (ESG)** and risk initiatives already in use, providing additional benefits such as understanding these as a set of interrelated issues with trade-offs.

So where does biodiversity come in? Biodiversity plays an integral role, underpinning the goods and services that natural capital stocks generate (figure 1.1).

Biodiversity describes the variety of life and is the living component of what can be thought of as natural capital stocks. It plays an important role in the provision of the services we receive from nature. Biodiversity can refer to the level of genetic variation, the variety of species present, or the variety of groups of species or ecosystems. In general, more biodiversity equates to a higher **quantity**, **quality**, and **resilience** of ecosystems and the services they provide, which underpin the benefits to business and society. As such biodiversity can be an indicator of the condition and resilience of natural capital stocks. It also contributes benefits to business and society in its own right, for example through **direct** and **intrinsic** value of species, **nature-based solutions**, and by enriching other benefits such as nature-based recreation.

Figure 1.1
Relationship between biodiversity and natural capital stocks, flows, and values (adapted from figure 1.1 of the Natural Capital Protocol 2016)

Figure 1.1 expands on figure 1.1 in the Protocol to illustrate how biodiversity underpins healthy natural capital stocks. The figure provides further examples of biodiverse ecosystem service flows and highlights how biodiversity underpins the value flowing to business and society using the examples of pollinators providing benefits to a coffee production business and mangroves/flamingos providing flood mitigation/wildlife viewing for society.

Biodiversity is in unprecedented decline on a global scale. The rate of species extinction is already tens to hundreds of times higher than in the past and is increasing. The majority of natural ecosystems are deteriorating or have been destroyed. For example, over 85% of wetland habitats present in 1700 had been lost by 2000 (IPBES 2019).

Glossary :

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 a part; this includes **diversity within species, between species, and of ecosystems**" (Art. 2, CBD 1992). Multiple characteristics of living systems are encompassed within the term biodiversity and it is difficult to capture everything within a single definition. Biodiversity includes, but is not limited to, functional, taxonomic, and genetic diversity, diversity in space, time, and population demographics, and endemic, threatened, and charismatic species and ecosystems.

Natural capital
"The **stock** of renewable and non-renewable **natural resources** (e.g., plants, animals, air, water, soils, minerals) that combine to yield a **flow of benefits** to people" (Natural Capital Coalition 2016).

Ecosystem services
The **flows of benefits** to people from ecosystems, commonly divided into the following categories: provisioning, regulating, cultural, and supporting (MA 2005). Examples of ecosystem services include providing food, materials, and energy (provisioning), preventing soil erosion (regulating), and enhancing recreation (cultural). The terms ecosystem services and "nature's contributions to people" have very similar meanings. Nature's contributions to people has been defined as "all the contributions, both positive and negative, of living nature to the quality of life for people," and is the terminology used in key biodiversity documents including the IPBES Global Assessment (IPBES 2019) and zero draft of the post-2020 global biodiversity framework (CBD 2020).
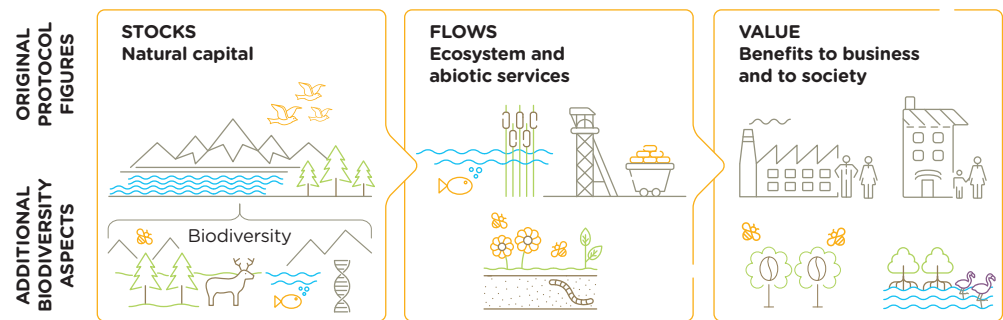
Biodiversity's decline has important negative implications for business and society. The current rate of loss exceeds a **planetary boundary** (Steffen et al. 2015) meaning that it poses a high risk of deleterious or even catastrophic environmental change. Biodiversity loss will prevent us from achieving international objectives such as the **Sustainable Development Goals** (UN 2015) and is considered to be one of the greatest risks facing humanity on a global scale, in terms of both likelihood of occurring and the potential magnitude of negative impact (WEF 2020b).

There is an important and complex relationship between biodiversity and the delivery of ecosystem services. In many cases, biodiversity affects the quantity, quality, and resilience of the goods and services delivered from natural capital stocks:

- **Quantity:** More biodiversity, in general, has the potential to deliver a greater number of ecosystem services to a wider range of beneficiaries. For example, a biodiverse woodland may have high cultural and recreational values, deliver regulating services like water filtration, soil stabilization, and carbon sequestration, and be sustainably harvested for timber. In comparison, a plantation woodland made up of a small number of species might only provide timber and some regulating services.

- **Quality:** In many instances, biodiversity is linked with the quality of ecosystem service delivery. For example, a plantation woodland is likely to provide a lower level of ecosystem services such as water filtration, soil stabilization, and carbon sequestration than a biodiverse woodland.

- **Resilience:** Biodiversity also contributes to the resilience of natural capital stocks and the stability of ecosystem service provision. For example, biodiverse coral reefs (which contribute to ecosystem services such as maintaining fish stocks and defending coastlines against storms and erosion) are more resilient to changes in ocean temperature. The variety and genetic diversity of species and ecosystems present affects the ability of a reef to resist and adapt to the effects of climate change and other disturbances.

Thinking about it in this way, you can broadly equate the benefits of biodiversity to the benefits of a diverse portfolio of financial stock. The more diverse the stock, the greater the spread of risk.

See box 1.1 for frequently asked questions about biodiversity and natural capital.

Box 1.1: Frequently asked questions

Is biodiversity the same as natural capital?
No. Natural capital refers to a stock of living and non-living components that combine to yield a flow of benefits to people. Biodiversity refers to the variety within the living components of this stock, and can be seen as an indicator of its condition.

Is biodiversity just about threatened species and protected areas?
No. The term biodiversity applies to the variety of all living organisms. Threat status or delineation as a protected area are specific designations granted to species or habitats that are considered important or threatened, to support their conservation. However, taking account of all components of biodiversity is challenging, so threatened species, protected areas, and other measures of the area and integrity of ecosystems are often used when attempting to measure biodiversity.

How does biodiversity relate to ecosystem services?
Ecosystem services are provided by the presence and interactions of natural capital stocks. Biodiversity forms a fundamental part of natural capital stocks and their ability to deliver goods and services to business and society. In many cases, the relationship between biodiversity and the goods and services produced is complex. In general, more biodiversity equates to a higher quantity, quality, and resilience of ecosystem service provision. Less biodiverse natural systems can still yield ecosystem goods and services but they are generally fewer, of lower quality, and more vulnerable to change.

I have included ecosystem services in my natural capital assessment. Doesn't that mean I've automatically included biodiversity?
No. Ecosystem services are flows of goods and services, while biodiversity refers to the variety of the living component of a natural capital stock. Natural capital assessments that focus only on the flow of benefits (ecosystem services) rather than the condition of the stock (biodiversity) can lead to poor business decisions. For example, a sole focus on ecosystem services could lead to investments in maximizing highly valued flows in the short-term while stocks are left to deteriorate. Biodiversity's contribution to ecosystem services is complex, and often poorly understood. Natural capital assessments need to explicitly include biodiversity as the stock that generates benefits.

b. What are the values of biodiversity?
Despite the benefits biodiversity provides to business and society, many of its values are often underappreciated in natural capital assessments (see box 1.2 for more discussion of value).

The values of biodiversity can be summarized as follows:

1. **Direct value:** In some instances, biodiversity itself has value to business's bottom line, for example through providing food, or in tourism based on wildlife watching.

2. **Underpinning value:** More commonly, biodiversity has value through its role in the delivery of ecosystem services. Systems such as water cycles, carbon cycles, and crop production rely on the interactions of living things, and the diversity of these living things will influence the quantity and quality of the services delivered.

3. **Insurance and options value:** Some goods and services can be delivered with relatively low biodiversity, but are vulnerable to change from factors such as pests, diseases, or climatic instability. Biodiversity increases the resilience of a system, enabling it to continue providing ecosystem services despite changes in conditions that may occur in the future, which are often uncertain. Biodiversity provides options for delivery of ecosystem services from alternative sources in the future (for example new crop species that might be domesticated for agriculture or new medicines). Biodiversity also provides options for new ecosystem services, for example benefits from biodiversity that are not yet recognized (i.e., where biodiversity is currently providing benefits to business and/or society that we are not yet aware of) or services that will only become beneficial in the context of future technological or societal innovations (i.e., where biodiversity contributes to processes that are not currently beneficial but become beneficial due to future changes to the natural environment or changes to the way people live or what they value).

4. **Intrinsic value:** Biodiversity has value independent of human use of the goods and services it provides. This value is associated with the moral right of living things to exist. Some people consider intrinsic biodiversity values to also be intertwined with other values, such as bequest value (knowing that future generations will continue to benefit

from biodiversity), altruist value (knowing that other people of the same generation can benefit from biodiversity), and existence value (connected to our desire to protect biodiversity irrespective of whether we derive any value from it other than associated with our knowledge of its existence).

You may also come across the terms "**use value**" and "**non-use value**" to describe and categorize biodiversity values. Use values encompass the direct values, underpinning values (also sometimes called indirect values), and insurance and options values outlined above. Non-use values relate to biodiversity's intrinsic value, bequest value, altruist value, and existence value (TEEB 2010).

The relevance of biodiversity to your business relates to both the values it provides to your business and the value of biodiversity to wider society. Often, the value of biodiversity will be realized from the perspective of wider society, rather than solely for your business.

Box 1.2: What is meant by value?

In the Protocol, value is defined as the importance, worth, or usefulness of something (Natural Capital Coalition 2016).

The concept of value represents what something is worth to someone. Biodiversity may have different values to different groups of people, and the value of biodiversity may be different from a business perspective and from a societal perspective.

Value is not the same as cost or price. Cost represents the amount incurred through an action (or lack of action), while price is the amount paid for something (Olajide et al. 2016).

Valuation is the process of estimating the relative importance, worth, or usefulness of natural capital to people (or to a business), in a particular context. Valuation may involve **qualitative**, **quantitative**, or **monetary approaches**, or a combination of these (Natural Capital Coalition 2016). See the **Valuing Guidance** for further information on valuing biodiversity as part of your natural capital assessment.

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c. Why are some of these values often underappreciated in natural capital assessments?

The full value of biodiversity may be overlooked in your natural capital assessment if links have not been identified between your business activities and biodiversity. For example, your business might depend on water extracted from a natural water source, and the quality and quantity of water available might be affected by biodiversity in the upstream watershed. This link between biodiversity and delivery of water needs to be recognized to identify and include the value of this business dependency on biodiversity within your natural capital assessment. Furthermore, your business may not have identified all impacts on biodiversity. For example, abstraction of water may have impacts on species in downstream wetland areas, and these impacts cannot be included in your natural capital assessment if they have not been identified.

Another reason why biodiversity might be underappreciated is due to the multitude of different components (e.g., species, habitats, ecosystems, genes) that make up biodiversity, and upon which your business might have impacts and/or dependencies. For example, the impacts of your business activities on some species might be minimal, however other species might be more sensitive. Lack of knowledge and understanding associated with these different components of biodiversity, and the interactions between them, may lead to underappreciation of some biodiversity values in natural capital assessments.

In addition, the Protocol focuses primarily on flows of ecosystem services from natural capital, and their value to business and society. Capturing flows is important, however the full contribution of biodiversity to the quantity, quality, and resilience of ecosystem service delivery can be unclear when using this approach (CCI 2016, Mace 2019). The biodiversity values likely to be underappreciated when focusing on flows of benefits are outlined below.

- **Underpinning value:** By focusing on flows of final benefits, assessments may fail to recognize the role of biodiversity in delivery of ecosystem services. Recognizing this underpinning value can be challenged by the difficulty of untangling the specific contribution of biodiversity to ecosystem service delivery, particularly given time lags between the loss of biodiversity and the decline in delivery of goods and services. Furthermore, underpinning value can be underappreciated where biodiversity contributes to goods and services that we are unable to measure, or may even fail to recognize as providing us with benefits in the first place.

- **Insurance and options value:** By focusing on flows of immediate and tangible benefits, natural capital assessments may overlook future benefits that biodiversity could provide. These benefits could include biodiversity's role in providing a stable and resilient flow of ecosystem services under changing environmental conditions (insurance value), and/or delivering other benefits in the future that may not yet be known, such as new medicines, materials, or crops (options value).

- **Intrinsic value:** Biodiversity's intrinsic value is independent of any use of goods and services by people and therefore will be overlooked when focusing on ecosystem service flows.

Better recognition of the importance of biodiversity can be achieved through improvements in assessment methodologies. However, it is important to recognize that gaps will remain and some values will continue to be underappreciated. For example, this may be due to limitations in scientific understanding of the relationships between biodiversity and delivery of goods and services. You should usually consider the values of biodiversity identified in a natural capital assessment as minimum estimates and take a precautionary approach in business decision-making, considering biodiversity values alongside other information and in consultation with stakeholders.

1.2.2 Apply these concepts to your business context

Every business and financial institution depends, to some degree, on biodiversity. Business activities often have negative impacts on biodiversity (e.g., through inputs to production processes, or outputs resulting from business activities). These impacts and dependencies result in economic costs and benefits for business and society (e.g., related to air, water, and soil pollutants, or habitat destruction or preservation). While these generate **risks** to your business, good management can also create **opportunities**, either directly or indirectly through the **costs/benefits** experienced by society (figure 1.2).

As figure 1.2 shows, the risks and opportunities experienced by business and society are transferred to the financial sector through banking, insurance products, and investments such as corporate bonds, stocks, and financial derivatives.
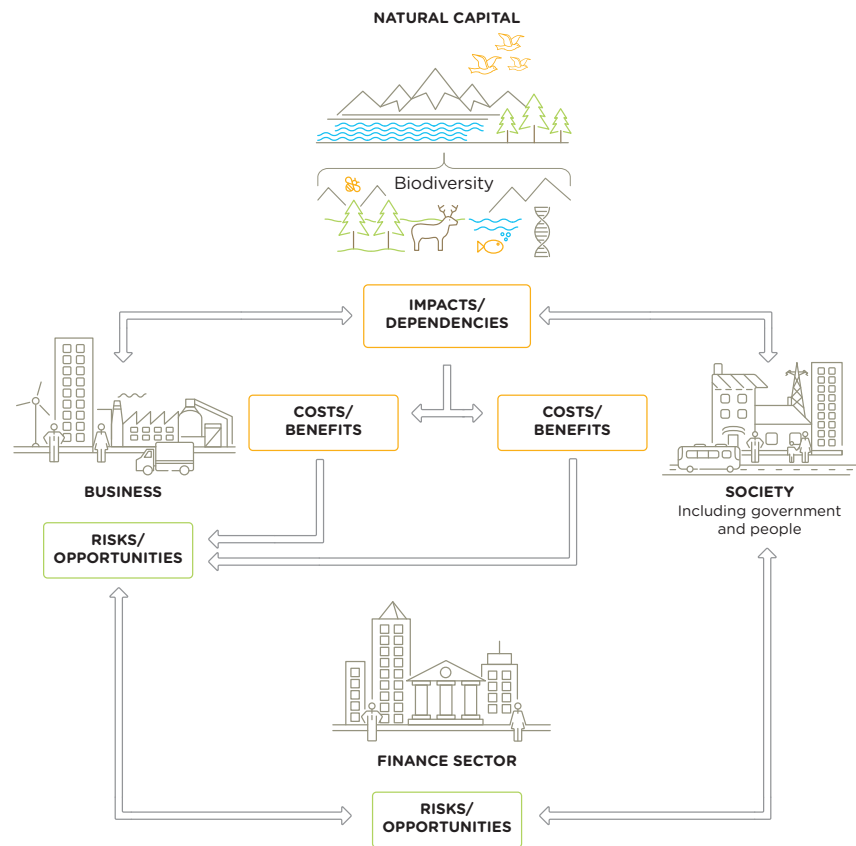
Figure 1.2
Biodiversity impacts and dependencies: conceptual model for business, the finance sector and society (adapted from figure 1.2 of the Natural Capital Protocol 2016)

a. Business impacts and dependencies on biodiversity
Impacts
Your business activities may have numerous impacts on biodiversity and natural capital, which can have positive or negative effects. As with other aspects of natural capital, your business impacts on biodiversity occur through impact drivers, which include:

1. Business use of natural resources as inputs to production processes, such as water use, terrestrial ecosystem use, or marine ecosystem use;

2. Non-product outputs resulting from business activities as well as the use and disposal of products that the business creates, such as air pollutants, solid waste, or disturbances.

Your business impacts on biodiversity may be **direct**, **indirect**, and/or **cumulative**. Indirect impacts are triggered in response to the presence of your business projects or operations, rather than being directly caused by them. Cumulative impacts arise from the combined impacts of your operations, those of other organizations (including other businesses, governments, and local communities), and other background pressures and trends (BBOP 2012a). Similarly, impacts can accumulate over time, so that relatively small impacts of each subsequent activity can add up to a large overall impact. Your business impacts on biodiversity, particularly your indirect and cumulative impacts, may often be non-linear and difficult to predict (this is covered in more detail in the **Measuring and Valuing Guidance**).

A single business production process may have impacts on biodiversity through multiple direct, indirect, and/or cumulative mechanisms. For example, production of natural fibers in the textiles industry requires use of water and large areas of land for growing crops, and may produce air, water, and soil pollutants, as well as solid waste (ENCORE 2020). In this example, direct impacts on biodiversity could occur through converting habitats for crop production. Indirect impacts could occur in downstream areas when water is abstracted from natural sources and used for crop production. Cumulative impacts could occur through pollutants; even if the pollution from a single fiber producer is minimal, when combined with the pollution from other producers and industries operating in the landscape, there could be substantial negative impacts on sensitive species.

Dependencies
The ecosystem services provided by natural capital stocks, such as clean air and water, healthy soils, and raw materials, are ultimately the basis of all economic activity. Biodiversity underpins many of these ecosystem services. More than half of global gross domestic product (GDP) is highly or moderately dependent on nature, with business activities depending heavily on nature both in direct operations and in supply chains (WEF 2020a).

In the Protocol, a dependency is material if consideration of its value, as part of the set of information used for decision-making, has the potential to alter that decision. Some business activities have material dependencies on the presence of aspects of biodiversity, such as species or habitats. For example, the natural rubber industry depends on sap collected from specific species of tree. In contrast, some production processes depend on the diversity of habitats or species. For example, agricultural crops depend on a diverse range of animal pollinators for benefits such as being able to grow crops requiring pollination by different species, and being able to grow crops throughout the year when different pollinator species are active.

b. Business risks and opportunities
Natural capital thinking provides businesses and financial institutions with a more detailed understanding of the significance of impacts and dependencies on biodiversity and other aspects of the environment by framing them as risks and opportunities. This can strengthen your business's consideration of interconnections and trade-offs between different environmental, social, and economic issues, leading to more informed decision-making. For financial institutions, understanding the value of impacts and dependencies on biodiversity leads to better insight on the magnitude, reliability, and resilience of financial returns, due to biodiversity's role in supporting delivery of ecosystem services.

Risks
Biodiversity loss can pose direct risks to your business operations where you have dependencies on the goods and services that biodiversity generates, either directly and/or within supply chains. The risk of disruption will continue to intensify if biodiversity continues to be lost.

In many instances, the majority of the benefits from biodiversity are received by society rather than directly by your business. As a result, where your business activities (or the activities of businesses in your financial portfolio) impact on biodiversity, you face risks associated with societal relationships, reputation, marketing, laws, regulations, and access to finance.

Reputational risks to business are increasing as biodiversity continues to decline, and as pressure from consumers to slow and reverse this decline continues to grow. For example, impacts on charismatic species affect societies who place value upon them for cultural, ethical, and/or philosophical reasons. Threats to these species resulting from business operations can create reputational risks for business. For example, clearing rainforest habitats to grow oil palm may destroy the habitat of the orangutan, a culturally important species. Including societal values in the scope of a business's natural capital assessment is therefore needed to identify reputational risks.

Financial institutions are exposed to multiple types of biodiversity-related risk, including risk of default by clients, lower returns from investees, and increasing insurance liabilities. Understanding the contribution of biodiversity enhances understanding of natural capital risks across your portfolio, enabling more informed risk management decisions. Financial institutions can turn risks into opportunities by managing investments sustainably to mitigate impacts on biodiversity (UNEP et al. 2020). An investment manager, for example, could promote sustainable land use practices that result in positive biodiversity and socioeconomic impacts through blended finance (where public money is used to increase private investment in projects that can have positive development while producing financial returns).

It is important that you apply a broad approach to natural capital assessments that considers the multiple ways in which biodiversity has value to different stakeholders. You should carry out assessments over a suitable scale and time period for your impacts to be identified, including impacts that accumulate over time, and direct and indirect impacts (e.g., overexploitation of resources, habitat loss, contributions to climate change), as well as impacts that occur as a result of the interaction of activities of different organizations operating in a landscape (cumulative impacts).

- For example, the contribution of a farm's pesticide use could add to the cumulative impacts of surrounding farms, which in aggregate can affect the ecosystem's predator-prey balance, risking future pest outbreaks or a decline in access to wild pollinators and associated pollination services.

- Another example is overfishing. Overfishing can reduce fish biomass, affecting marine biodiversity and the sustainability of fisheries (Sumaila et al. 2020). In the case of the North Atlantic cod stock, this resulted in the collapse of six populations of cod leading to a moratorium where fishers were no longer allowed to harvest the species (Myers et al. 1997, Pederson et al. 2017).

Inclusion of cumulative impacts in the scope of a business's natural capital assessment is important to ensure risks such as declining fish stocks, future crop losses, or increased pest control costs can be mitigated.

Finally, biodiverse ecosystems are more resilient to unpredicted changes. In the example of a tropical island experiencing a greater number of cyclones over a five-year period due to climate change, an island with a greater number of tree species of different heights, with the roots reaching to varying depths, is more likely to be able to withstand high wind speeds with minimal damage. An island covered with a single species of tall trees, however, is more likely to experience damage, and a lengthened recovery period. For this reason, biodiverse natural surroundings are better able to mitigate against unpredictable weather events. Biologically diverse communities are more likely to contain species that confer resilience of that ecosystem to change. As a community accumulates species, there is a higher chance of any of them having traits that enable them to adapt to a changing environment (Cleland 2011).

Click here to see how a fashion company has integrated biodiversity as part of a natural capital assessment to identify risks in their operations and supply chain.

Opportunities
Understanding biodiversity as an integral part of natural capital stocks, as well as its role in underpinning the goods and services that stocks generate, allows you to identify and manage potential new business opportunities, business models that are viable in the long term, cost savings, and increases in operational efficiency. If your business is able to demonstrate minimal impacts, or biodiversity enhancements, you are likely to secure benefits such as preferential access to resources and financing, better relationships with stakeholders, maintaining a social license to operate, and retaining employees. For example, adopting sustainable fishing practices to prevent overfishing would require a reduction in the number of catches made annually and result in a reduction in short-term profit. However it would better ensure sustainability of resources and a maintained social license to operate in the long term. This is especially true in the case of fishing companies who have a high impact on fisheries in their catchment area and local communities.

Click here to see how a financial institution has integrated biodiversity as part of a natural capital assessment to identify opportunities for sustainable and socially responsible investment.

Business models and activities that promote biodiversity can present an opportunity for enhancement of natural capital stocks. Examples of these activities include implementing regenerative agriculture to reduce fertilizer costs, or adopting nature-based solutions to increase resilience to natural disasters. In both cases these activities would offer sustainable opportunities for benefits to a business while enhancing natural capital stocks, with resulting benefits for wider society.

Financial institutions can make investment decisions based on impacts and dependencies on biodiversity, and therefore realize reputational benefits while reducing risks within a portfolio.

Further examples of potential business risks and opportunities relating to biodiversity are provided in table 1.2.

Table 1.2
Examples of biodiversity risks and opportunities for business*

Category	Risk example	Opportunity example
Operational Regular business activities, expenditures, and processes	Overexploitation in an important fishery has caused depletion of fish stocks. The reduction in fish population has had a cascading effect through the ecosystem, leading to conditions that are no longer suitable for development of juveniles. The fishing industry has collapsed, with knock-on implications for fishers, processing plants, distributors, and seafood retailers.	Climate change threatens to reduce the dry-season water supply to a hydroelectric dam. The energy company operating the dam has adopted a nature-based solution through funding restoration of wetlands high in the watershed with diverse native vegetation in order to increase water storage. This is expected to improve the reliability of downstream water flows throughout the year, despite climate uncertainty.
Legal and regulatory Laws, public policies, and regulations that affect business performance	A chemical used in pesticides is harmful to bees and other insects that pollinate agricultural crops. New laws have been brought in banning its use. Agrochemical companies that were using the chemical are no longer able to manufacture and sell several of their products.	A major supermarket is supporting new legislation to reduce use of single-use plastics in food packaging, due to concerns about impacts on marine biodiversity. The supermarket already exclusively uses suppliers who minimize single-use plastics in their packaging. Therefore, this legislation will give an advantage over competing supermarkets who have not adapted their approach to packaging.
Financing Costs of, and access to, capital including debt and equity	A mining company is seeking investment to expand its operations in a mineral-rich forest. The forest has high biodiversity value and supports the livelihoods of local communities by providing services such as food, fuel, and water. The company lacks systematic information on their impacts on biodiversity and ecosystem services. Financial organizations are unwilling to lend to or invest in the company as risks are unknown.	A small forestry company has become the first operator in a developing country to receive environmental certification. These environmental credentials have enabled the company to access a long-term loan to monitor and report on their sustainable forestry practices, and make investments to improve the efficiency of forestry management.
Reputational and marketing Company trust and relationships with direct business stakeholders, such as customers, suppliers, and employees	A multinational oil company has suffered a spill around an offshore drilling rig, causing extensive damage to surrounding ecosystems and mass mortality of seabirds and turtles. Public and investor confidence has fallen rapidly, with the company seeing a huge reduction in market value.	For the first year following release of a new range of products, a cosmetics company is donating part of their income from each purchase to a biodiversity conservation project focused on protecting habitat for a charismatic eagle. Through linking the product range to this culturally important species the company are expecting to attract new customers into their stores.
Societal Relationships with the wider society (e.g., local communities, NGOs, government agencies, and other stakeholders)	A development bank is supporting a road-building project through a remote area of tropical forest. The biodiversity impacts of this project are expected to be negative, particularly for large mammals which are harvested by local communities for food and rituals. The bank is under pressure from an alliance of international NGOs and local communities to abandon the project.	A water company has restored habitat for wetland bird species around the margins of one of its reservoirs. The area is now well used by both local and more distant visitors for nature-based recreation, benefiting the company's public image and stakeholder relationships.

*The typology of risks and opportunities in table 1.2 is the same as in the Natural Capital Protocol. Other similar typologies are also used, such as the biodiversity-related financial risk categories in the "Nature is too big to fail" report (PwC & WWF 2020).

Definitions of regenerative agriculture and nature-based solutions

Regenerative agriculture:
"A holistic land management practice that leverages the power of photosynthesis in plants to close the carbon cycle and build soil health, crop resilience, and nutrient density" (Regenerative Agriculture Initiative 2017).

Nature-based solutions:
"Actions to protect, sustainably manage and restore natural and modified ecosystems in ways that address societal challenges effectively and adaptively, to provide both human well-being and biodiversity benefits" (IUCN 2016).

1.2.3 Prepare yourself for a natural capital assessment

A key step to framing your natural capital assessment is to identify the **Business Application** or the intended use of the results of the assessment. Framing a natural capital assessment to incorporate biodiversity will focus the selection of the Business Applications. The Aligning Biodiversity Measures for Business collaboration sets out eight Business Applications specifically for biodiversity assessments (EU Business @ Biodiversity Platform 2019) based on work on the development and use of biodiversity indicators in business by the International Union for the Conservation of Nature (Addison et al. 2018). Table 1.3 lists how these biodiversity-inclusive Business Applications map to the applications listed in the Protocol, with examples of the types of decisions that can be informed when biodiversity is included in an assessment.

Table 1.3
Business Applications for a biodiversity-inclusive natural capital assessment

Business Applications (table 3.4 in the Protocol)	Business Applications from Aligning Measures (EU Business @ Biodiversity Platform 2019)	Relevance of Business Application to your biodiversity-inclusive natural capital assessment
Assess risk and opportunities	BA7: Screening and assessment of biodiversity risks and opportunities	Assessing business risk, for example for due diligence assessments as part of mergers and acquisitions, or assessments undertaken by investors to differentiate between investment options, either based on the biodiversity performance or return on investment of different companies. This might also be undertaken by financial institutions to assess biodiversity risk and inform pricing credit. Assessing business opportunities related to nature restoration, for example investing in nature-based solutions.
Compare options	BA4: Comparing options	Comparing the impact and dependency of different business options on biodiversity, including economic considerations.
Assess impacts on stakeholders	BA1: Assessment of current biodiversity performance	Demonstrating to stakeholders that your company is doing well in terms of biodiversity performance, or simply to know the company's current performance in relation to biodiversity.
	BA3: Tracking progress to targets	Setting targets which are important to specific stakeholder groups, or relate to fulfilling stakeholder expectations.
Estimate total value and/or net impact	BA1: Assessment of current biodiversity performance	Knowing the current net biodiversity impact of your company.
	BA2: Assessment of future biodiversity performance	Assessing future biodiversity performance as a result of, for instance, positive impact actions (e.g., restoration actions and/or actions that reduce pressures on biodiversity) or changes in your activities.
	BA5: Assessment/rating of biodiversity performance by third parties, using external data	Comparing company biodiversity performance across a sector, based on criteria and external data by a third party.
	BA6: Certification by third parties	Third-party certification based on auditing of a clearly established methodological approach.
	BA3: Tracking progress to targets	Periodic tracking of targets on biodiversity performance.
Communicate internally and/or externally	BA8: Biodiversity accounting for internal reporting and/or external disclosure	Compiling consistent, comparable, and regularly produced data using an accounting approach framework, such as the Biological Diversity Protocol.
	BA1 to BA7	Communicating the findings of your assessment.

The results of a natural capital assessment can also inform the setting of corporate biodiversity targets. This might include commitments to "**no net loss**" and "**net gain**" of biodiversity (box 1.3), and/or commitments in response to regulatory drivers, such as the targets in the EU Biodiversity Strategy for 2030 (European Commission 2020). There are also a number of other global biodiversity target-setting initiatives (table 1.4).

Understanding alignment and contributions to these targets could be the objective of your natural capital assessment. By not incorporating biodiversity commitments within your natural capital assessment objective, you may miss a strategic opportunity to clearly demonstrate the value of your net contributions to biodiversity to both your business and to society, and/or miss potential risks associated with links to other environmental issues such as climate or water.

Table 1.4
Example target-setting initiatives for biodiversity

Biodiversity target	Description
Science Based Targets for Nature	Targets which define and promote best practice for businesses by responding to five Earth systems; climate, fresh water, land, ocean, and biodiversity (SBTN 2020). Interim guidance on science based targets for nature, including biodiversity, will be launched in late 2020.
Global Apex Goal for Nature	A proposal for a clear, science-based Global Apex Goal that is measurable, communicable, and provides the direction and the destination that the global community must embrace and converge towards: Zero Net Loss of Nature from 2020, Net Positive by 2030, Full Recovery by 2050 (Apex Goal 2020). This draft goal is supported by 14 conservation and business organizations.
CBD post-2020 biodiversity framework	The Convention on Biological Diversity's post-2020 global biodiversity framework will replace the Aichi Targets to provide a pathway towards achieving the 2050 Vision of "Living in harmony with Nature" (CBD 2020c).
UN Sustainable Development Goals (14 and 15)	SDG Goals 14 and 15 focus on the protection of biodiversity and ecosystems within the marine and terrestrial environments (UN 2015).

See the **Application Guidance** for more information on setting biodiversity targets as part of your natural capital assessment.

Financial institutions have a key role in achieving biodiversity targets, as they can catalyze behavior changes and influence economic pathways, and business models and practices. A report from the UN Environment Programme, released in 2020, addresses biodiversity-related target setting by the finance sector (UNEP et al. 2020).

Box 1.3: Potential Business Application for a biodiversity-inclusive natural capital assessment—tracking progress towards "no net loss" and "net gain" commitments.

The concepts of "no net loss" and "net gain" rely on the mitigation hierarchy to ensure preventative mitigation measures, principally avoidance, are prioritized to achieve these goals (CSBI 2015). This hierarchy has most often been applied to manage the biodiversity impact of development projects, including extractive and infrastructure projects, but has also been considered for managing the impacts of many business operations, including those along a supply chain. For companies already adopting the mitigation hierarchy, a biodiversity-inclusive natural capital assessment can strengthen the business case for action by clearly demonstrating the value of biodiversity at all stages of its implementation.

The mitigation hierarchy consists of four stages comprising a sequence of actions, in order of priority, to anticipate and mitigate impacts on biodiversity:

1. **Avoid** biodiversity impacts during business operations, by first anticipating the potential impacts of a business activity, then putting in place measures to prevent these adverse impacts. This may include, for example, selecting alternative raw materials that do not have negative impacts upon biodiversity, developing in alternative locations to avoid sites of high biodiversity value, or working with suppliers so they avoid non-sustainable practices.

2. **Minimize** any impacts where they cannot be immediately avoided. This could include for example measures to maintain habitat connectivity at the site level.

3. **Restore** biodiversity that has been impacted at the site level, for example through reforestation or the enhancement of important habitats.

4. **Offset** impacts in areas not affected by the project, when residual impacts occur on-site. This could include protection of habitat off-site that is under threat, or the restoration of habitat previously impacted, for example, restoring coastal saltmarsh to offset impacts of a coastal development. Note that offsetting should be used as the lowest priority step in the mitigation hierarchy and with caution, as it often cannot substitute for the complexity of biodiversity at the original site. This has led to criticism of offsets as a "license to trash" creating potential for reputational damage to businesses that rely heavily on offsetting.

After planning and implementing the mitigation hierarchy, "no net loss" refers to the point at which project-related impacts on biodiversity are balanced by mitigation measures, so that no net loss remains. Where gains are greater than losses, "net gain" targets are achieved.

The relationships between biodiversity, natural capital, and risks and opportunities for business may be quite complex. However it is important that the role of biodiversity is explicitly considered within a natural capital assessment.

Continue to the **Scoping Guidance** to read more about how biodiversity can be integrated as part of a natural capital assessment.

Case studies

Company example: Supply chain (fashion industry)

Kering S.A. has developed an Environmental Profit and Loss (EP&L) accounting methodology for measuring and quantifying the impacts of its activities on natural capital. The methodology aims to capture both the impacts of the Group's direct operations and those of its supply chain. The methodology measures carbon emissions, water consumption, air and water pollution, land use, and waste production. These impacts are converted into monetary values for comparison and use in guiding sustainability decisions (Kering 2013).

Ecosystem services supported by biodiversity sit at the base of the supply chain for many of Kering's products. The EP&L has a broad scope, and although it does not quantify biodiversity as a separate indicator, many of the impacts that it seeks to manage have consequences for biodiversity. Impacts on biodiversity are included in the methodology primarily through indicators of land-use change, which take into account areas of habitats (such as tropical forests, wetlands, etc.) that have been converted for different production systems, and the associated reduction in the value of ecosystem services. Specifically, to estimate the impact on ecosystem services, the EP&L looks at three indicators: above-ground biomass, species richness, and soil organic carbon (the latter is a strong proxy for overall soil health).

Kering's methodology is continually evolving, and more explicit integration of impacts on biodiversity is a key priority for the organization. Given that it is not appropriate or possible to place an economic value on all aspects of biodiversity, Kering is exploring separate biodiversity indicators to sit alongside and complement the EP&L (CISL 2020; CISL 2016).

To date, application of the methodology has provided insights and increased transparency around the environmental impacts of different aspects of Kering's business. For example, it has revealed that the majority of impacts lie in their supply chain. This has enabled Kering to prioritize strategies that can lead to improved environmental outcomes, such as regenerative agriculture in the production of raw materials. By integrating biodiversity as part of the methodology, Kering will be able to identify and implement actions to reduce biodiversity impacts, hence reducing the risk of disruption to their supply chains.

Company example: Finance

ASN Bank is a finance organization committed to sustainable and socially responsible investment. Using natural capital thinking they have developed ambitious, long-term goals associated with a three pillar sustainability framework: climate change, biodiversity, and human rights. Consistent with their natural capital approach, ASN Bank sees important interconnections between these three pillars, for example they recognize that investing in biodiversity can also create benefits associated with mitigating climate change and human rights.

ASN Bank acknowledges that their operations might be contributing to the loss of biodiversity. Their goal is to reverse this, where "all investments and loans of ASN Bank result in a net positive effect on biodiversity in 2030." To assess progress against this goal, they need to be able to measure their biodiversity impacts. They have developed a methodology for calculating the biodiversity footprint of their loans and investments, which was first applied in 2014 and subsequently refined in annual assessments. Insights from this assessment can be used to tailor ASN Bank's investment portfolio to its long-term biodiversity goal, through identifying "impact hotspots" (risks), and sectors and investments that will have a positive impact on biodiversity (opportunities).

Furthermore, ASN Bank are planning to establish a Partnership for Biodiversity Accounting Financials initiative (PBAF), which aims to bring together financial institutions to develop and refine methodologies for biodiversity footprinting. This will draw upon the bank's experience of establishing and running a similar initiative for assessing greenhouse gas emissions, the Partnership for Carbon Accounting Financials (PCAF), which is a global initiative adopted by 50+ financial institutions.

SCOPE STAGE

Key messages

- Identifying the Business Application and relevant stakeholders can help articulate a clear objective for a biodiversity-inclusive natural capital assessment.

- Identifying biodiversity-related impact drivers and dependencies requires further technical considerations as part of setting baselines and the spatial, temporal, and value-chain boundary of an assessment.

- Traditional approaches for defining materiality may not capture all biodiversity risks and opportunities—the values of biodiversity may be hidden when focusing solely on the flow of goods and services.

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SCOPE STAGE

What is the Scope Stage?

The **Scoping Guidance** describes how to set and incorporate biodiversity-inclusive objectives and define the scope of your assessment. This includes aligning **natural capital** assessments with existing corporate biodiversity commitments or policies, and outlining key technical considerations when defining the scope of an assessment that considers biodiversity. Building on the **Framing Guidance**, this document relates to Steps 02–04 of the Natural Capital Protocol and introduces further guidance that has been developed as part of this series on measurement, valuation, and application.

What additional biodiversity guidance is provided for the Scope Stage?

Table S.1 provides an overview of the questions and actions of Steps 02–04, the Scope Stage in the Protocol, indicating the actions for which the **Scoping Guidance** provides additional information.

This Guidance has been developed to address questions related to setting objectives and scope that specifically focus on biodiversity:

Step 02: How can biodiversity **objectives** be set as part of a natural capital assessment?

Step 03: What is an appropriate **scope** to meet my biodiversity objectives and what key technical issues need to be considered?

Step 04: How can the **materiality** of biodiversity-related **impact drivers** and **dependencies** be assessed?

Table S.1:
Key questions addressed and their relation to the Natural Capital Protocol

Protocol Step		Questions this Step will answer	Protocol actions	Additional guidance included?
02	**Define the objective**	**How can biodiversity objectives be set as part of my natural capital assessment?**	2.2.1 Identify the target audience	**No** Refer to Protocol page 26 for guidance
			2.2.2 Identify stakeholders and the appropriate level of engagement	**Yes** See action 2.2.2
			2.2.3 Articulate the objective of your assessment	**Yes** See action 2.2.3

Protocol Step		Questions this Step will answer	Protocol actions	Additional guidance included?
03	Scope the assessment	**What is an appropriate scope to meet my biodiversity objectives and what key technical issues need to be considered?**	3.2.1 Determine the organizational focus	**Yes** See action 3.2.1
			3.2.2 Determine the value-chain boundary	**Yes** See action 3.2.2
			3.2.3 Specify whose value perspective	**Yes** See action 3.2.3
			3.2.4 Decide on assessing impacts and/or dependencies	**Yes** See action 3.2.4
			3.2.5 Decide which types of value you will consider	**Yes** See action 3.2.5
			3.2.6 Consider other technical issues (baselines, boundaries, and time horizons)	**Yes** See action 3.2.6
			3.2.7 Address key planning issues	**No** Refer to Protocol page 41 for guidance
04	Determine the impacts/ dependencies	**How can the materiality of biodiversity-related impact drivers and dependencies be assessed?**	4.2.1 List potentially material impacts/dependencies	**Yes** See action 4.2.1
			4.2.2 Identify criteria for your materiality assessment	**Yes** See action 4.2.2
			4.2.3 Gather relevant information	**No** Refer to Protocol page 49 for guidance
			4.2.4 Complete the materiality assessment	**No** Refer to Protocol page 50 for guidance

Additional notes

Table S.2 provides a non-exhaustive list summarizing some additional resources to aid in setting the objectives and scope and illustrates how these resources may be useful for your assessment.

Table S.2
Additional resources for setting the objective and scope of a biodiversity-inclusive assessment

Author	Title (Year)	Type	Description
Business for Nature	Businesses' commitments for nature (n.d.)	Webpage	List of international commitments that are relevant for reversing nature loss.
act4nature	Examples of commitments made by companies to integrate biodiversity into their business activities (n.d.)	Database	Individual commitments made by companies to integrate biodiversity in their operations.
Endangered Wildlife Trust	Step 5: Decide how to deal with biodiversity dependencies and impacts of your business (in development)	Report	Part of a larger series of guidelines (Biodiversity Disclosure Protocol) to help businesses disclose their biodiversity performance in a standardized and comparable manner. Step 5, specifically, focuses on setting the scope and ambition of the biodiversity policy of the business.
EU Business @ Biodiversity Platform	Assessment of biodiversity accounting approaches for businesses and financial institutions. Update Report 1 (2018)	Report	The first of a series of update reports assessing biodiversity measurement approaches for businesses and financial institutions. Includes discussion on Business Applications for biodiversity-inclusive assessments.
Cross-Sector Biodiversity Initiative	A cross-sector guide for implementing the mitigation hierarchy (2015)	Report	Describes practical steps to implement the mitigation hierarchy at the site level, to achieve no net loss or net gain targets.
IUCN	The development and use of biodiversity indicators in business: an overview (2018)	Report	Outlines prominent scopes for Business Applications for biodiversity indicators, which range from site-level to corporate-level assessment of biodiversity performance, through to third-party biodiversity performance assessment.
IUCN	Threats classification scheme (n.d.)	Database	Hierarchical breakdown detailing the drivers of species decline. Aids in articulating impact pathways.
UNEP-WCMC	ENCORE (Exploring Natural Capital Opportunities and Risk Exposure) (n.d.)	Decision-support tool	Online platform that aids in exploring the impacts and dependencies of businesses on natural capital and ecosystem services.

02 Step 02 Guidance: Define the objective

2.2.1 Identify the target audience

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 26 FOR GENERAL GUIDANCE.

2.2.2 Identify stakeholders and the appropriate level of engagement

Your assessment is likely to be more relevant, reliable, and useful in the longer term if you are able to consult and involve the right internal and external stakeholders from the outset. You should consider whether the relevant stakeholders vary when specifically including biodiversity. For example, certain external stakeholders may have specific dependencies on biodiversity (e.g., fishers, farmers). Other examples include regulators who may be responsible for managing biodiversity impacts, financial institutions who may be looking to understand the biodiversity-related impacts and dependencies of their loans or portfolios, and civil society organizations/experts who can help provide information to help undertake and verify your assessment.

REFER TO THE PROTOCOL PAGE 27 FOR FURTHER DETAILS ON STAKEHOLDER IDENTIFICATION.

2.2.3 Articulate the objective of your assessment

Once the biodiversity-inclusive Business Application, target audience, and relevant stakeholders have been identified, you should proceed to articulate the specific biodiversity objectives for the assessment. Some examples are provided in table 2.1.

Table 2.1
Example objectives for a biodiversity-inclusive natural capital assessment which could be developed after selecting the Business Application and identifying the target audience.

Example Business Application from Aligning Measures (EU Business @ Biodiversity Platform 2019)	Example target audience	Example objective
Assessment of current biodiversity performance (BA1)	Internal stakeholders (e.g., environment/sustainability manager) External regulators (e.g., statutory conservation body)	To assess site-based impacts on biodiversity
Tracking progress to targets (BA3)	Internal operations department External stakeholders (e.g., NGOs, scientific community, customers)	To demonstrate to stakeholders compliance with no net loss biodiversity objectives at the site level
Comparing options (BA4)	Internal procurement teams (e.g., supply chain manager) External stakeholders (e.g., affected communities, indigenous people, farmers/fishers)	To assess which procurement option has the highest dependence on biodiversity
Assessment/rating of biodiversity performance by third parties, using external data (BA5)	Internal stakeholders (e.g., environmental and social governance teams, higher-level management) External stakeholders (e.g., rating agencies and certification bodies)	To demonstrate whether the company meets certification requirements for acceptable biodiversity performance
Screening and assessment of biodiversity risks and opportunities (BA7)	Internal operations department (e.g., risk officers) External regulators (e.g., statutory conservation bodies)	To assess risk exposure of business operations to risks associated with biodiversity loss

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03 Step 03 Guidance: Scope the assessment

3.2.1 Determine the organizational focus

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 31 FOR GENERAL GUIDANCE

For financial institutions, assessments can be conducted at one of two levels, either individual entity (this may be a single organization, project, activity, or asset) or portfolio (this may be your full portfolio or a subset by asset class or region).

Risks can combine to become significant at portfolio level even if they appear to be of lesser importance at an individual entity level. For example, financial institutions might find that they have significant exposure to biodiversity-related risks because of their aggregated exposure to specific geographies, sectors, or markets, even if these were not identified as significant risks at the individual entity level. Equally, biodiversity may not aggregate into significant impacts/dependencies at portfolio level but could be high-risk considerations within a sector or geographically-specific asset group.

Your choice of organizational focus has implications in terms of the resources you will need to conduct the assessment, especially knowledge, data, time, and skills.

3.2.2 Determine the value-chain boundary

When incorporating biodiversity as part of your natural capital assessment, you should note that many dependencies often lie in the supply chain (i.e., upstream in the value chain). For example, in the food industry crop production supplies the raw materials to make food products, and may be reliant on pollination and nutrient cycling—key ecosystem services supported through biodiverse ecosystems.

Downstream stages of the value chain may represent a significant portion of a business's impacts on biodiversity. For example, a company manufacturing plastic products should also consider its downstream impacts since mismanaged waste (plastic that is not properly disposed of) can end up in rivers, lakes, and oceans, affecting freshwater/marine biodiversity.

REFER TO THE PROTOCOL PAGE 32 FOR KEY CONSIDERATIONS WHEN SELECTING YOUR VALUE-CHAIN BOUNDARY.

3.2.3 Specify whose value perspective

The **value perspective** for a biodiversity-inclusive assessment may vary. As outlined in page 33 of the Protocol, you can carry out natural capital assessments from a **business value perspective**, a **societal value perspective**, or both.

Business and societal value perspectives focus on different aspects of biodiversity's value. Depending on the value perspective that you choose, you will be assessing different aspects of your relationship with biodiversity:

- By choosing a **business value perspective**, you will primarily be assessing:

  1) Consequences of your dependencies on biodiversity (e.g., financial implications for your business of decrease in pollination services);

  2) Consequences of your impacts on biodiversity for your own operations and performance (e.g., reputational damage due to your impacts on biodiversity, or social license to operate and other legal, operational, or reputational risks).

- By choosing a **societal value perspective**, you will primarily be assessing:

  1) Consequences of your biodiversity impacts on society (e.g., loss of earning by fishers affected by an oil spill from your company; depleting coastal fish stocks within a reef community, causing a downturn in tourism revenue).

📖 **Glossary :**

Value
The importance, worth, or usefulness of something.

Value perspective
The perspective or point of view from which value is assessed; this determines which costs or benefits are included in an assessment.

Business value
The costs and benefits to business, also referred to as internal, private, financial, or shareholder value.

Societal value
The costs and benefits to wider society, also referred to as external, public, or stakeholder value (or externalities).

Definitions are taken from the Natural Capital Protocol (2016). Additional guidance on the different values (direct, underpinning, insurance and options, intrinsic) is provided in **Framing Guidance** action 1.2.1 under "What are the values of biodiversity?".

Since ecosystems deliver both societal values and business values, choosing to adopt only a business value perspective can make it difficult to anticipate how broader societal impacts will affect business operations. Adding a societal perspective allows a company to better understand potential biodiversity issues for society as a whole that may be caused by the company's activities. Such issues can create a societal response that affects business performance, now or in the future. The consequences of your impacts on biodiversity are likely to pose important business risks and opportunities linked to your societal relationships (see the **Framing Guidance** for more information). A more comprehensive assessment may also give you insights that help in gaining preferential access to resources or financing and build better relationships with stakeholders. Looking at business value in the context of societal values provides a more comprehensive view of the relationship between your business and biodiversity than a purely business value perspective. You are therefore encouraged to consider both value perspectives in your assessment.

Even where many consequences related to a value are captured, you may still underappreciate some values. The intrinsic value of biodiversity is not captured from either a business or a societal value perspective. It is therefore important to keep in mind that values are likely to be minimum estimates when examining the results of any valuation assessment.

Click here to see how a sustainable landscape fund and an infrastructure company are enhancing biodiversity as a result of a valuation assessment.

3.2.4 Decide on assessing impacts and/or dependencies

Due to the relationship between biodiversity and the quantity, quality, and resilience of ecosystem services, it is recommended that the scope of a biodiversity-inclusive natural capital assessment seeks to evaluate business dependencies on biodiversity, as well as impacts.

When deciding whether an assessment should include impacts on biodiversity it is important to bear in mind that impacts along the value chain may be **direct**, **indirect**, and **cumulative**, and to consider how this may affect the scope of the assessment. Cumulative impacts refer to "the total impact arising from the project (under the control of the developers), other activities (that may be under the control of the others, including other developers, local communities, government) and other background pressures and trends which may be unregulated" (BBOP 2012a). For example, the construction of one road may not have a large impact in a landscape, but multiple roads over the wider landscape may reduce habitat connectivity. Similarly, impacts can accumulate over time, so that relatively small impacts of each subsequent activity can add up to a large overall impact.

To understand and measure cumulative impacts from a biodiversity perspective, a key challenge is addressing the need for data on a landscape/population scale. Spatially explicit data, specifically the need for high-resolution data on habitats, human uses, and stressors, are especially critical in cumulative impact assessments (Halpern and Fujita 2013). However, due to significant data gaps on habitats, human uses, and stressors, it can be difficult to fully understand and measure the cumulative impacts. Additionally, the ecosystem response to cumulative impacts and the different thresholds of habitats and biodiversity features is poorly understood and it can be particularly difficult to measure these effects (Halpern and Fujita 2013).

REFER TO FRAMING GUIDANCE ACTION 1.2.2 AND PAGE 34 OF THE PROTOCOL FOR MORE INFORMATION ON THE IMPORTANCE OF ASSESSING BIODIVERSITY IMPACTS AND DEPENDENCIES.

3.2.5 Decide which types of value you will consider

The Protocol outlines how valuation involves a continuum of **qualitative**, **quantitative**, and **monetary** approaches, and describes key features of each approach. It also suggests key considerations when determining which type of valuation is most appropriate to meet your objectives. Valuing natural capital often involves valuing the final benefits that people/businesses receive from natural capital. If biodiversity contributes to these final benefits, but is not explicitly considered as part of them, its contribution or necessity may not be visible in your assessment. It is important to assess how identified benefits rely on the underlying biodiversity stock, and ensure the ramifications for maintaining the condition of biodiversity are considered alongside valuation results. If biodiversity is not visible or not captured in your valuation process, its importance can be underappreciated. Your organization will not have a full picture of how risks and opportunities can manifest and may therefore make decisions based on incomplete information (for more information see **Framing Guidance** action 1.2.1 on "Why are some of these values often underappreciated in natural capital assessments?").

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Before proceeding with your valuation, you should be aware of, and find ways to address, potential concerns that generate opposition to valuing biodiversity, especially in monetary units. Concerns may include, but will not be limited to, fears around the "commodification" of nature and the risk that bringing nature closer to the economic system will detract from societal responsibilities to protect biodiversity. You should also recognize that it is both inappropriate and impossible to accurately quantify the intrinsic worth of biodiversity in monetary units, and you should find alternative ways to consider biodiversity's intrinsic value in your decision-making. It is important that you present the approach taken, the aspects of biodiversity's value included, and the assumptions made clearly alongside your results. This will help to avoid a well-intended assessment from being taken out of context or otherwise misunderstood.

Monetary valuation can be used to understand the magnitude and relevance of costs and benefits associated with your impacts and dependencies on biodiversity. Monetary valuation summarizes information in a common and tractable unit, making it easier for you to communicate with key stakeholders and assess trade-offs.

Before undertaking monetary valuation however, you should consider whether this is the appropriate approach. In the following circumstances you should not use monetary techniques (adapted from TEEB 2010):

1) When you cannot estimate accurate values;

2) When it can be considered morally inappropriate (e.g., placing a monetary value on an intrinsically/culturally valuable area to the surrounding communities) (Synder et al. 2003);

3) When a large-scale change in biodiversity is taking place (e.g., when a large proportion of a remaining population or habitat is affected);

4) When an irreversible change is expected.

Other factors that you should consider when deciding whether to use a monetary technique include the nature of your decision, the target audience, and the availability of data to support conversion to monetary units. Qualitative and quantitative techniques can be applied to values that cannot be assessed with monetary techniques.

For further information about qualitative, quantitative, and monetary valuation approaches, see **Measuring and Valuing Guidance** action 7.2.3.

3.2.6 Consider other technical issues

a. Baselines
One key consideration for all natural capital assessment is **baselines** (defined in the Protocol as the starting point or benchmark against which changes in natural capital attributed to your business's activities can be compared). In addition to those covered in the Protocol, some additional considerations related to biodiversity include:

• **Prevailing conditions** where impacts in a year are compared to the average over previous years. A prevailing conditions baseline may be particularly appropriate if the objective is reducing the biodiversity impact of the whole business, where comparing to the last financial year could be an appropriate baseline. Using prevailing conditions as a baseline however may make it challenging to take into consideration the impacts of activities already occurring in the land/seascape.

• **Pristine baseline** where impacts are measured relative to biodiversity in its natural state. Pristine baselines have the advantage of making impacts easy to conceptualize, and encourage restorative actions. Most business activities are likely to be negatively impacting biodiversity when comparing to a pristine state. Some measurement approaches use a pristine, undisturbed state as a baseline. Further guidance on measurement approaches is provided in the **Measuring and Valuing Guidance**.

- The **counterfactual scenario** describes changes relative to a plausible state of biodiversity that would occur if the business did not operate (referred to as a "business as usual" scenario in the Protocol). The use of counterfactual scenarios can greatly affect the assessment of impacts during your assessment (Sonter et al. 2017). Biodiversity may change or decline over time independently of the business activity being assessed, and this state of decline is used as the counterfactual scenario. Climate change, for example, may force species to shift their ranges. If a counterfactual scenario represents an area of substantial biodiversity loss, then business impacts may be assessed as relatively lower (i.e., less biodiversity loss is attributed to the business activity), or alternatively biodiversity affected by the business operation could be deemed more valuable with time (e.g. sustainable management of degraded lands to improve biodiversity values). If the counterfactual scenario represents an area of stable, or increasing biodiversity, then business impacts may be assessed as relatively larger (i.e., more biodiversity loss is attributed to the business activity).

b. Spatial and temporal boundaries

Including biodiversity influences the spatial and temporal boundary of your assessment; it is likely that broader geographical and temporal boundaries will be needed for a biodiversity-inclusive assessment than when focusing on the non-living components of natural capital.

When considering biodiversity, the potential areas of influence can be large, due to, for example, impacts on migratory or wide-ranging species. For financial institutions undertaking portfolio-level assessments or companies with geographically dispersed operations, the potential area of influence may include multiple geographical and temporal boundaries.

The timeframes over which the implications of impacts and dependencies on biodiversity are felt also require further consideration. For example:

- The condition of biodiversity can change over time, influencing the benefits received by business and society in the future. It can be difficult to predict changes in benefits linked to changes in biodiversity, but it is risky to assume that benefits will persist without managing biodiversity. Equally there may be a time-lag between loss of biodiversity and the loss of services, particularly where it is the resilience of the ecosystem that is impacted making it vulnerable to collapse at a later date. Information on trends in biodiversity, and the drivers of its condition, will help you to understand whether it is likely to change.

- Biodiversity management efforts can take time to achieve their desired outcomes. You need go beyond a single snapshot in time, and consider the consequences of changes in the state of biodiversity over time.

- The presence of potential thresholds and tipping points, where minor changes in biodiversity can result in larger changes to the ways ecosystems function. Your timeframe should be appropriate to assess the consequences, and potential irreversibility, of your impacts on biodiversity.

3.2.7 Address key planning issues

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 41 FOR GENERAL GUIDANCE.

04 Step 04 Guidance: Determine the impacts/dependencies

4.2.1 List potentially material impacts/dependencies

Once you have set the objectives of your assessment and completed your initial scoping actions, you should complete a materiality assessment. Throughout this process, it is important to remember that:

i) The value of biodiversity in providing ecosystem services may be hidden and so may not initially be identified as material to a business.

ii) Impacts on biodiversity affect dependencies (i.e., impacts on biodiversity may also reduce the flow of ecosystem services supporting business operations).

iii) Impacts may appear more material when focusing on societal value as growing concern over biodiversity loss may result in greater regulation and greater consumer pressure.

The first stage of a materiality assessment is to identify impact and dependency pathways, in order to later prioritize which are material. Impact pathways describe how, as a result of a specific business activity, a particular impact driver results in changes in natural capital and how these changes impact different stakeholders. A dependency pathway shows how a particular business activity depends upon a specific component of natural capital. An example for a biodiversity dependency might be a coffee farm's dependence on the pollination of its coffee plants to yield coffee beans (see figure 4.1). This pollination service is reliant on a variety of species and ecosystem processes (e.g., plants supplying nectar supporting the pollinators). In this way, the coffee production process is reliant on habitats rich in biodiversity.
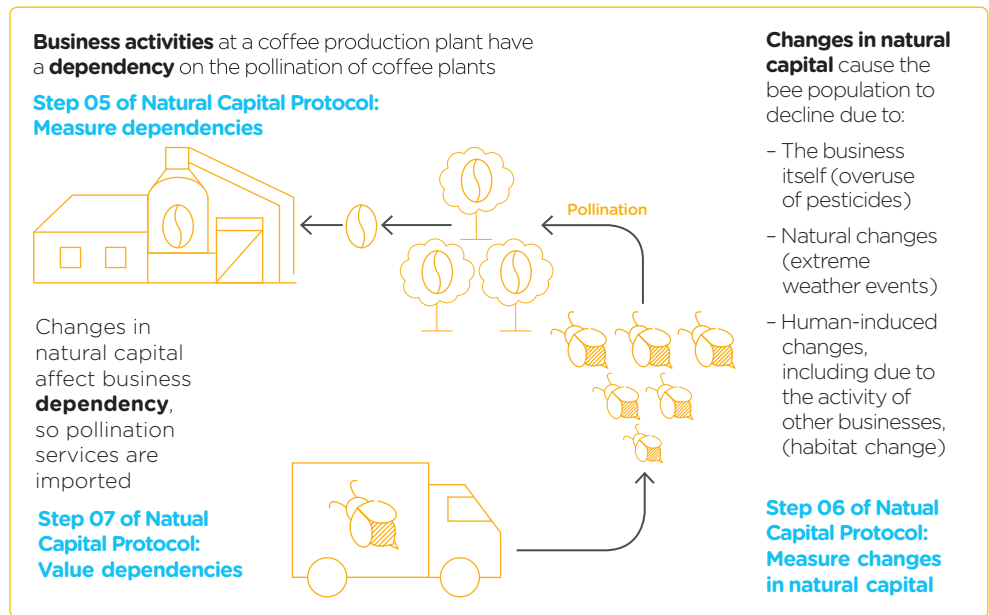

Business activities at a coffee production plant have a **dependency** on the pollination of coffee plants

Step 05 of Natural Capital Protocol: Measure dependencies

Pollination

Changes in natural capital affect business **dependency**, so pollination services are imported

Step 07 of Natual Capital Protocol: Value dependencies

Changes in natural capital cause the bee population to decline due to:

– The business itself (overuse of pesticides)

– Natural changes (extreme weather events)

– Human-induced changes, including due to the activity of other businesses, (habitat change)

Step 06 of Natual Capital Protocol: Measure changes in natural capital

Figure 4.1
Generic steps of a dependency pathway for a coffee plantation dependent on insect pollinators (figure 4.2 from the Natural Capital Protocol)

Similarly, businesses may impact on biodiversity which in turn can affect dependencies. Impact pathways begin with a specific impact driver. An impact driver is a measurable quantity of a natural resource that is used as an input to production, or a measurable non-product output of a business activity. Using pollination for coffee plantations as an example, clearing a measurable area of land (impact driver) for agricultural conversion can reduce the species richness (biodiversity impact) within pollinator-supporting habitats, thereby increasing the risk of reduced crop productivity and disrupting the coffee production process (business value).

4.2.2 Identify criteria for your materiality assessment

After identifying your potential impact and dependency pathways, these should then be prioritized by screening against set criteria to determine materiality. The criteria for assessing materiality may vary when including biodiversity. For example:

- **Operational** – Business operations, in particular upstream operations, may be specifically dependent on biodiversity, as well as on the non-living components of natural capital.

- **Legal and regulatory** – Biodiversity may be managed under a different set of regulations than the non-living components such as water resources.

- **Financing** – Some financial institutions are starting to quantify biodiversity impacts within their risk management processes. This means a company's biodiversity impacts can affect their access to capital.

- **Reputational and marketing** – These criteria may have higher materiality weighting for biodiversity due to the intrinsic value of biodiversity to many stakeholders or customers.

- **Societal** – For biodiversity, societal dependencies are examined through business's impacts that affect delivery of goods and services to society. With the importance of biodiversity being increasingly recognized, unaccounted impacts on society increase your reputational, financial, and regulatory risks and opportunities.

Examples of impact and dependency pathways specifically related to biodiversity are provided in table 4.1 along with their associated materiality criteria. Multiple impact pathways may act together to cause a change in state of biodiversity. For example, vegetation clearing and pollution may act synergistically to reduce the quantity and quality of biodiversity in an area.

Table 4.1
Example material impact and dependency pathways specifically related to biodiversity

	Impact driver/ dependency	Changes to biodiversity	Value to business/ society	Materiality criteria
Impact- input	Area of open cast mine	Reduction in total vegetation cover and structural complexity	Increased damage cost from flood or cost of setting artificial flood protection	Operational/societal
Impact- output	Noise	Declining breeding success of protected species	Abatement costs of mitigation measures required through regulations	Legal and regulatory
Dependency	Pollination of crops	Declining biodiversity in pollinator-supporting habitats	Costs of reduced yields, unpredictable upstream supply and decreased pollination of surrounding habitats (affecting livelihoods of local communities)	Operational/societal

Building up these impact and dependency pathways allows you to map out the impacts and dependencies on biodiversity as part of your natural capital assessment.

Tools have been developed which can aid in the assessment of materiality of your business dependencies and impacts on biodiversity. At present these are restricted to understanding species and habitats and do not represent the variety of species, ecosystems, and genetic diversity, or the intrinsic value of biodiversity. For example, the ENCORE tool (Exploring Natural Capital Opportunities, Risk and Exposure) assessed the importance of the contribution an ecosystem service makes to a production process, and the materiality of the impact if this service is disrupted. Two materiality criteria were considered in the ENCORE analysis: 1) How significant is the loss of functionality in the production process if the ecosystem service is disrupted? and 2) How significant is the financial loss due to the loss of functionality in the production process?

4.2.3 Gather relevant information

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 49 FOR GENERAL GUIDANCE.

4.2.4 Complete the materiality assessment

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 50 FOR GENERAL GUIDANCE.

Having set your objectives, scoped your assessment, and identified a prioritized list of material impacts, dependencies, and changes in biodiversity to include in your natural capital assessment, please continue to the **Measuring and Valuing Guidance** to explore how these can be measured.

MEASURE AND VALUE STAGE

Key messages

- A number of measurement methods are available to help businesses quantify their impacts on biodiversity across the value chain.

- Methods to measure dependencies on biodiversity remain a gap.

- Progressing from measurement to valuation can help you understand the relevance and, to an extent, the magnitude of your impacts and dependencies on biodiversity in a defined context.

- Understanding the data available within your business and from external sources, and the strengths and limitations of different approaches, can help determine which biodiversity measurement and valuation approaches are feasible for your overall objective and scope.

- There are a variety of valuation approaches available (qualitative, quantitative, and monetary), all of which have advantages and disadvantages. Some aspects of biodiversity's value cannot be captured with monetary techniques. In those instances, qualitative and/or quantitative approaches can be applied to assess the value of biodiversity.

- All measurement and valuation approaches have limitations which are important to understand. These limitations must be disclosed to ensure transparency with key stakeholders. Sensitivity analysis should be conducted to understand the implications of the limitations of any approach with respect to decision-making.

Introduction

Frame stage

Scope stage

Measure and Value Stage

Apply stage

MEASURE AND VALUE STAGE

What is the Measure and Value Stage?

The Measure and Value Stage of the Natural Capital Protocol introduces guidance on how impacts and dependencies can be **measured** and **valued**, building on information provided in the Scope Stage. This **Measuring and Valuing Guidance** details how to Measure (Steps 05 and 06 of the Protocol) and Value (Step 07 of the Protocol) biodiversity impacts and dependencies as part of your natural capital assessment and builds on information provided in the **Scoping Guidance**.

You may be incorporating biodiversity into your natural capital assessment for the first time, or you may be looking to strengthen the measurement and/or valuation of impacts and dependencies on biodiversity of previously completed assessments.

What additional biodiversity guidance is provided for the Measure and Value Stage?

Table MV.1 provides an overview of the questions and actions of the Measure and Value Stage in the Protocol and outlines the actions for which the **Measuring and Valuing Guidance** provides additional information.

Step 05: How can your biodiversity impact drivers and/or dependencies be measured?

Step 06: What are the changes in the state and trends of natural capital [biodiversity] related to your business impacts and/or dependencies and how can they be measured?

Step 07: What is the value of your natural capital [biodiversity] impacts and/or dependencies?

Table MV.1
The Measure and Value Stage: Mapping between the Protocol and the Biodiversity Guidance

Protocol Step		Questions this Step will answer	Protocol actions	Additional guidance included?
05	**Measure impact drivers and/or dependencies**	**How can your impact drivers and/or dependencies be measured?**	5.2.1 Map your activities against impact drivers and/or dependencies	**Yes** See action 5.2.1
			5.2.2 Define which impact drivers and/or dependencies you will measure	**No** Refer to Protocol page 60 for guidance
			5.2.3 Identify how you will measure impact drivers and/or dependencies	**Yes** See action 5.2.3
			5.2.4 Collect data	**No** Refer to Protocol page 65 for guidance

Protocol Step		Questions this Step will answer	Protocol actions	Additional guidance included?
06	**Measure changes in the state of natural capital [biodiversity]**	**What are the changes in the state and trends of natural capital [biodiversity] related to your business impacts and/or dependencies?**	6.2.1 Identify changes in natural capital [biodiversity] associated with your business activities and impact drivers	**Yes** See action 6.2.1
			6.2.2 Identify changes in natural capital [biodiversity] associated with external factors	**Yes** See action 6.2.2
			6.2.3 Assess trends affecting the state of natural capital [biodiversity]	**Yes** See action 6.2.3
			6.2.4 Select methods for measuring change	**Yes** See action 6.2.4
			6.2.5 Undertake or commission measurement	**Yes** See action 6.2.5
07	**Value impacts and/or dependencies**	**What is the value of your natural capital [biodiversity] impacts and/or dependencies?**	7.2.1 Define the consequences of impacts and/or dependencies	**No** Refer to Protocol page 80 for guidance
			7.2.2 Determine the relative significance of associated costs and/or benefits	**No** Refer to Protocol page 82 for guidance
			7.2.3 Select appropriate valuation technique(s)	**Yes** See action 7.2.3
			7.2.4 Undertake or commission valuation	**Yes** See action 7.2.4

Additional notes

You should address all of the actions associated with each Step in the Measure and Value Stage of the Protocol. This Guidance provides additional information for some of the actions where biodiversity-specific considerations need to be taken into account. For a detailed appraisal of the suitability and potential accuracy of different methods of measurement and valuation please refer to the Protocol.

How should you plan for this Stage?

Before you get started with the Measure and Value Stage of your assessment, you should consider your planning requirements. The Protocol identifies some of the resource needs that should be considered for each Step of the assessment. For measuring impacts on your business, fewer external resources are typically needed, as some data may be available in your company or in published literature. For measuring your impacts on society and your business dependencies, however, more resources are likely needed and this may require specialist environmental/natural resource modeling expertise.

Progression from measurement to valuation is helpful to understand the relevance and magnitude of your impacts and dependencies on biodiversity in your business context. However, considerable training and applied experience are required to apply valuation techniques to biodiversity impacts and dependencies. You may need to commission external partners and consultants to assist your biodiversity valuation.

The availability of existing data and the ability to leverage biodiversity-specific published literature are planning considerations not only for measurement and valuation but also when scoping your natural capital assessment. For biodiversity, there are a number of resources for measuring and valuing including guidelines, frameworks, and measurement tools. Table MV.2 provides a non-exhaustive list summarizing some of these and illustrates how they may be useful for your assessment alongside this Guidance.

Table MV.2
Examples of biodiversity-specific resources relating to measurement and valuation

Author	Title/Name (Year)	Type	Stage	Description
Convention on Biological Diversity (CBD)	An exploration of tools and methodologies for valuation of biodiversity and biodiversity resources and functions (2007)	Report	Value	Compilation of methodologies for valuation of biodiversity and biodiversity resources and functions, as well as other tools for prioritization in decision-making. It includes 13 valuation case studies.
Convention on Biological Diversity (CBD)	Voluntary guidelines on biodiversity-inclusive impact assessments (2006)	Guidelines	Measure	Structured to match the steps outlined in environmental impact assessments (EIA), guidelines are provided to better integrate biodiversity-related considerations in the EIA process.
Department for Environment, Food & Rural Affairs (UK)	Enabling a Natural Capital Approach (ENCA): Guidance (2020)	Report	Measure	Data, guidance, and tools to help understanding of natural capital (including biodiversity).
economics for the environment (eftec) and the Department for Environment, Food & Rural Affairs (UK)	Environmental Valuation Look-up Tool (2015)	Database	Value	Database which contains indicative monetary values for a range of UK environmental impacts (including biodiversity).
Environment and Climate Change Canada and Department for Environment, Food & Rural Affairs (UK)	Environmental Valuation Reference Inventory (n.d.)	Database	Value	Searchable storehouse of empirical studies on the economic value of environmental assets and human health effects, which could be used in value transfer.
EU Business @ Biodiversity Platform	Assessment of biodiversity accounting approaches for businesses and financial institutions. Update Report 1 (2018)	Report	Measure	The first of a series of update reports assessing biodiversity measurement approaches for businesses and financial institutions. Methods using quantitative indicators are specifically assessed.
EU Business @ Biodiversity Platform & UNEP-WCMC	Assessment of biodiversity measurement approaches for business and financial institutions. Update Report 2 (2019)	Report	Measure	Second assessment report providing updates on measurement methodology developments with a focus on technical issues. Annex includes updates on each tool and explanatory notes on GLOBIO and ReCipe data tools.
EXIOBASE Consortium	EXIOBASE (n.d.)	Database	Measure	An example of an environmentally extended multiregional input-output database. Multiple input-output databases have been developed by different initiatives.
Global Reporting Initiative	GRI 304: Biodiversity 2016 Standard (2016)	Framework	Measure	GRI's main and current standard on biodiversity impact measurement and reporting. This guidance is being updated.
PBL Netherlands Environmental Assessment Agency	GLOBIO (n.d.)	Database	Measure	Model using a mean species abundance (MSA) metric to calculate impacts on biodiversity due to human pressures.

Author	Title/Name (Year)	Type	Stage	Description
International Association for Impact Assessment	Biodiversity and Ecosystem Services in Impact Assessment (2018)	Framework	Measure	Provides best practice to improve development and capacity building within business to improve the EIA process.
IBAT Alliance (Birdlife International, Conservation International, IUCN, UNEP-WCMC)	Integrated Biodiversity Assessment Tool (IBAT) (n.d.)	Mapping tool	Measure	IBAT provides authoritative global biodiversity data. Users can import raw data on locations and create reports and map files
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)	Diverse Values and Valuation (2016)	Guidelines	Value	Methodological guidance based on the IPBES Preliminary guide on diverse conceptualization of multiple values of nature and its benefits. Covers topics including "Contrasting Approaches to Values & Valuation" and a "Six Step Approach to Valuation."
International Union for Conservation of Nature (IUCN)	The development and use of biodiversity indicators in business: an overview (2018)	Report	Measure	Background information on the business need for biodiversity indicators related to specific business applicatons
International Union for Conservation of Nature (IUCN)	Threats Classification Scheme (n.d.)	Database	Measure	Hierarchical breakdown detailing the drivers of species decline.
PRé Sustainability	ReCiPe (2016)	Database	Measure	Developed for life cycle assessment, the model expresses potential disappearance of species as an indicator of impacts on biodiversity.
The Economics of Ecosystems and Biodiversity (TEEB)	The Economics of Ecosystems & Biodiversity (TEEB) Ecological and Economic Foundations (2010)	Report	Value	Conceptual foundation linking economics and ecology, highlighting the relationship between biodiversity and ecosystem services and showing their importance for human well-being. Chapter 4 (The socio-cultural context of ecosystem and biodiversity valuation) and Chapter 5 (The economics of valuing ecosystem services and biodiversity) are particularly relevant to Step 07 of the Protocol.
The Economics of Ecosystems and Biodiversity (TEEB)	Valuation Database (2010)	Database	Value	Estimates for monetary values of ecosystem services that could be used in value transfer.

05 Step 05 Guidance: Measure impact drivers and/or dependencies

5.2.1 Map your activities against impact drivers and/or dependencies

a. Identifying impact drivers

Once the impact pathway is understood, it is important to consider how biodiversity impact drivers and dependencies can be **measured**. In a practical sense, you could determine how your business activities drive impacts on **species** and **habitats**, as these two metrics are the most easily quantifiable measures of biodiversity, particularly for site-/project-level assessments. However, as noted in the **Framing Guidance**, biodiversity is much more than species and habitats alone. For an overview of concepts related to impact drivers and impact pathways, refer to page 44 of the Protocol.

Biodiversity impact drivers can be **direct** (impacting biodiversity immediately) or **indirect** (leading to changes in biodiversity as a consequence of something else). These are identifiable because they result in a measurable change to the environment. This can be through the measurable use of a natural resource called an **input** (e.g., area of wetland used during construction), or the creation of a non-product **output** (e.g. volume of pollutant emitted to the wetland during construction). Examples of direct and indirect biodiversity **impact drivers** are presented in table 5.1 below.

Table 5.1
Direct and indirect biodiversity impact drivers (adapted from IPBES 2017) and related biodiversity examples

Type of impact driver	Impact driver category	Input/ output	Examples of specific, measurable impact drivers related to biodiversity
Direct	Land-/sea-use change	Output	Area of land converted from natural forest to agricultural land, area of seabed used to install a windfarm
	Direct exploitation	Input	Number of animals displaced due to project installation
	Climate change	Output	Emission of GHGs into the atmosphere
	Pollution	Output	Wastewater entering the marine environment, agricultural runoff, operational noise
	Invasive alien species	Output	Movement of invasive species through shipping and transportation of goods
Indirect	Demographic and sociocultural	Output	Increase in human population near project site, change in consumption pattern of local resources (by humans)
	Economic and technological	Input	Trade of species

The **IUCN Threats Classification Scheme** (IUCN n.d.) details the categories of threats arising from impact drivers in a hierarchical structure. It details current drivers of decline for individual species, including historical threats that are no longer active and future threats that are likely to occur within three generations or ten years. This can be used to help identify impact drivers posing a threat to, and consequently impacting on, biodiversity. Activities highlighted as having a greater threat would be deemed as having a higher risk and should be prioritized for avoidance, mitigation, and offsetting in line with the mitigation hierarchy.

b. Identifying dependencies

As biodiversity is an integral part of **natural capital stocks**, and underpins the goods and services that stocks generate, businesses inherently depend on biodiversity. For example, a coffee plantation will be dependent on the pollination of its coffee plants to yield coffee beans (see figure 5.1). A successful coffee yield is dependent on the habitat (a component of biodiversity) used to grow the coffee plants and the pollinators within the area.
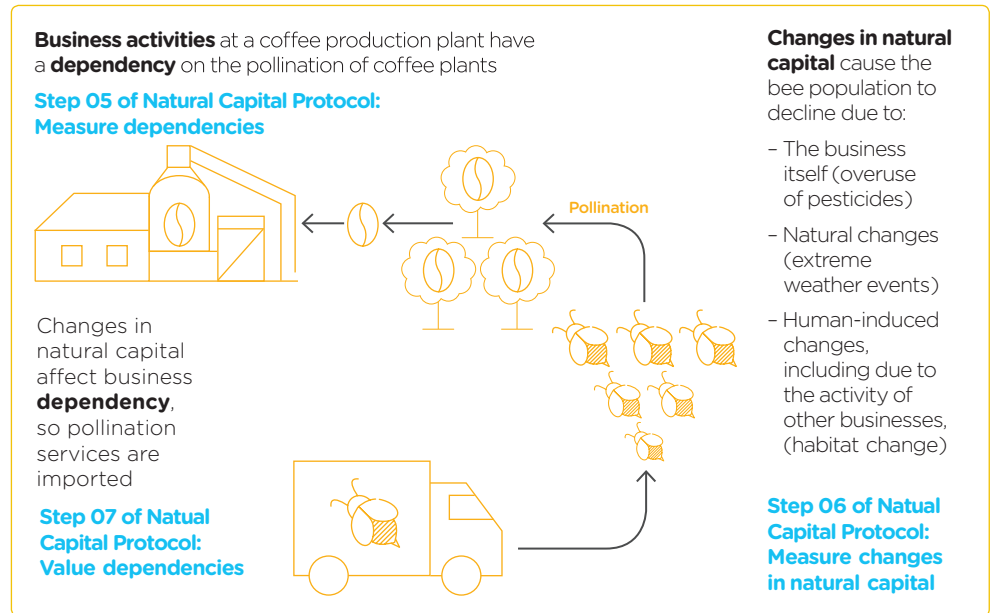
Business activities at a coffee production plant have a **dependency** on the pollination of coffee plants

Step 05 of Natural Capital Protocol: Measure dependencies

Changes in natural capital affect business **dependency**, so pollination services are imported

Step 07 of Natual Capital Protocol: Value dependencies

Pollination

Changes in natural capital cause the bee population to decline due to:

– The business itself (overuse of pesticides)

– Natural changes (extreme weather events)

– Human-induced changes, including due to the activity of other businesses, (habitat change)

Step 06 of Natual Capital Protocol: Measure changes in natural capital

Figure 5.1
A coffee plantation's dependencies on insect pollinators for the success of its business (Figure 4.2 in the Natural Capital Protocol, 2016)

ENCORE (Exploring Natural Capital Opportunities, Risks, and Exposure) is an online tool to help businesses identify the impact and dependency pathways related to their business activities. It is applicable to all business sectors and financial institutions and details how impacts and dependencies on natural capital may pose a business risk if environmental degradation occurs.

5.2.2 Define which impact drivers and/or dependencies you will measure

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 60 FOR GENERAL GUIDANCE.

Examples are given in table 5.2 of business activities that result in an impact driver, including its associated quantitative indicator, key data gaps, and uncertainties to consider before undertaking measurement.

5.2.3 Identify how you will measure impact drivers and/or dependencies

To measure an impact driver and or dependency, you need to determine the type of data required. Many data sources exist and are described in detail within the Protocol (page 60). To measure biodiversity impact drivers and/or dependencies, there are generally two forms of data to consider acquiring and/or collecting. Each is described below with examples.

Primary data:

• Internal business data

• Site-level impact driver data collected through field surveys and sampling

• Data collected from suppliers or customers

Secondary data:

• Published, peer-reviewed, and grey literature (for example, life-cycle impact assessment (LCIA) databases; industry, government, or internal reports)

• Estimates derived using modeling techniques, including:

   • Environmentally extended input-output (EEIO) models. Many EEIO initiatives exist, including the commonly used EXIOBASE, EORA and GTAP.

   • Productivity models

   • Mass balance models

• Past natural capital assessments

Data collection techniques are highly variable and often dependent on location, project, and area of the value chain being assessed. For this reason, one technique may not be practical or well suited across multiple applications (however techniques should be compatible to ensure consistency and comparability as far as possible). For example, a site-level project (e.g., an environmental assessment for a prospective mine) may involve habitat surveys to assess area of habitat that would be lost, whereas data collection for a wholesaler looking at impact drivers related to commodity sourcing may require information provided by individual farmers through a survey. Both techniques result in the collection of primary data.

Data should be collected and organized in a consistent manner, so that the various data collected are compatible with each other and with the scope of analysis, and are easily comparable, shareable, and interoperable across sites, countries, time, and organizations (where applicable). Users should consider how impact driver data, and the various assessments undertaken, may need to be compared over time when selecting data and methods that are compatible.

The Protocol provides more detail on the limitations and considerations when collecting and using primary or secondary data to measure impact drivers. This includes the use of intermediate indicators (see table 5.6 in the Protocol).

For examples of business activities and their associated impact drivers, indicators, and data sources required, refer to table 5.2. This also includes important considerations on data gaps and related uncertainties.

Table 5.2
Examples of business activities that result in an impact driver, associated quantitative indicator, and key data gaps or uncertainties to consider before undergoing measurement

Activity	Impact driver	Quantitative indicator	Data source	Example data gaps and key issues to consider
Site-level impact: mining for ore	Land-use change (i.e., habitat loss)	Hectares of habitat lost	**Primary** data: Direct collection	− Need to determine physical boundaries for site. − Determine if cumulative effects are being included.
	Water use	Volume of water used annually	**Primary** data: Direct collection	− Need to consider timescales. For example, land-use change is likely to occur primarily during project construction, whereas water use will continue on an annual basis and require repeated surveys.
	Water pollutants (i.e., tailing ponds)	Tons of deleterious chemicals released to surface water	**Primary** data: Direct collection	− Need to determine physical boundaries of where water pollutant assessment will occur. − Need to consider which pollutants will be assessed and the local (i.e., regional or national) water quality assessment guidelines that will used.
Product-level impact: manufacturing leather shoes	Direct exploitation (i.e., species lost from sourcing materials)	Quantity of leather sourced per year (measured by weight or volume of materials purchased)	**Secondary** data: Global datasets	− Consider parts of the value chain being assessed (upstream, downstream, and/or direct impacts). − Will rely on proxy data to understand impact driver through the supply chain.
	Pollution (i.e., wastewater from production plant)	Tons of deleterious chemicals released to surface water	**Primary** data: Direct collection	− Need to determine physical boundary of assessment (i.e.,over what geographic area of direct operations will impacts and dependencies be considered). − Need to determine time period when field work will be completed, and number of repeat measurements necessary.
	Water use	Volume of water used annually	**Primary** data: Direct collection	− Need to consider area of the value chain being assessed (upstream, direct operations, and/or downstream). − If unable to collect direct data from manufacturing facility, may rely on secondary data (i.e., proxy or modeled data) based on size of the company.
Portfolio-/ sector-level impact: food production	Land-use change (i.e., biodiversity footprint of a food industry portfolio)	Hectares of land converted to monoculture	**Secondary** data: **Public data** (annual reports), private databases (fee required), and **internal** data collected (at global level)	− Data likely come from multiple sources and in multiple formats requiring heavy data pre-treatments. − Transforming multiple datasets into the same format is generally completed by experts. − Different levels of confidence may result for different aspects of the data.
	GHG emissions (e.g., from land-use change or fertilizer use)	Volume of carbon dioxide (CO_2) emitted into the atmosphere	**Secondary** data: Global datasets	− Need to consider part of the value chain being assessed (i.e.,. upstream, downstream emissions associated with product). − May rely on modeled data for some aspects of operations if direct measurements are not available.
	Marine ecosystem use (e.g., shellfish grown in terrestrial-based aquaculture facility)	Area of aquaculture used to grow blue mussels	**Primary** data: Direct collection	− Availability of approaches for measuring impacts and dependencies on marine ecosystem use are currently limited.

In the case of a business's dependencies on biodiversity, once these are identified they will need to be measured in a standardized way. Currently, changes to the **stocks** (i.e., the impacts on biodiversity) and **flows** (i.e., impacts to ecosystem services) are relatively well understood. However, the relationship between stocks and flows are poorly understood and hard for businesses to quantify.

There are some tools such as ENCORE (focused on identifying impact and dependency pathways for financial institutions), LIFE (applicable at all Organizational Focuses), InVest, and ARIES, which identify relevant ecosystem services for business activities. Currently, standardized corporate **measurement approaches** to quantify biodiversity dependencies are very limited and this is an area which will require innovation. Meanwhile, you can use the approach of the Natural Capital Protocol to incorporate dependencies on biodiversity as part of your assessment.

5.2.4 Collect data

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 65 FOR GENERAL GUIDANCE.

06 Step 06 Guidance: Measure changes in the state of natural capital [biodiversity]

6.2.1 Identify changes in natural capital [biodiversity] associated with your business activities and impact drivers

This action considers the changes in biodiversity resulting from the impact drivers measured or estimated in Step 05. Example impact drivers resulting in changes to the state of biodiversity, and potential challenges when determining impacts on biodiversity, are described in table 6.1. Refer to the Protocol (page 68) for further detail.

Table 6.1
Examples of impact drivers resulting in changes (i.e., impacts) to the state of biodiversity.

Impact driver	Change in biodiversity state	Cause of change in state	Points to consider
Pollution (kilograms of nitrates released to surface water)	Reduction in the number of species present in a given area.	Reduced oxygen levels within a waterway (river, lake, or stream) due to the input of chemicals.	Changes in biodiversity due to water pollution are location specific. The type of pollution, quality of receiving water etc., can present challenges for accurate measurement in large-scale assessments. Available modeling approaches are likely to require in-house training or consultant expertise. Water quality assessments are likely to be required on a monthly basis over a long period of time.
Land use (hectares of natural land converted to agricultural land)	Decreased habitat availability and connectedness within a given area.	Land use transforms the amount of natural habitat available and fragments the landscape.	Changes in biodiversity due to land use need to consider the amount of area lost in combination with the loss in connectivity between available (natural) habitat. Loss in connectivity (i.e., fragmentation) can lead to a loss of habitat quality; remaining fragmented habitats may be less resilient to future environmental change or extreme events affecting the provision of ecosystem services.

REFER TO THE PROTOCOL PAGE 68 FOR FURTHER GUIDANCE.

6.2.2 Identify changes in natural capital [biodiversity] associated with external factors

a. Determining external factors related to impacts
You should identify external factors that could result in changes to the state of biodiversity within the bounds of your assessment. These factors may directly or indirectly affect the perceived significance of impacts resulting from your business. This becomes important when required to compensate for biodiversity losses relating to your activities.

An optimum method for assessing changes in biodiversity associated with external factors at the site-level is through the comparison of impacts within the assessment area and a reference site at a secondary location where your business activities are not occuring. It can be very challenging to disentangle these external factors and the use of a reference site is often not feasible.

b. Determining external factors related to dependencies
You should consider identifying external factors affecting, or potentially affecting, your business's dependencies on biodiversity. Considering the coffee plantation example, if a nearby river supplying water to the farm were dammed, there would be less water available to activities dependent upon the water supply. Or, if the forest surrounding the coffee plantation were to be degraded, this would reduce the protection from fire and flooding that is inherently provided by the surrounding, natural habitat.

The ENCORE tool can help identify impact and dependency pathways to determine external factors that may affect your business.

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6.2.3 Assess trends affecting the state of natural capital [biodiversity]

You should distinguish between changes in biodiversity driven by impact drivers over which your company has some control from changes due to drivers which the company does not control. A number of tools and databases are available to assist in the assessment of background rates of change in biodiversity. See the Biodiversity Guidance **Navigation Tool.**

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 72 FOR GENERAL GUIDANCE.

6.2.4 Select methods for measuring change

Data requirements will change based on selected measurement methods and need to be reviewed in each instance. You should also bear in mind that actions 5.2.3 through 6.2.4 can be used iteratively to ensure that data and methods are compatible.

For example, measurement methods using primary biodiversity data usually involve **on-the-ground** data collection. If budget, time restrictions, or the objective of your assessment do not allow for the use of primary data, then secondary data can be used instead. Using secondary data, such as on climate change, land use, and pollution, can allow you to model biodiversity impacts through a variety of methods. However, modeled results often convey less detail. Table 6.2 provides additional biodiversity-specific considerations for the use of primary and secondary biodiversity data. For a detailed appraisal of the suitability and potential accuracy of different techniques, refer to the Protocol.

Table 6.2
Biodiversity-specific considerations for primary and secondary data approaches

Type of data	Biodiversity-specific considerations

Primary data	Challenges to consider when collecting primary biodiversity data:
	
	– Timescales – data collected may not span the time required for impacts on biodiversity to manifest
	– Seasonal variations – biodiversity can vary across seasons, therefore full impacts may not be captured if data are limited seasonally. Primary data collection will need to be planned so it is completed in relevant seasons (for example breeding bird surveys)
	– Spatial variations – data may not be collected over an appropriate spatial scale to incorporate many impact drivers
	– Technical expertise is often required such as from biology/ecology consultancies, non-governmental organizations, or academia.
	– Other challenges more broadly applicable to primary data collection include:
	  – Remote-sensing data (i.e., satellite data) can be reliant on clear weather conditions, restricted in temporal scale, and costly
	  – Land access
	  – Cost

Secondary data	Challenges to consider when utilizing secondary data: – Data required are often location-specific and complex – Data gaps result in the use of data assumptions, which decrease accuracy – Models of the distribution of biodiversity, and of the effects of impact drivers, are often not robust enough for reliable assessments – Underlying assumptions and limitations need careful consideration to ensure the modeling scenario is appropriate for your situation — often models are built for other purposes and are not applicable to new circumstances – Some models require expertise to be used effectively – Proprietary rights of data sources must be considered as biodiversity data are sometimes restricted for commercial use

Other specific limitations will exist for each method reviewed, and these limitations need to be considered in the greater context of your assessment. Refer to the EU Business @ Biodiversity Assessment report and associated annexes for further explanation of issues related to data and specific limitations/applicability for each method. Examples of various measurement and estimation methods are provided in table 6.3.

Table 6.3
Examples of measurement and estimation methods for biodiversity

Measuring changes in biodiversity	Direct measurement	Proxies	Modeling methods
Species	Direct measurement of species richness and abundance through field surveys. **Organizational Focus**: product, project, site, company	Use of the Integrated Biodiversity Assessment Tool (IBAT) to identify the presence of IUCN Red List threatened species. This includes freshwater species that are present upstream and downstream of a specified water basin. **Organizational Focus:** project, company	Use of GLOBIO model to estimate the mean species abundance (MSA) change as a result of a given impact driver. Use of species specific habitat suitability models to estimate changes in the likelihood that local populations of species will persist after land use change (Durán et al. 2020) **Organizational Focus**: site/sector/portfolio
Habitat	Direct measurement of habitat area and assessment of quality through field surveys. **Organizational Focus**: site, project	Use of the Integrated Biodiversity Assessment Tool (IBAT) to identify the presence of Key Biodiversity Areas and Critical Habitat in terrestrial and freshwater habitats. Use of Ocean+ data to identify the presence and extent of key marine and coastal habitats. Use of Global Mangrove Watch to download data and identify mangrove extent by region. The Defra biodiversity metric provides a method for estimating habitat quality and extent. **Organizational Focus**: project, company	Use of Global Forest Watch to obtain data on deforestation and forest biodiversity intactness in area/region of interest. **Organizational Focus:** site, project

Several biodiversity measurement approaches for business are under development globally. Here, we define "measurement approaches" as encompassing indicators, frameworks, and tools for assessing corporate biodiversity impacts and dependencies. The majority are currently in the piloting phase (see figure 6.1 and box 6.1). They are currently classified by Business Application (see **Framing Guidance**) and Organizational Focus (see **Scoping Guidance**), but these are indicative and not restrictive.

Box 6.1: Aligning Biodiversity Measures for Business

The Aligning Biodiversity Measures for Business collaboration, in conjunction with the EU Business @ Biodiversity platform, aims to provide clarity on available corporate biodiversity measurement approaches. The partners are working to develop a systematic means of determining the most appropriate measurement approach for any biodiversity-inclusive natural capital assessment. Refer to the EU Business @ Biodiversity Assessment (Update Report 2, 2019) for description of the current methods available (as of December 2019), the data required to use each approach, and associated limitations. The Business Applications identified by the collaboration have been used within this Guidance. See the **Biodiversity Guidance Navigation Tool** and **Framing Guidance** for more information. The matrix in table 6.1 has been developed to visualize the available measurement approaches and their applicability across the value chain. The information included in the matrix is self-reported by the measurement approach developers, and the EU Business @ Biodiversity platform is assessing various case studies from piloting of these methods to determine the validity of this self-assessment (results expected end of 2020). For this reason, the matrix may be updated as the collaboration continues to convene method developers and expand beyond the approaches identified below. It is suggested that you review all applicable approaches, and choose the one most suited to your business needs. This can be achieved through the use of the online **Biodiversity Guidance Navigation Tool**.

It is recommended that you refer to the **Biodiversity Guidance Navigation Tool** to determine the measurement approaches appropriate for your business and assessment objectives. You may need to adopt multiple approaches to provide a comprehensive assessment. Additionally, the combination of measurement approaches that works for one organization may not be relevant for another. Once measurement approaches have been selected, the Guidance presented here will assist you in data collection, measurement, and valuation of your business's impacts on biodiversity. Choosing an appropriate measurement approach is also described in more detail below.

It is noted that the measurement approaches identified below (see figure 6.1) are primarily used for determining impacts and dependencies with regard to terrestrial biodiversity. It is recognized that these approaches are limited in addressing and incorporating aquatic (freshwater) and marine biodiversity (see table 10 of the EU Business @ Biodiversity Assessment Update Report 2 (2019)).

Business application supported	Organisational focus					
	Product/service	Site/project	Supply chain	Corporate	Portfolio/sector	Country/region
1. Current performance	ABD PBF	ABD LIFE BISI STAR BD BMS BPI	ABD LIFE BD PBF BIM BMS EPL	BD GBS BISI LIFE BIM BMS EPL	BFFI LIFE GBS	ABD LIFE
2. Future performance	PBF	LIFE STAR BPT	LIFE PBF	GBS LIFE	BFFI LIFE GBS	LIFE
3. Tracking target progress	ABD PBS	ABD BISI BD LIFE STAR	ABD STAR BD LIFE	ABD BIM BD LIFE GBS STAR	ABD LIFE BFFI STAR GBS	ABD STAR
4. Comparing options	ABD PBS	ABD STAR BISI	ABD LIFE BIM EPL	ABD BIM BISI GBS EPL	ABD GBS BFFI LIFE	ABD LIFE
5. Third party assessments/ratings		LIFE		GBS LIFE	GBS LIFE BFFI	LIFE
6. Third party certification		BD LIFE BMS	BD LIFE BMS	BD LIFE BMS	LIFE	LIFE
7. Risk & opportunity assessment	ABD	ABD BISI BPI	ABD EPL	ABD BISI EPL	ABD	ABD
8. Biodiversity accounting		BD	BD	BD		

Key

ABD	Agrobiodiversity index	BISI	Biodiversity Indicators for Site-based Impacts	LIFE	LIFE Impact index
BFFI	Biodiversity Footprint Financials	BD	Biological Diversity Protocol	PBF	Product Biodiversity Footprint
BIM	Biodiversity Impact Metric	GBS	Global Biodiversity Score	STAR	Species Threat Abatement & Recovery
BMS	Biodiversity Monitoring System for the Food Sector	EPL	Environment Profit & Loss	BPT	Biodiversity Performance Tool
	Addresses biodiversity		Addresses ecosystem services		Biodiversity & ecosystem services

Figure 6.1
Examples of corporate biodiversity measurement approaches, with Business Applications and Organisational Focus they support indicated.

Source: EU Business @ Biodiversity Assessment Update Report 2 (2019). The approaches identified in the matrix were self-reported and will be updated through further developments of the Aligning Biodiversity Measures for Business collaboration. Refer also to the **Biodiversity Guidance Navigation Tool** for a list of measurement approaches available for your biodiversity-inclusive natural capital assessment.

The categorizations of measurement approaches as relevant to various Business Applications and Organisational Focus areas (figure 6.1) are indicative and self-reported by method developers. The indicated approaches may not be applicable for all specific decisions requiring biodiversity measurement.

Once an applicable measurement approach has been selected and reviewed (using the **Biodiversity Guidance Navigation Tool** and the visual matrix in figure 6.1 above), it is important to consider the different datasets and associated metrics required. The method chosen will dictate what input data are needed, the level of granularity, and the information gained once measurement is completed. Different underlying metrics are described in detail under action 6.2.5.

Once measurement approaches have been used to quantify biodiversity impacts and dependencies, this information can then feed into the next step of valuation. Progression from measurement to valuation is helpful to understand the relevance and magnitude of your impacts and dependencies on biodiversity in your business context. There are a variety of valuation approaches available (qualitative, quantitative, and monetary) all of which have advantages and disadvantages, refer to action 7.2.3 for more details. No single approach can fully capture the value of biodiversity or communicate its complexity. Multiple valuation approaches can be used to complement each other. For example, where monetary techniques are unable to capture certain aspects of biodiversity, qualitative and/or quantitative approaches can be used to complement (or instead of) monetary valuation.

Click here to see how a financial institution has reviewed biodiversity measurement approaches to assess their applicability for a portfolio-level biodiversity-inclusive natural capital assessment.

6.2.5 Undertake or commission measurement

The most commonly used metrics underlying biodiversity measurement approaches (in figure 6.1) include; **mean species abundance** (MSA), **potentially disappeared fraction of species** (PDF), and the **risk of species extinction** (e.g., through the **Species Threat Abatement and Restoration** (STAR) metric) (for a non-exhaustive list see table 6.4). A particular metric may be more applicable depending on the activity or impact driver that you want to assess. Metrics such as MSA and PDF do not capture changes to all aspects of biodiversity, such as **genetic diversity** or **ecosystem diversity**. This is a current data gap within biodiversity measurement approaches requiring innovation.

There is a large ongoing effort to develop biodiversity indicators for state actors and public policy decision-making, coordinated by the Biodiversity Indicators Partnership. There is potential for these metrics to be applied by business with additional analysis. For example, the Biodiversity Intactness Index measures the effects of different land use and land use intensities on community composition.

Table 6.4
Selected examples of underlying metrics within corporate biodiversity measurement approaches

Example Metric	Description	Data used	Level of applicability	Limitations
Mean species abundance (MSA)	– Indicator of biodiversity intactness – Considers mean abundance of species relative to their abundance in undisturbed ecosystems (i.e., reference site) – Relative abundance giving a value from 0 (completely destroyed ecosystem with no original species) to 1 (species abundance is unchanged)	– Often estimated using the GLOBIO model, which aims at assessing scenarios of human-induced changes in biodiversity – No weighting factors are applied to different taxonomic groups or to reflect gaps in biodiversity data	– Product – Project – Company	– Does not weight areas by species richness – No distinction is made between species with potentially different conservation values (e.g., common vs. Red-listed) – Based on modeled data in many instances and requires significant handling before it provides company- or project-level insights

Potentially disappeared fraction of species (PDF)	– Provides indicator of decline in species richness in an area over a time period
	– Larger PDF values indicate a higher level of impact for the activity
	– PDF impact factors focus on the species richness of plants
		– Often estimated using the ReCiPe model, which links economic activity to changes in biodiversity
		– Three European data sources used
		  o UK (Crawley & Harral 2001)
		  o Countryside Survey (2000)
		  o Switzerland (Koellner 2003)
			– Product
			– Project
			– Company
				– No distinction is made between species with potentially different conservation values (e.g., common vs. Red-listed)
				– Reliant on estimates based on species-area relationship
				– Focused on species richness rather than abundance

Species and habitat diversity (richness and abundance)	– On-the-ground monitoring / measurement of species and habitats determine species richness, abundance and trends over time	– Direct measurement – Reliance on local datasets	– Product – Project	– Time bound – Costly – Potential for species measured to vary depending on approaches used
Risk of extinction (e.g., STAR metric)	– Assesses potential reduction in extinction risk gained from removal of threats (such as mining) in a given area	– IUCN STAR layer (based on IUCN Red List data)	– Product – Project – Company	– Assesses extinction risk to threatened species and does not consider common species
Presence of protected species and/or protected areas	– Screening of sites for the presence of protected species or the location of protected areas, for example through the Integrated Biodiversity Assessment Tool	– IUCN Red List data – World Database of Protected Areas	– Project	– Screening potential impacts rather than quantitative measurement

Most impacts on biodiversity manifest over **time horizons** that do not match real-time decision-making. Companies need to select appropriate **measurement intervals** to best address this mismatch. For example, yearly monitoring surveys are likely more appropriate than monthly surveys when assessing response of a mammal population to noise from a power plant. Whereas monthly surveys (likely for a year or more) are most appropriate when looking at changes to water quality in relation to a mine's effluent.

All measurement methods have limitations, which are important to understand before selecting the most appropriate approach. There is a trade-off when selecting measurement approaches between generality/comprehensiveness and precision/specificity. This trade-off influences the interpretation of assessment results for business decision-making in the Apply Stage (**Application Guidance**).

Case Study

Company example: Finance (asset management)

BNP Paribas Asset Management completed an initial piloting of the **Measuring Guidance** to 1) determine the measurement approaches available to a financial institution completing a portfolio-level natural capital assessment, and 2) complete a gap analysis and identify the pros and cons of each measurement approach identified. The assessment of biodiversity measurement approaches revealed the importance of combining approaches to address some of the existing information gaps associated with different measurement approaches and ensure a comprehensive assessment that fully encompasses biodiversity.

After reviewing the actions outlined within the **Measuring Guidance**, the Aligning Biodiversity Measures for Business matrix (figure 6.1) was used to identify the measurement approaches most relevant for corporate and portfolio assessments. The approaches identified were the **Global Biodiversity Score** (GBS), the **Biodiversity Footprint for Financial Institutions** (BFFI), and the **LIFE index**. These approaches were chosen based on their ability to support corporate and portfolio-level assessments.

Additional measurement approaches were assessed based on their ability to resolve limitations of the primary approaches. These approaches included the **Species Threat Abatement and Restoration** (STAR) metric and the **Biodiversity Impact Metric** (BIM). The **TRASE** tool was also considered.

In the context of this pilot, it was identified that a combination of approaches is needed to cover the spectrum of biodiversity goals. For example, combining the STAR and Global Biodiversity Score measurement approaches would capture information relating to species extinction and ecosystem integrity. BFFI and GBS are similar in their methods and data requirements—however their applicability is heavily dependent upon the objective of the assessment, highlighting the importance of using the online **Biodiversity Guidance Navigation Tool**. The tool is designed to help you understand what you need to analyze and why (based on your overall objective) as these are the most important factors when deciding which measurement approach to use. The **Scoping Guidance** is an important resource for determining which approaches should be further explored.

Where financial institutions hold large portfolios of companies, biodiversity assessments can be complex and time consuming. To fully assess and compare companies in a portfolio, a standardized approach for biodiversity measurement is considered necessary, but it is recognized that using a single measurement approach will not allow for a comprehensive understanding of the impacts and dependencies on biodiversity. Similarly, in assessments identifying impacts and dependencies on biodiversity at the portfolio level, it is difficult to attribute or allocate the impacts of specific companies within the same area. This is a recognized gap even when using a combination of approaches and requires investigation by measurement approach developers.

Although it is recommended that a combination of measurement approaches be used to better assess corporate impacts and dependencies on biodiversity, users still need to investigate the use of these measurement approaches individually to ensure the assumptions of each produce results that build upon one another and avoid the misinterpretation of data (e.g., through double counting, etc.). Additionally, a measurement approach that works for one company may not be relevant for another. Determining the most viable combination of tools for your specific sector and/or company is important. Ultimately, the combination of approaches is a suggested method to fill current gaps in available approaches, but a more permanent solution will be required.

07 Step 07 Guidance: Value impacts and/or dependencies

7.2.1 Define the consequences of impacts and/or dependencies

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 80 FOR GENERAL GUIDANCE.

7.2.2 Determine the relative significance of associated costs and/or benefits

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 82 FOR GENERAL GUIDANCE.

7.2.3 Select appropriate valuation technique(s)

You can use valuation to understand the importance of biodiversity in a particular context. A variety of approaches are available. When selecting an approach, you must understand its applicability and limitations.

Your choice of valuation technique will depend on whether you want to estimate qualitative, quantitative, or monetary values for biodiversity:

- **Qualitative** values inform the scale of costs and benefits in non-numerical terms.

- **Quantitative** values use numerical data as indicators of costs and benefits.

- **Monetary** values translate costs and benefits into a common currency.

FOR FURTHER INFORMATION ABOUT QUALITATIVE, QUANTITATIVE, AND MONETARY VALUATION APPROACHES, REFER TO THE PROTOCOL PAGE 37.

Different types of values offer different ways to examine the consequences of your impacts and dependencies on biodiversity. **Hybrid approaches** involve using different types of value (i.e., qualitative, quantitative, and/or monetary) in combination to assist your decision-making. You may find hybrid approaches particularly helpful for ensuring that both of the following values are captured in your assessment: 1) the value of biodiversity as part of a natural capital stock underlying continued provision of benefits; 2) the value of the final benefits provided by biodiversity.

You may find it easier to measure the condition of biodiversity (as part of a natural capital stock) in biophysical units, such as the number of individuals of a species or the area of a habitat. If you wish to progress to valuation, you could then convert measurements into qualitative, quantitative, or monetary values. For example, expressing the number of individuals of a species at a site (measurement) as a proportion of the total population could give a quantitative indication of the biodiversity value of the site.

It can be challenging to place monetary values on biodiversity stocks. It is often more straightforward to apply monetary valuation techniques to the goods and services flowing from biodiversity (i.e., the value of the final benefits provided by biodiversity). For example, you could value the benefits provided by wild pollinators using market prices for crops.

Even where monetary valuation is your ultimate goal, you may only be able to convert some aspects of biodiversity's value to monetary units. Qualitative and/or quantitative approaches can be applied to aspects of biodiversity's value that cannot be assessed with monetary techniques. For example, you could apply qualitative approaches to spiritual values associated with biodiversity, and/or might use quantitative values to understand health benefits associated with biodiversity.

You may wish to apply a sequential approach where you first estimate values qualitatively and/or in quantitative units, and then convert them into monetary values (TEEB 2010). You can develop biodiversity values over several iterations. For example, in initial valuation analysis with limited scope you may estimate qualitative values, and then convert progressively more values to monetary units in subsequent assessments with increasing complexity and assumptions.

a. Qualitative and quantitative valuation techniques

The qualitative and quantitative valuation techniques described in the Protocol can be applied to estimating values for biodiversity (box 7.1). The advantages and disadvantages of applying different techniques to biodiversity are the same as for other aspects of natural capital. Therefore, you are encouraged to look at the Protocol for information about valuing biodiversity using qualitative or quantitative techniques. Note that while this Guidance only provides further biodiversity-specific information about monetary valuation techniques, qualitative and quantitative techniques are often more appropriate for capturing some aspects of biodiversity's value.

Box 7.1: The UK National Ecosystem Assessment

The United Kingdom's National Ecosystem Assessment (UK NEA) provides an example of how non-monetary valuation techniques can be used to consider biodiversity's value alongside monetary values. In this assessment, impacts on farmland bird species and bird diversity were valued using multi-criteria analysis (MCA; refer to the Protocol table 7.1 for more information on this and other valuation techniques). Monetary valuation techniques were applied to other impact drivers such as agricultural output, greenhouse gas emissions, as well as to recreation and urban greenspace under different scenarios (Bateman et al. 2011). The different types of value could then be considered in parallel in decision-making—this is therefore also an example of a hybrid approach.

The NEA synthesis report shows how this hybrid approach has been applied and a study by Defra (UK, Department for Environment, Food, and Rural Affairs) also highlights the difficulty of assessing cultural goods though monetary techniques alone, emphasizing the importance of recognizing their values using a range of techniques, such as MCA. The collective value of biodiversity and ecosystem services requires a hybrid approach, using both quantitative and qualitative techniques (UK NEA 2011). Businesses would be able to apply this approach to integrate both the values of biodiversity stocks and final benefits when undertaking natural capital assessments.

b. Monetary valuation techniques

Monetary valuation allows you to compare costs and benefits in a single, readily understood unit. It can simplify the assessment of trade-offs, not only incorporating biodiversity values, but also other environmental, social, and economic considerations.

The valuation techniques included in this Guidance are the same as those already included in the Protocol, but there are some additional considerations that you should take into account when selecting a technique to apply to biodiversity.

Table 7.1 in this Guidance outlines key biodiversity-specific considerations for each technique. Note that this table builds on table 7.1 in the Protocol, which should be read alongside it. Table 7.1 in the Protocol provides a description of each technique, and an indication of the data requirements, duration, budget, skills required for application, and advantages and disadvantages in the general context of natural capital.

Table 7.1 below provides you with information on the benefits and limitations of each technique in the context of biodiversity, including what type of biodiversity values it can capture and whether it captures impacts and/or dependencies on biodiversity. Table 7.1 also provides examples of how each technique can be used to estimate biodiversity values.

Refer to the **Framing Guidance** action 1.2.1 (B) for more information on the different types of values used in table 7.1.

Table 7.1
Biodiversity considerations relevant to different monetary valuation techniques

Monetary valuation technique		Biodiversity considerations*
Market and financial prices		**Benefits:** Well-suited to identifying and valuing final benefits provided by biodiversity.
		Limitations: The extent to which the value of biodiversity is captured is heavily dependent on the degree to which variation in biodiversity influences demand for the market good.
		Biodiversity values: Direct, some underpinning, insurance, and options
		Impacts or dependencies: Both
		Examples of use: The market price of an agricultural output could be used to value an expected increase in crop yield associated with interventions to increase wild pollinator populations accessing a plantation. Previous studies have been used to make the case for biodiversity-positive investments to protect and increase pollinator populations given their direct potential to influence the quality and quantity of the crop that is produced.
Production function (change in production)		**Benefits:** Can be used to assess the value of complex and unclear business dependencies on biodiversity.
		Limitations: Requires complex modeling which may introduce a high level of uncertainty.
		Biodiversity values: Underpinning, insurance, and options
		Impacts or dependencies: Dependencies
		Examples of use: More diverse forests tend to absorb and store more carbon. The increase that is derived from biodiversity in the carbon value of a forest may be estimated using production function modeling. Businesses looking to invest in forests as part of their climate mitigation and adaptation strategies can use this approach to understand their options, and to seek investments which support their biodiversity and climate objectives.
Cost-based approaches	Replacement costs	**Benefits:** Reflects business costs that would be needed to maintain operations with changes in biodiversity. Can be used to look at the biodiversity underpinning flows of benefits.
		Limitations: Despite valuing biodiversity requiring measurement of the demand for biodiversity, cost-based methods report the costs that would be associated with a particular action with no relationship to demand.
		Biodiversity values: Direct, underpinning, insurance, and options
		Impacts or dependencies: Both
	Damage costs avoided	**Examples of use:** Businesses can use these approaches to look at the costs of adhering to the mitigation hierarchy (avoid, minimize, restore, offset) as part of a financial analysis of how to mitigate their impacts on biodiversity. The costs of restoration and offsets are examples of replacement costs, and the difference between these costs and costs associated with avoidance and minimization of impacts can represent damage costs avoided. Replacement cost has also been used to highlight the costs of pollinator decline where the next best alternative is hand pollination by humans. The costs of bringing in managed pollinator populations can also be used if this is a feasible alternative.
Revealed preference (indirect)	Hedonic pricing	**Benefits:** Can isolate the contribution of particular ecosystem services from biodiversity to human well-being.
		Limitations: A proxy-based method that may have context-dependent inaccuracies, for example hedonic pricing methods will struggle to distinguish a value of biodiversity if levels of biodiversity are not noticeably variable across the assessment area. Similarly, where there are many potential biodiversity sites in a given area travel costs may be low. To an extent both methods reveal what people have to pay to receive a benefit rather than the value they receive.
		Biodiversity values: Direct, underpinning, insurance, and options
		Impacts or dependencies: Both
	Travel costs	**Examples of use:** Research in England has shown substantial values (reflected in house prices) associated with proximity to high-value biodiversity habitats and designations. This technique allows businesses to understand the values of biodiversity to consumers, and use it to their advantage when considering pricing. For example, a housing developer may be able to determine the benefit of leaving a natural space within their housing development based on the increase in cost of the houses that are in close proximity to the natural area.

*The "biodiversity considerations" column in table 7.1 draws heavily from eftec (2015b) and TEEB (2010). Annex B of the Protocol also provides more information about different monetary valuation techniques.

Monetary valuation technique		Biodiversity considerations*
Stated preference	Contingent Valuation (CV)	**Benefits:** Focus on estimating demand, therefore offer a theoretically justified method to estimate use and non-use values for biodiversity. Non-use values cannot otherwise be easily estimated. **Limitations:** Highly subjective, and there is often variation between what people claim they are willing to pay with regard to biodiversity (especially summed across a number of surveys) and what is revealed by their behavior and affordable within their budget constraints. Results can be subject to numerous problems connected to participants' lack of experience attributing monetary values to non-market goods (such as many of the benefits that biodiversity provides to society), and capacity to distinguish values across different levels of their provision (sensitivity to scope).
	Choice Experiments (CE)	**Biodiversity values:** Direct, some underpinning, insurance, and options **Impacts or dependencies:** Both **Examples of use:** Stated preference methods have been applied in different contexts ranging from valuing individual species to estimating the benefits of country-level biodiversity action plans. Businesses can use this approach to understand the wider benefits they are delivering through biodiversity-positive action, and estimate values associated with the impact of biodiversity loss on society.
Value (benefits) transfer		**Benefits:** Bypasses requirements for investment in new primary research. **Limitations:** Relationships between biodiversity and provision of benefits are often complex and context-specific. Value transfer requires the study used as input to have a very similar ecological and socioeconomic context as the current assessment in order to transfer values in a justifiable way. Validity of results is likely to be questionable, especially if the cultural/temporal/ecological context of the source study is not similar. **Biodiversity values:** Direct, underpinning, insurance, and options **Impacts or dependencies:** Both **Examples of use:** Context-specific values for different ecosystem services provided and/or supported by biodiversity (estimated using techniques outlined previously in this table) have been compiled in databases such as the TEEB valuation database (see table MV.2) and can be applied to estimate biodiversity values in similar contexts, or used in different contexts with suitable adjustments. This is the most common technique used by businesses to develop natural capital accounting. **For a more detailed example, refer to the case study for Repsol's natural capital valuation methodology.**

*The "biodiversity considerations" column in table 7.1 draws heavily from eftec (2015b) and TEEB (2010). Annex B of the Protocol also provides more information about different monetary valuation techniques.

Selection of a valuation technique will often be aligned with the risks and opportunities you identified through your materiality assessment. For example, if your business is facing legal risks from its biodiversity impacts, the consequences could be understood through costs of non-compliance. Alternatively, to understand the business value of your dependency on biodiversity, you could estimate the costs of replacing biodiversity benefits.

Click here to see how a leading energy company is integrating biodiversity within its natural capital valuation methodology.

7.2.4 Undertake or commission valuation

Applying these techniques to estimate values for biodiversity requires significant training and applied experience. You should consider whether you have the necessary skills and experience within your business to undertake valuation internally. If necessary, you should commission external partners, such as appropriate consultants, academics, or non-governmental organizations to assist with your biodiversity valuation.

Avoiding double-counting and considering the condition of biodiversity stocks
Double-counting can be a concern when you value biodiversity and ecosystem services. This is because biodiversity delivers benefits in multiple ways. For example, in production of agricultural crops, biodiversity supports nutrient cycling and pollination. These ecosystem services (and other benefits from biodiversity) combine to provide one final benefit to a business—increased crop yields. If you value each ecosystem service individually you may count the role of biodiversity several times.

To avoid double-counting, you can focus on final benefits, such as the crop yield, rather than intermediate or supporting services, such as nutrient cycling or pollination.

However, when you value final benefits (if they are flows resulting from values other than biodiversity's direct value) the connection between business benefits and the underlying condition of biodiversity stocks may be overlooked. For example, if you focus on valuing final crop yields the importance of pollinators may not be recognized. Where biodiversity is being degraded, it is particularly important that you consider these connections, as the final benefit being valued may also be degraded in the long term.

To address the limitations of only valuing final benefits, it is important to try to identify where the condition of biodiversity stocks has been overlooked in estimated values, and consider the importance of biodiversity for continuing to provide benefits to your business in the future.

Refer to action 1.2.1 (C) of the **Framing Guidance** for more information on the hidden values of biodiversity.

Further potential limitations and how to address them
Whether you are undertaking or commissioning valuation, there are several important limitations, particularly to monetary valuation, which you should consider and try to address when designing and implementing methodologies and interpreting valuation results (Sukhdev et al. 2014):

• **Subjectivity** – Values are a reflection of how a single group of people perceive their relationship with biodiversity at a single point in time. To address this limitation, you should try to identify and engage with all relevant stakeholders to understand their perceptions of biodiversity and its importance. You should avoid influencing these perceptions when designing your assessment.

• **Incommensurability** – The problem of incommensurability remains, even where some aspects of biodiversity's values have been converted to monetary units, as the full value, which cannot be expressed in monetary units, remains difficult to take into account. For example, it is impossible to use monetary units to express intrinsic values associated with biodiversity, and very difficult to calculate accurate values associated with rights, responsibilities, and care. Biodiversity provides multiple benefits to business and society, and even when all are expressed in monetary units it may be inappropriate to mix market values associated with biodiversity with values that biodiversity provides linked to the welfare of wider society. By exploring non-monetary techniques, you can look at the impact of weighting and scoring different values and begin to reduce the risk of missing intrinsic and ethical values in the valuation.

• **Economic uncertainty** – Economic uncertainty can contribute to the complexity of valuations (particularly where ecologically uncertain relationships exist) and risks reducing the reliability of the results. Using the best available information on forecasted market prices and revising these market prices periodically to incorporate deviations on the state and values of your impacts and dependencies on biodiversity will help reduce the economic uncertainty of the results.

• **"Commoditization"** – Expressing biodiversity values in monetary units can be misinterpreted as pricing and marketing biodiversity. Even if the results of your monetary valuation indicate that greater economic value could be obtained through land uses or activities that would have negative impacts on biodiversity, you should not interpret these results as suggesting biodiversity is replaceable. To reduce concerns surrounding commoditization you should make clear that biodiversity has many hidden values and intrinsic value that it is not possible to assess through monetary values. You could use qualitative techniques alongside monetary values to better incorporate biodiversity's intrinsic value in your assessment, or perhaps include a condition to always maintain a certain level of biodiversity in calculations of potential economic values associated with different business options.

It is important that you recognize these limitations and try to address them where possible. You should interpret values estimated for biodiversity with caution, and use them alongside other information to assist (rather than replace) deliberation in your decision-making. You should always present the approach taken, and the assumptions made, clearly alongside your valuation results. Remember that values for biodiversity are likely to represent minimum estimates.

These issues notwithstanding, biodiversity valuation can provide a useful aid to your decision-making.

Having now measured and potentially also valued your biodiversity impacts and dependencies, please continue to the **Application Guidance** to explore how to interpret, apply, and act on the results of a natural capital assessment.

Case Study

Company example: Energy company

Repsol, an energy company operating globally, is committed to being at the forefront of the industry in its efforts to measure, mitigate, and minimize the negative impacts of its projects and operations on society and the environment. Repsol is adopting a natural capital approach for environmental decision-making because it enables them to clearly link ecological systems with their contributions to human well-being.

Repsol has developed a novel methodology for the comprehensive valuation of the environmental impacts and dependencies of its projects and operations worldwide, called the Global Environmental Management Index (GEMI). The GEMI has been piloted with Repsol's operations in the Block 57 concession located in the Amazonia region of Cusco, Peru. This is one of the richest areas for biodiversity in Peru.

The GEMI methodology analyzes improvements (impact reductions) derived from application of the mitigation hierarchy. Environmental impacts are first measured in biophysical units, then converted into monetary values, primarily using value transfer. Modulation factors are then applied to the monetary values to calculate dimensionless "Impact Units." Repsol has applied the GEMI at Block 57 to estimate the value associated with natural capital loss, comparing the on-ground scenario, where measures to mitigate impacts on biodiversity were implemented, and a counterfactual scenario with no biodiversity mitigation measures. Monetary values for ecosystem services were estimated through collation of 119 values for similar ecosystem services from 27 studies, and then applying site-specific adjustments. Biodiversity is incorporated through adjustment of ecosystem service values for specific biodiversity features, such as the abundance of protected species, and threats such as habitat loss and fragmentation.

Repsol are currently refining the GEMI methodology, and will use the Valuing Guidance to support this process. For example, Repsol can more explicitly consider the importance of biodiversity for delivery of different ecosystem services, and how the economic values for ecosystem services may change with changes in the condition of biodiversity. Furthermore, they can use the Guidance to broaden the scope of their method to also assess business dependencies on biodiversity and ecosystem services, and ensure that limitations to valuation techniques and implications for interpretation of biodiversity valuation results are consistently recognized. Repsol are currently working to ensure these considerations are integrated within their GEMI methodology.

APPLY STAGE

Key messages

- The results of your biodiversity-inclusive natural capital assessment can be used to direct a range of business actions, including the development of biodiversity inclusive strategies, policies, and action plans.

- Interpreting, testing and communicating the results of your assessment do not require additional biodiversity-specific guidance, so users are referred to the Protocol for general guidance.

- Biodiversity target setting is one strategy that businesses can pursue following a biodiversity-inclusive natural capital assessment. Approaches exist that can be used to develop targets in line with global, regional, and national biodiversity goals. There are alternative options using frameworks such as no net loss of biodiversity.

- Guidance is provided on how best to include biodiversity-inclusive natural capital assessments as part of the way you do business.

APPLY STAGE

What is the Apply Stage?

The Apply Stage of the Natural Capital Protocol introduces guidance on how you can **interpret**, **apply**, and **act** on the results of a natural capital assessment, building on information provided in the Measure and Value Stage. This **Application Guidance** details how to apply and act upon biodiversity-inclusive natural capital assessment results, to help define a clear strategy (including setting informed **biodiversity targets**), or develop a biodiversity-inclusive policy or action plan. This aims to help you embed the results within your business and work towards your objective outlined in Step 02 of the Protocol and the **Scoping Guidance**. The **Application Guidance** builds on information provided in the **Measuring and Valuing Guidance**.

What additional biodiversity guidance is provided for the Apply Stage?

Table A.1 provides an overview of the questions and actions of Steps 08 and 09 of the Apply Stage in the Protocol and outlines the actions for which the **Application Guidance** provides additional information. This Guidance has been developed to address the following questions asked within the Protocol:

Step 08: How can you interpret, validate, and verify your assessment process and results?

Step 09: How will you apply your results and integrate natural capital into existing processes?

This Guidance does not provide a detailed methodology on how to comprehensively carry out all of these actions, but provides further detail on how to ensure natural capital assessment results can be used effectively to mainstream biodiversity into decision-making.

Table A.1
The Apply Stage: Mapping between the Protocol and the Biodiversity Guidance

Protocol Step		Questions this Step will answer	Protocol actions	Additional guidance included?
08	Interpret and test the results	**How can you interpret, validate, and verify your assessment process and results?**	8.2.1 Test key assumptions	**No** Refer to Protocol page 96 for guidance
			8.2.2 Identify who is affected	**No** Refer to Protocol page 97 for guidance
			8.2.3 Collate results	**No** Refer to Protocol page 97 for guidance
			8.2.4 Validate and verify the assessment process and results	**No** Refer to Protocol page 99 for guidance

Protocol Step		Questions this Step will answer	Protocol actions		Additional guidance included?
			8.2.5	Review the strengths and weaknesses of the assessment	**No** Refer to Protocol page 101 for guidance
09	Take action	**How will you apply your results and integrate natural capital into existing processes?**	9.2.1	Apply and act upon the results	**Yes** See action 9.2.1
			9.2.2	Communicate internally and externally	**No** Refer to Protocol page 106 for guidance
			9.2.3	Make [biodiversity-inclusive] natural capital assessments part of how you do business	**Yes** See action 9.2.3

Additional notes

You should address all actions associated with each Step in the Apply Stage. This Guidance provides additional information for only some of the actions where it is most appropriate.

How should you plan for this Stage?
Before you get started with the Apply Stage of your assessment, it is important to consider any planning requirements. The Protocol, for example, identifies some of the resource needs that should be considered for each phase of the assessment.

For applying your biodiversity-inclusive natural capital assessment, there are a number of published resources including guidelines, frameworks, and measurement tools that can provide support. Table A.2 provides a non-exhaustive list of these resources.

Table A.2
Examples of biodiversity-specific resources that can inform your biodiversity-inclusive natural capital assessment

Author	Title/Name (Year)	Type	Description
Business and Biodiversity Offsets Programme (BBOP)	Business Planning for Biodiversity Net Gain: a Roadmap (2018)	Report	Designed to guide users to develop and apply best practice towards achieving no net loss or net gain of biodiversity through the application of the mitigation hierarchy.
Business for Nature	Business commitments for nature (n.d.)	Webpage	An example list of international commitments that companies are committing to towards reversing nature loss.
Convention on Biological Diversity	Global Partnership for Business and Biodiversity (2019)	Report	An overview of the national and regional business and biodiversity initiatives which may be relevant to business sectors and activities. It provides an overview of the initiative's activities, structures, and services.
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services	Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (2019)	Report	Designed to provide a summary for policymakers of the global assessment of biodiversity and ecosystem services. Includes sections on relevant global biodiversity targets which could help inform the development of your own biodiversity targets.
IPIECA (The global oil and gas industry association for advancing environmental and social performance) and International Association of Oil & Gas Producers (IOGP)	Biodiversity and ecosystem services fundamentals (2016)	Report	Designed to provide best practice guidance for the oil and gas sector on how businesses can address their impacts on biodiversity and ecosystem services. This guidance provides a management framework of six interrelated Biodiversity and Ecosystem Services (BES) practices with an overview of tools for application within these practices.
International Council on Mining and Metals (ICMM)	Good Practice Guidance for Mining and Biodiversity (2006)	Report	Designed to provide best practice guidance for mining professionals to improve biodiversity management throughout the mine cycle and to support relationships between mining and biodiversity stakeholders.
Gesellschaft für Internationale Zusammenarbeit (GIZ)	Standards and labels for the promotion of biodiversity-friendly production and commercialization. An overview (2017)	Report	Designed to provide an overview of how existing standards and labels can promote biodiversity-friendly production and commercialization and how businesses can incorporate these within their own activities.
Evidensia	Online library	Online tool	Online tool designed to collate evidence, information, and insights on sustainability of supply chain initiatives and tools, such as standards and certification, which businesses could use to help build a sustainable supply chain.

08 Step 08 Guidance: Interpret and test the results

8.2.1 Test key assumptions

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 96 FOR GENERAL GUIDANCE.

8.2.2 Identify who is affected

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 97 FOR GENERAL GUIDANCE.

8.2.3 Collate results

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 97 FOR GENERAL GUIDANCE.

8.2.4 Validate and verify the assessment process and results

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 99 FOR GENERAL GUIDANCE.

8.2.5 Review the strengths and weaknesses of the assessment

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 101 FOR GENERAL GUIDANCE.

09 Step 09 Guidance: Take action

9.2.1 Apply and act upon the results

At this point, your natural capital assessment will have identified biodiversity-related risks and opportunities, building upon the assessed impacts and dependencies, which should be used to inform a series of corporate actions in relation to biodiversity. This could include actions related to your business sector, your operations, or your strategy, or alternatively, it could include creating a new biodiversity target within your company or sector.

Table 9.1 lists examples of company actions that may be taken following a biodiversity-inclusive natural capital assessment, and refers to the relevant Business Applications outlined in the **Scoping Guidance**.

Click here to see how a water company is restoring habitats its business operations are dependent on.

Table 9.1
Examples of business actions taken as a result of a biodiversity-inclusive natural capital assessment

Example company action based on assessment results	Based on assessed impacts or dependencies	Business Application
Biodiversity-informed procurement strategy Consider changing procurement strategy for upstream materials to reduce operational and financial risk (e.g., sourcing products with lower risk based on their biodiversity dependency). Provides an opportunity to be a leading business addressing biodiversity-related risks within your supply chain, increasing market competitiveness, and reducing reputational risk.	Dependencies	BA4: Compare options
Disclosure of biodiversity assessment Disclosure of assessment results to stakeholders provides evidence of biodiversity impacts and dependencies, increased transparency, and potential reduction of reputational risks.	Impacts/dependencies	BA5: Biodiversity accounting for internal reporting and/or external disclosure
Biodiversity certifications Work towards gaining relevant biodiversity certifications for production/sourcing of commodities which have increased risk (through high dependency and impact on biodiversity) to improve data collection and monitoring as well as reduce reputational and market risk.	Impacts	BA6: Certification by third parties
Support biodiversity restoration Support biodiversity restoration efforts where these support business operations (e.g., restoring pollinator-supporting habitats, to reduce operational and financial risk).	Dependencies	BA7: Screening and assessment of biodiversity risks and opportunities
Invest in natural infrastructure Enhance natural infrastructure across business operations (e.g., use of forests in flood defense schemes to reduce operational and financial risk, restoration of wetlands to improve water quality and reduce treatment costs, and to support market competitiveness.	Dependencies	BA7: Screening and assessment of biodiversity risks and opportunities

Introduction

Frame stage

Scope stage

Measure and Value stage

Apply stage

References

As a result of your biodiversity-inclusive natural capital assessment, you may wish to set a biodiversity target to manage your biodiversity risks and opportunities. This could be because:

1) You recognize that the actions you want to implement will be more effective, cohesive, and impactful if they contribute to a specific biodiversity target.

2) You have identified several interconnected issues through your biodiversity-inclusive natural capital assessment (including feedback loops between impacts and dependencies) which warrant a combined approach, guided by a specific target.

3) You want to respond to momentum and pressure around target setting in the context of businesses contributing to the **Sustainable Development Goals** (SDGs), the future global biodiversity framework under the **Convention on Biological Diversity** (CBD), or as a result of lessons from your own company and/or businesses setting targets on climate change.

4) Setting a specific biodiversity target may have been the objective of your biodiversity-inclusive natural capital assessment from the outset.

Target setting can be challenging, but can also help to provide direction to a business's activities. The following section provides guidance to help you understand the existing frameworks, how you might adhere or contribute to them, and how to go about creating your target.

a. What existing frameworks are there to guide your biodiversity target?
There are currently a range of existing targets and frameworks that you can use to inform the development of your own biodiversity targets. These include global goals and targets set by governments, such as the Sustainable Development Goals (SDGs) or those of the Convention on Biological Diversity (CBD). These global goals have also led to the development of national targets and priorities such as those within **National Biodiversity Strategy and Action Plans** (NBSAPs). **No net loss** or **net gain** commitments and policies are specific targets that are set by individual companies, financial institutions, as well as governments, and are inferred within the draft **post-2020 global biodiversity framework**. They can apply to different components of biodiversity including species and habitats, and a number of metrics have been developed to support implementation (refer to **Measuring and Valuing Guidance** action 6.2.5 for more information on metrics). Some examples of these current frameworks and targets are outlined below in table 9.2, however this list is not exhaustive. Please refer to the EU Business @ Biodiversity Assessment Update Report 2 (2019) table 5 for more information on additional frameworks such as environmental management systems (ISO 14001, EMAS), voluntary standards at a sector/product level (e.g. Roundtable on Sustainable Palm Oil), and others.

Table 9.2

Examples of global, national, and company-led frameworks and targets for informing biodiversity target setting

UN Sustainable Development Goals	Global goal
SDG Goals 14 and 15 focus on the protection of biodiversity and ecosystems within marine and terrestrial environments. In addition to these two Goals, the remaining 15 SDGs also include biodiversity-explicit targets (CBD 2020a).	

Benefits	Limitations
Provides a comprehensive list of indicators to measure progress towards a number of easily understood goals. Ecosystem services are essential for several of the SDGs, making this framework useful for companies that want to conserve ecosystem services (Wood et al. 2018).	Not designed with businesses in mind. Some of the information used for these indicators would be particularly difficult for businesses to access/obtain. However, there are examples for how businesses can adhere to these goals (United Nations Global Compact and KPMG 2015).

Aichi Targets (and the post-2020 biodiversity framework)	Global goal
There are twenty Aichi Targets, covering the period 2011-2020, which were established at a global level but with a flexible framework to allow integration into national or regional targets. Due to the flexible framework, individual countries were able to set their own targets and ensure their national needs and priorities were integrated. The Convention on Biological Diversity will meet in Q2/Q3 2021 to adopt the post-2020 global biodiversity framework (CBD 2019) to replace the Aichi Targets. The framework will provide a pathway towards achieving the 2050 Vision of "Living in harmony with Nature" and aims to provide realistic, measurable, and time-bound targets with respective indicators and clear ways to report, monitor, and produce baselines.	

Benefits	Limitations
Global policy framework adopted by all Parties to the Convention on Biological Diversity.	The Aichi Targets are difficult for businesses to engage with, however there are plans to address this within the proposed post-2020 global biodiversity framework (CBD 2019).

Science Based Targets for nature	Global goal
Targets which define and promote best practice for businesses by accounting for the five Earth systems: climate, fresh water, land, ocean, and biodiversity (SBTN 2020). Note that while companies can already set science based targets for climate, Interim Guidance on science based targets for nature, including biodiversity, will be launched in late 2020.	

Benefits	Limitations
Actor-based targets specifically designed for businesses, and linked to global policy goals.	Not yet defined for biodiversity.

National Biodiversity Strategy and Action Plans (NBSAP)s and related biodiversity policies	National goal/company-led goal
As part of the CBD, under Article 6 of the Convention of General Measures for Conservation and Sustainable Use, each Party member creates a national strategy, plan, or program on: how, when, and where biodiversity and ecosystem services should be conserved, used sustainably, and the benefits of their use shared equitably. NBSAPs can serve as a policy driver to set a country on the right track to meet its biodiversity and environmental objectives, which are outlined within the country's own environment policy. **Subnational Biodiversity Strategies and Action Plans** (SBSAPs) and **Regional Biodiversity Strategies and Action Plans** (RBSAPs) have also been developed within the framework of the CBD. The CBD online database can be used to see whether a country has a NBSAP or a national target (CBD 2020b). As well as NBSAPs, SBSAPs, and RBSAPs, individual companies or countries can develop Biodiversity Action Plans (BAPs) to help protect and enhance biodiversity. **Click here to see how a property development business has adhered to global and national targets when creating an internal biodiversity strategy.**	

Benefits	Limitations
Contributing to global biodiversity targets which are set under the CBD through national-scale policies/targets. With the importance of businesses aligning with national priorities in countries of operation, adhering to NBSAPs provides direction for how this can be achieved.	Framework can be difficult for businesses to engage with as many NBSAPs lack clear targets and businesses often operate in multiple countries and therefore need to respond to multiple NBSAPs.

No net loss and net gain (mitigation hierarchy)	National goal/company-led goal
The target of no net loss or net gain of biodiversity depends on adherence to the mitigation hierarchy (BBOP 2012b). Commitments to no net loss and net gain have gained interest in national policies such as those of the United Kingdom and Uganda (Department for Environment Food and Rural Affairs, 2019; National Environment Management Authority, 2019). More details can be found in the **Framing Guidance**.	

Click here to see how a construction company has used no net loss to create biodiversity targets.

Benefits	Limitations
Methodology is well developed for certain applications making this easier for businesses to use (e.g., by the Business and Biodiversity Offsets Programme and the Cross Sector Biodiversity Initiative). Can achieve successful outcomes for activities which are highly localized, such as mining (IUCN 2020), infrastructure, and building development, but also activities which are not site-specific, such as supply chains (Aiama et al. 2015) and the banking sector (ASN Bank 2020).	There is a need to ensure that these strategies benefit people as well as biodiversity and principles have been developed to support this (IUCN 2018). There are also a range of potential limitations related to the offsetting component of these strategies, since not all impacts can be compensated for (e.g., highly threatened species or those with extremely long recovery times such as coral reefs and ancient woodlands). A number of guidance materials are available to help address these limitations, including a framework to assess the achievability of offsetting within a given area (Gardner et al. 2013).

Planetary boundaries	Company-led goal
This concept includes nine processes which regulate the stability of the Earth's systems, to ensure the survival of humanity (Stockholm Resilience Centre 2020). Crossing boundaries "beyond zones of uncertainty" disrupts the balance between these processes, which may lead to increased risk of large-scale abrupt or irreversible environmental challenges. One of these boundaries explicitly addresses biodiversity loss – "Loss of biosphere integrity."	

Click here to see how a food production company has used the planetary boundaries framework to assess their biodiversity footprint.

Benefits	Limitations
Can help businesses to understand how their specific biodiversity targets are contributing to global Earth systems. Can also be used to support implementation of Sustainable Development Goals related to nature (PBL NEAA 2018).	As a rapidly evolving area, there are challenges in applying the planetary boundaries concept and framework in its current form into clear targets, actions, and operational tools for the business community (Cambridge Institute for Sustainability Leadership 2019). For example, the "tipping points" for biodiversity are undefined (Montoya et al. 2018) and the current data do not include global processes and/or rates of extinction (Montoya et al. 2018), leading to difficulty in assessing the global implications of a company's biodiversity target and quantifying a biodiversity target. Despite this, there have been some efforts by businesses to scale planetary boundaries at a landscape scale (Lammerant et al. 2016, Pictet Asset Management et al. 2020). A recent review of life-cycle-based methods for absolute environmental sustainability assessment and their applications has resulted in a new methodology, which provides detailed steps on when to choose, apply, and communicate the results of the planetary boundary framework (or other methods relating to other life cycle impact assessments (LCIA) (Bjørn et al. n.d)).

b. How can you adhere to global and national biodiversity targets?
Global biodiversity targets, such as the Aichi Targets and Sustainable Development Goals, set out broad goals which can be used to create your own biodiversity targets. However, these are not designed for businesses and do not lend themselves to corporate needs. Ideally, you should aim to align company biodiversity targets with national targets and priorities, as these can support global biodiversity goals. Since these reflect the specific priorities of each country, multinational companies will need to adhere to the priorities of the countries in which they operate but would not create a corporate biodiversity goal related to a single national target. Due to the lack of clarity on what constitutes a "good" biodiversity goal you should consider expert input or stakeholder consultation particularly important (refer to the Protocol page 106), as well as industry benchmarking to ensure your targets are appropriately positioned against peers. Biodiversity targets being developed for the CBD's post-2020 global biodiversity framework have emphasized the need for **Specific, Measurable, Ambitious, Realistic, and Time-bound** (SMART) targets.

The results of a natural capital assessment can aid in setting targets for businesses by helping identify where your most significant impacts and dependencies on biodiversity are, how these can be addressed, and where opportunities lie for positive actions. Company-specific targets can be used to drive action and demonstrate alignment to global conservation goals. Global biodiversity commitments can be extrapolated to your business by addressing your impacts and dependencies on biodiversity across your value chain. Businesses should also aim to align activities to support other environmental targets too, such as goals related to nature-based solutions, nature's contribution to people, and climate change.

For examples of how international or national biodiversity goals can be translated into corporate goals see table 9.3 which has been adapted from the Joint Nature Conservation Committee (Smith et al. 2018). By identifying your business impact and dependencies on biodiversity, the results of your natural capital assessment can be used to inform your corporate biodiversity goal and business actions.

Please note: As international negotiations continue to set the new global agenda for biodiversity, the hypothetical international and national biodiversity goals provided below as an example might lose their relevance.

Table 9.3
Hypothetical global biodiversity goals and their relevance to potential corporate biodiversity goals and actions

Hypothetical international biodiversity goal	Possible corporate/financial institution biodiversity goals	Example business actions
By 2050, increase the area, connectivity, and integrity of natural ecosystems (terrestrial, freshwater, and marine) by at least [X]%, whilst reducing the number of species which are threatened by [X]% and maintaining genetic diversity	Set a target to achieve net gain of biodiversity by: – Increasing the area, connectivity, and integrity of natural ecosystems by at least [X]% within your company's area of influence. – Increasing the population of threatened species by [X]% to maintain and enhance species abundance within your company's area of influence.	– Avoid negative impacts on or deliver net gains to critical habitats and threatened species. For example, through protection or restoration of critical habitats and / or addressing other threats to threatened species by 2030. – Reduce pressures on natural ecosystems by using sustainable agricultural practices such as perennial cropping systems for commodity production, no use of banned agrochemicals, and soil conservation practices by 2030. – Establish privately protected areas, Ramsar sites, or other effective area-based conservation measures (OECMs) within your company footprint, with area of the site to be at least [X]% of the total area which you use for your site-based activity. Ensure at least [X]% of protected areas, Ramsar sites, or OECM areas are to be under strict protection, to maintain connectivity for threatened species and reduce threats to species at risk of extinction by 2030.

Hypothetical international biodiversity goal	Possible corporate/financial institution biodiversity goals	Example business actions
Value, maintain, or enhance nature's contribution to people through conservation and sustainable use	Enhance nature's contribution to sustainable nutrition and food security, access to safe drinking water, and resilience to natural disasters within your company's area of influence. Enhance nature's value through green investments and private sector financial disclosure within your customer's footprint.	– Increase the portion of responsibly-sourced paper (recycled or PEFC/FSC certified), where certified forest areas are managed sustainably, and the impacts on water quality are verified, within your operations and or/supply chain by at least [X]% by 2030. – Mobilize [X million USD] for blended finance opportunities to fund conservation and sustainable use of biodiversity projects up to 2050. – As a financial institution, by 2030, ensure that [X]% of your portfolio is certified or in the process of certification through voluntary sustainability schemes or industry standards that effectively safeguard biodiversity. Additionally, ensure that [X]% of your financial transactions are conducted with stakeholders who have publicly disclosed their dependency and impact on nature. – Avoid and reduce pollution by [X]% from excess nutrients, biocides, plastic debris (compared to 2020 baseline amount) into freshwater sources by 2030 within your company footprint. – Design freshwater infrastructure and/or nature-based solutions with beneficial environmental flows within [X]% of your company footprint and implement by 2030. For example, create fisheries downstream of a hydroelectric dam to improve water quality for freshwater biodiversity.

Setting and working towards biodiversity targets is not only important to preserve and enhance biodiversity in its own right, but also for the role these targets play in broader sustainability goals.

As illustrated in figure 1.1 of the **Framing Guidance**, biodiversity is the critical foundation for a healthy, resilient stock of natural capital. Figure 9.1 builds on this to illustrate how this natural resource base (underpinned by biodiversity) supports sustainable production and consumption and ultimately societal well-being for current and future generations. Goals to preserve and enhance biodiversity therefore also contribute to, and are interconnected with, broader sustainable development goals focusing on natural resources, the economy, and ultimately societal well-being

Figure 9.1 illustrates one way in which the Sustainable Development Goals (SDGs) can be allocated across these layers. Achieving biodiversity goals underpins many actions needed to meet the SDGs (e.g., preserving and enhancing biodiversity supports SDG 14 Life Below Water, which in turn supports SDG 2 Zero Hunger, and this underpins SDG 3 Good Health and Well-Being).

These relationships are more apparent when considering biodiversity target setting as one part of the application of a broader biodiversity-inclusive natural capital assessment, and broader still, social and human capital assessments.

Figure 9.1
The Sustainable Development Goals "wedding cake" which highlights the importance of the biosphere for society and the economy (Adapted from PBL 2017)

As well as adhering to global biodiversity goals, you can align your biodiversity targets with regional, national, and subnational biodiversity strategies, such as National Biodiversity Strategies and Action Plans, Subnational Biodiversity Strategies and Action Plans, and Regional Biodiversity Strategies and Action Plans.

To assess whether you want to adhere to regional, national, or subnational biodiversity frameworks, you should consider:

- The next CBD Conference of the Parties (COP) will agree a new post-2020 global biodiversity framework, resulting in countries revising their National Biodiversity Strategies and Action Plans (NBSAPs).

- Does your business have project sites and supply chains across multiple regions and/or countries or is your business within one country only? Note that specific policies and legal and regulatory requirements will be biodiversity- and country-specific.

Once you have decided whether a regional, national, or subnational biodiversity framework is suitable, you can develop your policy, strategy, or management plan to include corporate biodiversity targets based on the possible options in table 9.3 and actions in the subsequent section of this Guidance.

c. How do you create a biodiversity target?

As global biodiversity goals are being developed, companies have created biodiversity targets internally using no net loss or net gain (Rainey et al. 2015) in line with guidance developed to assist this process (BBOP 2018). These targets aim to match the negative biodiversity impacts which occur as a result of a project, portfolio, or supply chain, with biodiversity gains. Habitat- or threat-specific targets such as zero deforestation or zero net deforestation are also used by companies to address land conversion (IUCN 2015).

The following provides a **hypothetical example of a company** wanting to manage their impacts and dependencies on biodiversity by achieving no net loss in response to a natural capital assessment, and as a means to contribute to a global biodiversity goal:

1) The results of your natural capital assessment suggest that you have a high impact on a particular species due to habitat destruction as a result of your activities in one site and/or supply chain. The species has legal protection and impacting it has a reputational and operational risk associated with it. You want to reduce your impact on the species at the site to manage these risks.

2) You will need to select relevant frameworks to inform the setting of your biodiversity target, (table 9.2 provides a non-exhaustive list of examples, with further frameworks sign-posted in this Guidance). Assess whether you can work towards global or national/regional biodiversity goals and/or create internal biodiversity targets. Use table 9.3 to consider the business actions you can take in relation to the biodiversity framework you have selected. Since you want to reduce your impact, you may decide to use no net loss as a target. If you wish to deliver a positive impact, net gain would be more suitable. You identify that adopting no net loss or net gain will help you to contribute towards global biodiversity goals through supporting protection and restoration of critical habitats for threatened species.

3) Use the results of your natural capital assessment to identify business actions which could avoid or otherwise minimize impacts on biodiversity at the site. The results of your natural capital assessment or detailed species assessments can be used to establish a baseline against which no net loss or net gain of biodiversity can be measured.

4) Impacts that cannot be avoided or minimized can be mitigated using restoration. Any residual negative impacts on the species need to be balanced with conservation action. This requires restoring or averting loss of the same habitat that is negatively impacted elsewhere. Stakeholder consultation will be important at this stage. No net loss and net gain strategies can be supported using a Natural Capital Account (eftec 2015a; CISL 2016) or a Biodiversity Natural Capital Account (Dickie et al. 2018) to track stocks, flows, and costs associated with actions. These frameworks are similar to financial and national accounting, making it easier for businesses to understand the benefits. The net changes to biodiversity, its value and the costs associated with actions can be tracked during multiple stages of the project, indicating whether your no net loss / net gain actions are on track. Using Natural Capital Accounts or Biodiversity Natural Capital Accounts, or a similar approach, and considering all limitations, you may decide to set your target for a 20-year period (i.e., no net loss or net gain of that species within your supply chain or at a particular site by 2040).

   Click here to see how a construction company has used this approach to develop no net loss biodiversity targets

5) You will then need to ensure you monitor and track progress towards your target by assessing population changes at appropriate intervals (intervals will depend on the species being monitored). Your contributions towards global biodiversity goals can be disclosed.

While the hypothetical case study above focuses on managing impact, a similar approach could be taken for dependency (e.g., recognizing the value of maintaining biodiversity through nature-based solutions). For example, an energy company operating the water supply of a hydroelectric dam could adopt a nature-based solution through funding restoration of wetlands high in the watershed with diverse native vegetation in order to increase water storage. This is expected to improve the reliability of downstream water flows throughout the year, despite climate uncertainty.

For business actions which involve supply chains, commitments towards zero deforestation and/or reducing negative land-use change impacts, for example, will require close collaboration with suppliers on targets to ensure that these can be successfully achieved. This can be done through commitments such as adopting voluntary certification standards that effectively address the threat of land conversion; reducing exposure to deforestation/land-use impacts; assessing company sourcing codes; supporting clients with improving their sustainability policies, reviewing clients' reporting and disclosure and monitoring frameworks. Collaboration can provide a platform for innovation in ways to produce products that have fewer impacts on biodiversity. Additionally, integrating suppliers as part of the development of a target contributes to the process of due diligence, and reduces reputational and operational risks of your organization (UNGC and IUCN 2012).

Steps for how to plan, implement, assess, and update a no net loss or biodiversity commitment to support the development of an internal biodiversity target can be found within the **Application Guidance** Annex.

9.2.2 Communicate internally and externally

FOR THIS ACTION, REFER TO THE PROTOCOL PAGE 106 FOR GENERAL GUIDANCE.

9.2.3 Make [biodiversity-inclusive] natural capital assessments part of how you do business

Global reports have ranked biodiversity loss and ecosystem collapse as one of the top five threats humanity will face (WEF 2020b) providing the opportunity and momentum for businesses to address the issue, not only for risk management but for market advantages (WEF 2020a).

The Capitals Coalition believes biodiversity-inclusive natural capital assessments improve risk management leading to better decisions and a competitive advantage within your business and sector. To ensure the longevity of these benefits to business, the results of these assessments need to be continually incorporated in decision-making and the actions taken need to be responsive to the identified risks at that time, resulting in an adaptive and resilient working culture.

To optimize the value to your business from a biodiversity-inclusive natural capital assessment, you should consider:

1) **Embedding biodiversity within your business model**

   • Keep updated with global, regional, and national biodiversity policy and its implications for business activities (e.g., access to finance and license to operate). This can inform any internal policies you might develop or provide the basis for an update to internal goals and targets.

   • Strengthen the business case for managing your relationship with natural capital and biodiversity within your organization, amongst corporate board members and senior staff of your business.

   • Relate your natural capital assessment results to your business model and present results of your biodiversity-inclusive natural capital assessment to senior management. Increasing rates of natural resource consumption and climate change can lead to unexpected and unpredictable changes for your business.

2) **Updating your methodology on how to measure and value biodiversity**

   • Continually explore new methodologies on how to measure and value your biodiversity impacts and dependencies.

   • Continually engage with project developers, suppliers, site managers, and other external stakeholders to better identify how your business is impacting and depending on biodiversity within existing projects and new projects.

   • Maintain internal capacity to measure and value biodiversity impacts and dependencies.

3) Exploring linkages with new and existing processes and or targets

- Ensure that information on biodiversity is integrated into other business management systems, including financial and management accounting through an existing process or a natural capital account. Consider existing environmental management systems (EMAS or ISO 1400) for implementation.

- Consider how biodiversity targets can be incorporated into societal goals which your business aims to achieve. This way multiple societal goals can be targeting with fewer business actions (UNGC and Duke University 2010).

4) Building capacity and strengthening collaboration amongst stakeholders

- Ensure the team undertaking the natural capital assessment fully understands the company/project/product impacts and dependencies on biodiversity and includes consideration of the value of this in future biodiversity-inclusive natural capital assessments. Also, ensure these individuals have the necessary resources and skills, similar to how your company manages financial and business accounts.

- Develop a theory of change on the role that biodiversity-inclusive natural capital assessments can have in influencing decision-making within your business (Conservation International 2013).

- Continue to collaborate with stakeholders with whom you have engaged in the natural capital assessment to facilitate knowledge exchange on your impacts and dependencies and shifts in stakeholder concerns and priorities.

- Continue to develop relationships with internal stakeholders and professional organizations to help influence the global debate on biodiversity. Doing so will ensure businesses are included in policy developments (early mover advantage) and can demonstrate their contribution towards global biodiversity goals and targets.

- Continue to investigate the opportunities for collective action on biodiversity with other businesses and/or sectors.

Case Studies

Company example: Water company

A major water company in the United Kingdom has engaged with habitat restoration programs that support their business operations.

The company recognized their dependency on the ecosystem service of clean water provision, but found the quality of the water collected in their catchment areas to be deteriorating over time, increasing operational costs of water treatment. They conducted a natural capital assessment to assess their dependence on healthy peatland habitats in providing clean water. The water company realized that degraded peatlands increase soil erosion and therefore water sedimentation. This led to the need for peatland habitat restoration within catchment areas to potentially reduce operational costs.

In response, restoring these habitats was integrated into their Biodiversity Action Plan, and the company engaged with relevant stakeholders and regulatory bodies in a multi-partner peatland restoration program. In doing so, they also fulfilled regulatory requirements for catchment management, reducing operational as well as legal and regulatory risk, whilst also demonstrating to external stakeholder their positive influence on biodiversity.

Company example: Property developer

A major property developer and owner, manager, and developer of retail destinations across Europe launched a Net Positive target in response to the United Kingdom's Biodiversity Action Plan which responds to the Convention on Biological Diversity.

The company aimed to improve new development and existing maintenance with regards to biodiversity across their land holdings to meet their target by 2030. The strategy aimed to deliver positive carbon, water, resource use, and socioeconomic impacts across all UK and international operations by 2030 and focused on biodiversity given its integral role in reducing carbon emissions through increasing the size and quality of carbon sinks.

The company's biodiversity action plan aimed to ensure that biodiversity targets were considered across supply chains. The property developer used the UK's Biodiversity Action Plan species and habitat list, and conservation targets, to identify individual species which were related to its own operations, to improve the quality and quantity of biodiversity at specific sites. As part of their Biodiversity Action Plan, ecological appraisals and impact assessments of all new developments were conducted to ensure appropriate mitigation steps were considered.

This delivered multiple benefits such as expedited regulatory processes, increased operator satisfaction, lower operational costs, and increased footfall for retail outlets.

Company example: Construction company

A construction company used a natural capital approach at the initial stages of a project to value community benefits derived from achieving biodiversity net gain.

The corporate natural capital accounting (CNCA) framework was adapted to measure wider environmental impacts to achieve biodiversity net gain, leading to the development of the Biodiversity Net Gain in Natural Capital Accounting framework. Using this framework, the initial impacts of a project and mitigation approaches including biodiversity offsets were highlighted. The output of this framework is a balance sheet which includes: i) net changes to biodiversity, ii) net changes to the value of natural capital assets, and iii) changes to cost at the sites (where the mitigation measures were implemented). For net changes to biodiversity, the Key Performance Indicator used was the official UK biodiversity metric, to quantify losses and gains of biodiversity following mitigation. The benefit of this approach is that these balance sheets can be produced before, during, and/or after implementation of a project, enabling the business to consistently track progress and adapt mitigation measures accordingly.

Before the construction project began, an assessment was conducted to identify the net natural capital value of the project to provide a baseline to compare the biodiversity loss against once the project was underway. The developer of the project invested in five biodiversity offsets which resulted in a small increase in biodiversity units, as well as increases in community benefits.

Company example: Food company

A food processing company used the planetary boundaries framework to examine their biodiversity impact in relation to the cultivation of two major crops: soya and almonds. The aim of the assessment was to better understand how cultivation of these specific commodities is linked to biodiversity loss and to develop a roadmap to reduce biodiversity loss and contribute to a resilient ecosystem.

The "biodiversity boundary" — known as biosphere integrity — is composed of functional diversity and genetic diversity. This boundary was downscaled to three specific site locations where the biodiversity footprint was assessed for one liter of soya and almond drink without packaging. The mean species abundance of original species (MSA) metric was used as an indicator to measure the biodiversity at baseline and future scenario levels where different management practices and intensities were implemented (refer to **Measuring and Valuing Guidance** action 6.2.5 for more information on this metric). The metric was used within a biodiversity footprint methodology based on the GLOBIO framework of the Netherlands Environmental Assessment Agency (PBL). This evaluates the impact on biodiversity from pressure factors: land-use intensity, climate change, nitrogen deposition, and fragmentation. As these impacts can be linked to specific companies and production chains, this methodology is useful to understand cultivation impacts on biodiversity.

Once methodologies were determined, the boundary and targets for loss of biodiversity could be set. Since it is not possible to attain zero loss of natural biodiversity with any agricultural production process, the company focused on identifying the main sources of impact on biodiversity and ways to reduce this impact.

Results demonstrated that higher productivity leads to a reduced biodiversity footprint, revealing a trade-off between extensive land management practices and the need to maintain a balance between agricultural output and loss of biodiversity at a local level.

As a result of the pilot, the company proposed 15 interventions to reduce biodiversity impacts for both soya and almond farming, as well as to stay within other planetary boundaries. These interventions included agroforestry, building corridors, cover cropping, crop rotation, and ecosystem management plans. The food processing company aims to use planetary boundaries and the GLOBIO methodology for a larger pilot, to further develop the methodology and to include farmers and affected stakeholders within interventions to mitigate negative impacts on biodiversity.

Annex: Plan, implement, assess, and update your biodiversity commitment

Steps to **plan, implement, assess, and update a no net loss (or biodiversity net gain) or biodiversity commitment** to support the development of an internal biodiversity target (Ideas adapted from Business Planning for Biodiversity Net Gain: A Roadmap (BBOP 2018), United Nations Global Compact and KPMG 2015, and United Nations Global Compact and IUCN 2012).

Note that the Assess and Update steps should be completed iteratively to ensure actions are continually being improved and to build internal capacity (de Silva et al. 2019).

Plan
- Assess the results of your natural capital assessment on biodiversity. The results will provide you with an indication of the risks within your company, and whether there is a high dependency or impact on biodiversity.

- Commit to achieve no net loss (or biodiversity net gain) or another biodiversity commitment. Assess your current commitments, processes, and tools which could be related to committing to no net loss or net gain. These would be identified during the Scoping Stage. The activities or business units which are relevant to a no net loss commitment will be revealed during the natural capital assessment. Use this information to define the biodiversity features for which no net loss or biodiversity net gain is going to be achieved.

- The results of the natural capital assessment will indicate the drivers for high impact/ dependency on biodiversity. Depending on your business, the areas of impact/ dependency may be site-specific, across whole supply chains, or both.

- Assess whether no net loss or another biodiversity commitment can be integrated within existing policy, strategy, or management areas (e.g., commitments to water quality and sustainable development) or whether there is potential for business activities to contribute to more than one goal simultaneously (e.g., biodiversity and climate change goals). Additionally, assess whether the company has capacity to deliver no net loss or net gain, or whether additional tools and resources are needed.

- Identify team members to steer the planning process and map internal and external stakeholder groups. In particular, include vulnerable and local stakeholder groups within this process to ensure local knowledge is reflected. Integrate action early within processes, especially for high dependency/impact activities outlined from the assessment. Identify areas where achieving no net loss or a biodiversity commitment is easily achievable to build experience and confidence, and then address more complicated tasks. Ensure your targets are SMART.

- Ensure that senior executives and board directors are involved within the process. This increases internal communication within the organization, and can also aid external communication with senior executives in other organizations.

Implement
- Assign activities to individual staff members who are involved with key activities related to your impact and dependencies on biodiversity. Ensure the necessary resources and capacity to deliver are available.

- Ensure there is a budget to implement these changes within the organization at multiple levels.

- Review existing company procedures on how you do business and integrate no net loss, net gain, or biodiversity activities within these existing frameworks.

- Engage with internal and external stakeholders throughout the process to encourage adaptive management processes and build internal capacity.

- Establish partnerships with key stakeholders to help implement activities (e.g., conservation scientists for technical support, or local stakeholders such as farmers and NGOs).

Assess
- Review progress of activities internally with key divisions of the organization, senior staff, and board members.

- Compare progress to your baseline to assess whether implementation of activities is on track to meet no net loss targets and whether there are processes which can be improved/altered. Measuring your progess could be done through a framework developed by IPIECA for example (IPIECA 2016).

- Engage with internal and external stakeholders for feedback on whether activities are reaching targets.

- Assess whether the activities towards no net loss are clear to track and evaluate whether they are sufficient to meet your target. If not, then identify these activities specifically and work to improve them.

- Monitor progress with external and internal stakeholders at product, site, and/or supply-chain level and ensure feedback from these stakeholders is recorded.

Update
- Implement steps which have been identified during the assess phase as described in this annex.

- Review and track progress along an agreed timeline to develop continuous improvement.

- Report and disclose progress towards no net loss to build credibility with stakeholders. Report under the Global Reporting Initiative Standards and management systems such as the ISO 14001. If you are aligning with global goals within your biodiversity targets, you should include this as a reference within your corporate sustainability strategies or biodiversity action plans.

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Introduction

Frame stage

Scope stage

Measure and Value stage

Apply stage

References

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