Measuring business impacts on nature

A framework to support better stewardship of biodiversity in global supply chains

The University of Cambridge Institute for Sustainability Leadership

The University of Cambridge Institute for Sustainability Leadership (CISL) is a globally influential Institute developing leadership and solutions for a sustainable economy. For over three decades we have built the leadership capacity and capabilities of individuals and organisations, and created industry-leading collaborations, to catalyse change and accelerate the path to a sustainable economy.

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Natural Capital Impact Group

The Natural Capital Impact Group is composed of progressive companies, including market leaders and household names, with significant land footprints and dependencies upon natural capital, which aspire to understand and then mitigate their impacts upon natural capital.

The Natural Capital Impact Group is convened by the University of Cambridge institute for Sustainability Leadership (CISL).

Natural Capital Impact Group members involved in development

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Executive Summary

The world's natural resources are being degraded and lost at an unprecedented rate. Transformative changes are required by business to protect and restore nature.

Businesses are both affected by and rely upon nature, regardless of organisation size, location and sector. However, nature and the resources it provides are declining at rates unprecedented in human history, with the private sector a key contributor to the crisis. Protecting and restoring nature is fundamental not only to global economic prosperity, but to the health and wellbeing of society. There is increasing consumer, regulatory and corporate awareness of the urgent action needed to halt the degradation and loss of nature.

This report was researched and written prior to the global outbreak of Covid-19, and much in our society and economy is likely to change as a result. Covid-19 has already been responsible for many thousands of deaths worldwide, and has disrupted whole societies and economies. Covid-19, which is now being transmitted amongst humans, originated in wildlife populations; a stark reminder of the inextricable interconnectedness of humans with the natural world upon which our economies and societies rely. If we are to avoid future environmental and social risks materialising we need to make transformative changes to protect and restore nature.

The World Economic Forum's *Global Risks Report 2020* highlighted degradation of nature as a key threat recognised by business.[1] There is expected to be renewed ambition to strengthen global targets and mechanisms that will reverse the loss of nature by 2030. Individual businesses need to play their part by aligning their strategies and setting their own ambitious targets.

Land transformation for the production of agricultural commodities is a key driver of impacts on nature. Many businesses have pledged to source key ingredients and raw materials in their supply chains responsibly. However, monitoring impacts, and progress against these commitments, has been slowed by the complexity of supply chains and a lack of appropriate metrics. Biodiversity, one of the key building blocks of nature, has tended to be overlooked, as other challenges such as climate change and plastic pollution have been prioritised, in part because measurement is relatively straight forward. Given the range of demands on business, simple methods are required to inform response strategies and deliver significant and sustainable change for biodiversity and nature.

The University of Cambridge Institute for Sustainability Leadership (CISL), through its Natural Capital Impact Group, whose corporate partners span across different sectors, identified a need for a high-level measure that could provide an indication of a business's impact on biodiversity in different regions of the world for different commodities. Given that many businesses lack complete data on the precise impacts of their upstream suppliers, a method that could make inferences using credible alternative data sources was required.

The Natural Capital Impact Group worked with leading academics and non-governmental organisations (NGOs) to develop a new approach to measuring biodiversity impacts in global supply chains. With this Biodiversity Impact Metric, businesses can determine where their operations pose the greatest threats to nature around the world. The metric can also be used to choose between different strategic responses and sourcing options.

The first step towards reversing nature's decline is for businesses to understand their own contribution and responsibilities. The second is to set bold, ambitious targets that move beyond being incrementally less bad to restoring nature. Building metrics and targets into corporate strategy is key to ensuring delivery on commitments. CISL's Biodiversity Impact Metric, when combined with our approach to developing a corporate biodiversity strategy, provides a powerful tool for businesses on their journey to restore nature.

The Natural Capital Impact Group hopes that this metric will help set businesses on a path to increased understanding of their relationship with nature, enabling and accelerating their ability to protect it for future generations.

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We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide.

Professor Sir Robert T Watson, Chair of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

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Foreword

Andy Murray
Asda's Chief Customer Officer and Chair
of the Natural Capital Impact Group

As the world gets to grips with a global pandemic, global retailers and businesses of all sizes are working to ensure their short and long term viability.

Whilst our immediate efforts are focussed on playing our part in the societal response, we must also continue to think and act for the long term.

It is likely that the current crisis will have long and far reaching implications for us all. In any version of a sustainable future, there will be a fundamental need for companies to play their role in valuing, restoring and protecting the natural world on which we all depend.

At Asda we source an incredible number and variety of goods and rely on nature for many of the ingredients and raw materials that make up our products. Nature is declining globally at rates unprecedented in human history. It is critical that we help protect the natural resources on which our raw material supply chains and the wellbeing of many other people depend.

In the last two decades we have made a number of sourcing commitments to support better stewardship of natural resources in our supply chains. Companies such as Asda can lead industry change but need to be equipped with the appropriate science and knowledge to better understand environmental impacts throughout their whole value chain.

I am delighted to see the leadership that the Natural Capital Impact Group has provided over the past four years by developing new measures that help quantify and compare natural capital performance. The Biodiversity Impact Metric will help provide a grounded understanding of the implications for nature of raw material sourcing, helping to identify and prioritise opportunities to deliver significant and sustainable change.

I firmly believe that in future business will be held accountable for its use of and stewardship of nature. Approaches like the Biodiversity Impact Metric will help Asda and other businesses to advance their understanding of the connections between nature, their supply chain, consumer demand and the future value of their business.

We are excited to be working with other members of the Natural Capital Impact Group to understand how this work can be deployed in our business and welcome further engagement with the wider business community.

Andrew J. Murray

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I firmly believe that in the future business will be held accountable for its use of and stewardship of nature.
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Why do nature and biodiversity matter to business?

Nature comprises communities of living (animals, plants, fungi) and non-living (water, climate and atmosphere) things. Together these provide the 'services' which are fundamental to human survival, such as clean water and productive soil to grow food. Nature also provides resilience to emerging threats caused by climate change.[2]

Biodiversity is the living component of nature, the variety of life on earth – from flatworms to forests. Biodiversity provides a wealth of essential goods, not least the food, fuel and fibres we rely on. Biodiversity also provides services for society: insects, birds and animals pollinate our crops; worms are essential to soil fertility and intact forests prevent the spread of diseases.[2]

The resilience of nature is directly related to the health and status of biodiversity.[2]

Globally, nature and biodiversity are in crisis, with the Living Planet Index recording an overall decline of 60 per cent in species' population sizes between 1970 and 2014,[3] meaning that 1 million species are now threatened with extinction.[2]

All businesses depend on natural systems either directly or through their supply chains. Recent research shows that $44 trillion of economic value generation – more than half the world's total gross domestic product (GDP) – is moderately or highly dependent on nature and its services.[4]

However, growing consumption and damaging production processes are driving land use changes and increasing pollution, undermining nature's resilience,[2] with negative consequences for business, trade and economies.[5] Agriculture is a key driver of impacts on nature and biodiversity, with more than a third of the world's land now used for crop and livestock production, at the expense of natural forests and grasslands.[2]

The worrying trends of the ecological crisis, interlinked with and exacerbated by climate change, mean that we can no longer continue with business as usual.[5] The loss of biodiversity will affect businesses that rely directly on nature for raw materials, waste assimilation or indirect support for production processes and continuity of operations. There could also be challenges for all businesses for supply chain continuity, predictability and resilience.[6]

Overall decline of species' population sizes between 1970 and 2014

60%

Biodiversity loss: risks and opportunities for business

Successful businesses spot opportunities and react to them quickly. They see the value in recognising early enough that tomorrow is not going to be identical to today. Businesses that understand their dependencies and impacts on nature, and take steps to safeguard and enhance the long-term resilience of nature, are positioning for success in the future. Nature and biodiversity are not just relevant to businesses that have built their brand around a sustainability culture.

- Businesses **that take a proactive role in addressing their impacts and dependencies on nature** and biodiversity will be well placed to succeed in the challenging context of the climate and ecological crises.

- Businesses **that take a lead on nature-related disclosure and action** are well positioned to establish a competitive advantage and increase their market share.

- Businesses **that account for and restore nature and biodiversity** will enhance the resilience of their supply chains and maintain a licence to operate, whilst creating additional benefits for society.

Nature-related risks for business

1. Operational and physical risk

As yields and productivity take a hit from the loss of nature's services, volume and quality of supply may be affected, and prices will likely rise.[6] For example, it is estimated that crops worth up to $577 billion are at risk annually from the loss of pollinators,[7] threatening the availability of crops such as cocoa, coffee and soy. Further, damaged ecosystems can no longer provide a natural buffer against floods and other extreme weather events, putting both raw materials and built assets at risk for all types of businesses.[6]

2. Transition risk, including regulatory and market developments

The ecological crisis is working its way up the political agenda[a] and gaining traction as key to delivering on climate and Sustainable Development Goals.[8] Scientists have called for transformative change to the global financial and economic systems to put the world back on track.[2,9] Regulation will surely follow[b], but changes in customer demand may come even sooner.

Businesses failing to anticipate this shift expose themselves to the costs of playing catch-up to align their businesses with new requirements and expectations.

3. Reputational risk

A business's destructive impacts on nature loss can trigger negative consequences far beyond the location of the physical damage. Public opinion increasingly holds companies accountable for biodiversity decline, and shareholder activism on sustainability issues is on the rise.[10] For example, a publicity campaign, partly targeted at shareholders, linking a high-profile multinational to the loss of orangutan habitat was credited with their shift to better verified sources of palm oil. The fallout for not looking after nature can be multi-faceted: shrinking customer base, lower brand value and share price, or even legal action from shareholders.

4. Systemic risk

Consequences of nature loss could become so severe that the society in which a business operates may become destabilised. Recently, the impact of infectious disease linked to the illegal wildlife trade has made its impact on the global economy.[11] We also know that climate change will cause rapid changes in ecosystems, thus the natural carbon sequestration of ecosystems is affected, which again worsens climate change. This negative feedback loop could completely change the world as we know it.[4,6]

Evolutions in the regulatory and market landscapes are coming, as they have in relation to the climate crisis, and will present opportunities for those ahead of the curve. Likewise, supply and demand dynamics will shift as consumers focus on environmental credentials.[12] Leading companies are already using disclosure on nature-related impacts to improve practices, collaborations and opportunities with stakeholders.[13,14]

[a]For example, in December 2019 the EU brought forward the European Green Deal as a response to the challenges of both the ecological and climate crises.

[b]For example, in January 2020 the UK proposed long-term targets for air quality, water and biodiversity in the draft Environment Bill
– www.gov.uk/government/publications/environment-bill-2020/30-january-2020-environment-bill-2020-policy-statement.

Business-led development of metrics

Sectors including food and beverage, apparel, cosmetics, pharmaceuticals and other major consumer goods are realising that much of their impact on biodiversity lies in their supply chains, particularly as a result of their raw material sourcing.[15] Businesses need a comprehensive and grounded understanding of the contexts of their raw material sourcing and impacts on nature throughout their whole value chain. However, many businesses are not vertically integrated, which adds complexity to identifying farm-level impacts, so a new approach to metrics is required to identify and account for these impacts.

CISL's Natural Capital Impact Group brings together companies to work collaboratively to determine how businesses can sustain and restore nature through their strategies and operating practices. Members of the Group co-develop, deploy and embed innovative and enterprising approaches to protecting nature, resulting in positive outcomes for both business and the environment. The Group aims to influence its industry peers through the example of business practice, drawing on research-informed knowledge, processes and tools.

In response to the business need for metrics that can be used to inform strategic sourcing decisions, the Natural Capital Impact Group has worked in partnership with leading academics to develop new approaches to measuring where business impacts pose the greatest risks to nature around the world. Three measures have been developed for biodiversity, soil and water. This report focuses on **biodiversity**.

Land transformation for the production of agricultural commodities is a key driver of impacts on biodiversity.[2]

Biodiversity   **Soil**   **Water**

Therefore, the development and testing of the Biodiversity Impact Metric has focused on agricultural commodities.

The metric has been designed to help businesses in the following ways:

1. **Measure** the impact on biodiversity from their sourcing of agricultural materials in global supply chains.

2. **Identify** high-risk locations where impact is most likely to threaten biodiversity.

3. **Inform** the development of strategies, underpinned by clear goals and targets.

4. **Align** with global goals for nature and biodiversity as they are developed, such as Science Based Targets.

Science Based Targets are evidence-based commitments adopted by companies to reduce their impacts in line with what the latest science says is necessary to meet global goals and stay within planetary boundaries, such as limiting global warming to 1.5°C.[16] A global target for nature will likely be agreed in the next year.

The Biodiversity Impact Metric

Biodiversity is context-dependent: the impact of a business depends on the location of the production of their agricultural commodities. For example, the conversion of forest to farmland in Europe will have a different impact from the conversion of forest to farmland in the tropics.

In an ideal scenario impacts would be measured directly, at the site where production occurred, in real time and iteratively. However, complex field-based biodiversity impact assessments are resource and skill intensive, making them difficult to scale across operations. This is particularly challenging for multinational businesses that source thousands of different raw materials from privately owned farms across the planet.

Purpose and rationale of the metric

The transformation of natural habitats for human use (eg deforestation of tropical forests), is the most significant driver of biodiversity loss.[2] The Biodiversity Impact Metric can be used to assess and track how a business's sourcing affects nature, through the biodiversity lost as a result of land and habitat transformation for agricultural production and the intensity of land use. The metric allows comparison of potential impacts (overall or per unit) across different sourcing locations and between commodities.

The metric is an ideal entry-level approach that allows a company to undertake a rapid risk-screening of its sourcing in order to identify where the greatest impacts are likely to occur, thereby helping to prioritise further investigations and interventions.

Methodology

For an agricultural commodity sourced from a particular location, the metric assesses impact based on:

- the land area needed for production of the commodity

- the proportion of biodiversity lost when the land is transformed to produce the commodity, related to the type of land use and its intensity; and

- the relative global importance of that biodiversity.

The basic framework for the Biodiversity Impact Metric is shown in Figure 1.

A business needs, at a minimum, three pieces of information to calculate the metric: **1) commodity type**; **2) sourcing country**; and **3) quantity purchased**. However, the accuracy of the metric improves with greater visibility of sourcing practices.
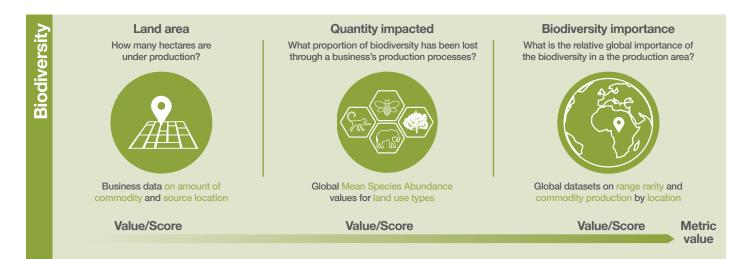

Figure 1: Framework for the Biodiversity Impact Metric

Land area: How many hectares are under production?

One of the most important factors affecting biodiversity impact is the total land footprint that a business requires to meet its sourcing requirement. The greater the area required, the greater potential for biodiversity impact. Therefore, data are needed on the number of hectares of land used to grow a commodity in a source country. In many instances, businesses will not have this level of visibility of their extended supply chain. In this case, the Biodiversity Impact Metric estimates the land area required to produce a commodity by using the quantity that a business has purchased in combination with information on yield. Preferably, if a business has its own yield data for a commodity this can be used. However, country-level yield data from the United Nations Food and Agriculture Organization (FAO) database can be used when alternative credible sources are not available.

Data requirements: Hectares required to produce the amount of commodity purchased, or total volume purchased. Actual yields will improve the accuracy of the metric.

Quantity impacted: What proportion of biodiversity has been lost through production?

The second factor to consider is how production impacts the biodiversity that exists within the land footprint of a business. When natural habitat is transformed for commodity production, some of the original species may be lost and others may increase or decrease in abundance. The extent of change is often dependent on the type of land use (eg pasture, cropland, forestry) and the intensity of management (eg intensive monoculture versus organic production).

The proportion of biodiversity left under different land use categories and management intensities is classified according to minimal, light or intense management. Values range from 0 (no impact) to 1 (all original biodiversity lost) and are primarily based on the latest Mean Species Abundance coefficients that estimate how many individuals

of a species you can expect to find in an area under productive use compared to a pristine state.[17] For the Biodiversity Impact Metric we interpolate some gaps in existing Mean Species Abundance coefficients using expert judgement. A questionnaire helps identify the intensity level of the commodity production. Further details are provided in the Supplementary Information.

Data requirements: Information on the land-use type and production practices for a commodity. If no production practice information is available 'intense' land use is assumed. Knowledge of actual production practices will improve the accuracy of the metric.

Biodiversity importance: What is the relative global importance of the biodiversity in a particular area?

There are many ways to measure the biodiversity importance of an area. However, two attributes that are widely used are species richness (the number of different species) and uniqueness (the rarity of these species). Rarity is assessed by the size of a species 'range', ie the area in which a species is found during its lifetime. Range rarity combines species richness and range size.

Range rarity values provide an indication of the relative importance of a place for biodiversity compared to other regions (Figure 2). Places with high range rarity hold many species and/or those with small global ranges. Whilst all biodiversity is important, land conversion in high range rarity areas is likely to have a greater impact on global biodiversity than it would elsewhere and has a greater risk of contributing to species' extinction.

To obtain a range rarity score, information is needed on a commodity's sourcing location. The more precise the source location, the more accurately the impacts on biodiversity can be assessed. However, when a company can only trace supply to the country level, inferences can be made about where in that country sourcing is likely to occur by using external datasets that provide sub-national production data. These data can be used to apportion the likelihood of companies sourcing to more precise locations by assuming that purchasing follows availability, for example, if one region within a country accounts for
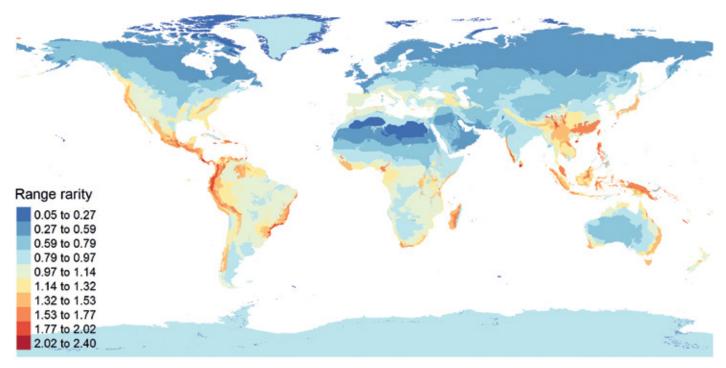
Figure 2: Global range rarity: high-scoring areas (in red) are likely to have a large number of species with small range sizes

50 per cent of national production, we can assume that 50 per cent of the company's sourcing comes from that region.

Data requirements: Information on the sourcing location to at least a country-level, more precise locations (eg to sub-region or even farm level) will improve the accuracy of the output.

Calculation of the Biodiversity Impact Metric

The Biodiversity Impact Metric is calculated using a simple multiplication of the three variables: land area, proportion of biodiversity lost and biodiversity importance (Figure 3). The unit of the output is 'weighted hectares', ie hectares weighted by biodiversity impact. The result can also be divided by the total amount of commodity purchased to give an indicator of impact per unit sourced, which can then be compared with a global average. The Biodiversity Impact Metric is fully additive across commodities and geographies, for example, you can get a total company score by adding together the results across all your sourcing areas.

Granularity of the calculation

The Biodiversity Impact Metric can work at any scale. The geographic area (eg farm, sub-region, country) at which a business chooses to calculate the Biodiversity Impact Metric is dictated only by the availability of the underlying data. For many businesses, it will be difficult to infer sourcing location beyond the country level. For those with greater traceability in their supply chains, the current availability of the range rarity data may limit the scale of the results. Whilst the range rarity layer can be computed at any resolution, the data layer is more commonly available at a scale of 1km². However, care must be taken when using the range rarity layer at finer resolutions because it is likely to increase the chance that a particular species is incorrectly considered present or absent from the area of interest. CISL has piloted the metric at the level of 'eco-regions', which are large areas of land containing geographically distinct collections of species, natural communities and environmental conditions.[18] The eco-region scale helps reduce the uncertainty around the accuracy of the 'biodiversity importance' variable.

$$\text{Biodiversity Impact Metric} = \text{Land area} \times \text{Proportion of biodiversity lost} \times \text{Biodiversity importance}$$

Figure 3: The Biodiversity Impact Metric equation

Limitations and assumptions

The biodiversity impact quantified by the metric reflects the level of biodiversity that persists in a productive landscape relative to the biodiversity that would be there if the original habitat was still intact. Note that the metric does not assess when land transformation took place, or who was responsible for it. The metric therefore assesses an ongoing occupancy impact or 'opportunity cost' for biodiversity of maintaining the transformed land in commodity production. It does not examine the impacts on individual species or other important aspects that businesses should consider such as overlap with protected areas.

The metric weights all three variables equally. In doing so the score tends to be more heavily driven by the 'area' variable than 'quantity impacted' and 'biodiversity importance'. This means the metric is most useful as a relative measure. It is most appropriate for examining differences between sourcing areas using data collected with a similar level of accuracy and/or examining company-level scores. It can be used to compare different commodities, but care should be taken, particularly when comparing very different systems with yields that are hard to measure.

The metric is not suitable for comparing the trade-offs between the three variables. For example, reducing land area might improve a Biodiversity Impact Metric score by 50 per cent, but reducing land intensity might only improve a score by 10 per cent; it would not be appropriate to say that the land intervention was five times better for biodiversity than the change in intensity. The underlying evidence required to weight these factors in a completely unbiased way is not currently available.

Currently, the 'intensity' score is limited in its ability to distinguish the impact of a number of different management practices. For example, specific levels of pesticide and fertiliser use or certification.

The metric does not assess the broader landscape context, for example, a producer may manage their production areas in an intensive way but provide and protect natural habitat in the surrounding landscape. The Biodiversity Impact Metric would only account for the production area impacts. The metric also does not assess the indirect effects (outside the land-use footprint) of commodity production; for example, the commodity production might cause pesticide run-off into local waterways, affecting freshwater biodiversity.

Development opportunities for the Biodiversity Impact Metric

The Biodiversity Impact Metric is a flexible framework and has the potential to be applied in a wider range of contexts with some additional development. For example, businesses that operate at the landscape scale, such as those that own and maintain forestry plantations and adjacent areas, may wish to modify the metric to see how developing conservation areas where natural habitat is protected mitigates their impact score.

Businesses that primarily deal with 'products' rather than raw materials, eg consumer goods and fashion companies, may wish to create a score at the product level, by adding together the impacts of different ingredients.[19]

In a similar vein, the metric is currently being trialled in the context of livestock sourcing, comparing intensive versus extensive systems. In intensive systems, where the animals are not exclusively pasture-fed, the impact of additional food sources, eg soy or maize, needs to be accounted for. Life-cycle analyses may be used to help identify the cradle-to-gate impacts from different production systems.

Ultimately the Biodiversity Impact Metric is one of many factors that a business should consider when making sustainable sourcing decisions. For instance, decisions are also made based on carbon emissions, water usage, social impacts and profitability.

> Businesses may integrate the Biodiversity Impact Metric into a decision-making framework that allows the benefits and trade-offs of sourcing options to be seen and decisions made in a way that maximises outcomes for business, society and nature.

Interpreting the results of the Biodiversity Impact Metric

The outputs from the metric are most easily interpretable in relative terms, for example, by examining whether the sourcing of a commodity is having a higher or lower impact on biodiversity per tonne sourced compared to other sourcing locations or the global average. By examining the total weighted hectares, a company can assess where their greatest exposure to sourcing risk might lie.

An example of a company sourcing cocoa from several different locations is shown in Table 1 and Figure 4. In the example, the company's total impact per tonne is lower than the global average impact for cocoa production. In two countries (Liberia and Nigeria), the company's cocoa sourcing is having an impact significantly higher than the global per tonne average, and they may want to focus their efforts here to reduce this impact (Figure 4a). However, given that only a small amount of cocoa is sourced from these regions, they might consider that their exposure to biodiversity risk in these countries is relatively small, and they may instead wish to prioritise action in Ghana and Côte d'Ivoire where their total impact is greatest (Figure 4b).

Table 1: Worked example of the Biodiversity Impact Metric for cocoa supply chains using fictional data values

Country	Tonnes sourced	Yield (kg/ha)	Land area (ha)	Proportion of biodiversity lost (with 1 representing 100% loss)	Biodiversity importance (range rarity)	Metric results	
						Impact/ tonne (weighted hectares)	Impact-weighted hectares
Côte d'Ivoire	5,000	522	9,579	0.90	1.33	2.29	11,431
Ghana	5,000	510	9,804	0.90	1.37	2.42	12,107
Dominican Republic	100	461	217	0.90	1.53	2.98	298
Nigeria	100	180	556	0.90	0.96	4.80	480
Cameroon	50	403	124	0.90	1.31	2.92	146
Liberia	50	142	352	0.90	1.40	8.87	443
Sierra Leone	50	361	139	0.90	1.29	3.22	161
Company total	**10,350**		**20,770**			**2.42[a]**	**25,066**
Global average		436		0.90	1.35	2.79	

[a] Weighted average across all source countries

Data sources
Tonnes sourced: Business data.
Yield (kg/ha): From credible sources including a business's own data, otherwise FAO country-level yield estimates used.
Land area (ha): Estimated using the volume of raw material purchased (tonnes)/agricultural yield (tonnes per hectare).
Proportion of biodiversity lost: Global Mean Species Abundance values for different land use types and intensities.
Intense (0.90) used for the global average as detailed intensity and land use information is unknown.
Biodiversity importance: Range rarity for cocoa-producing regions (an average that is weighted according to the land area used for production in each region).
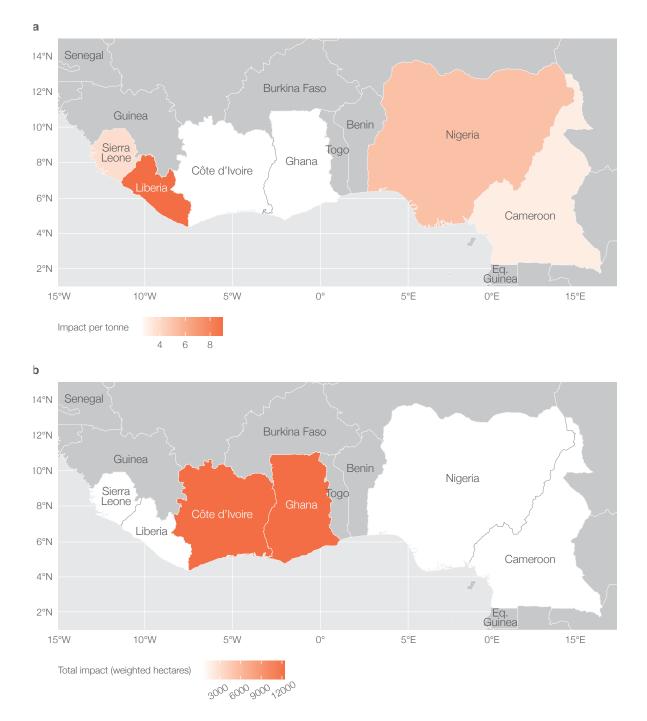
a

b

Figure 4: Biodiversity Impact scores for cocoa sourcing by country; per tonne sourced (a); total impact across all cocoa sourced (b). Countries not sourced from are shown in grey.

Using the Biodiversity Impact Metric to inform decision-making

There are three different ways that a business may be able to reduce their impact on biodiversity as measured by the Biodiversity Impact Metric:

- *Land area:* reducing the area used to source commodities, either by reducing the quantity of raw materials required, switching to alternative commodities, or by increasing yields on existing agricultural land.

- *Land use intensity:* by reducing the intensity of land use or changing the land use type.

- *Source location:* sourcing raw materials from areas that are less important for biodiversity and/or have higher yields, requiring less land area to produce the same quantity.

It is important to note that lower production intensity may result in yield trade-offs, which would in turn affect the total land footprint. Switching sourcing location also has a number of social, political and environmental consequences, and while it may reduce the impact for a particular business, it does not prevent the unsustainable production in the original location. Therefore, while the metric can help inform decision-making, this should be as part of a carefully thought-out strategy. In the first instance, the metric can provide a business with information to prioritise further investigation into their supply chain.

In the example in Table 2, the metric results have been recalculated to account for a reduction in the intensity of land use in Ghana and Sierra Leone. Land use intensity could be reduced through the adoption of sustainable agricultural practices such as the use of agroforestry. In this instance the sourcing in Ghana is now well below the global average, and the total Impact-weighted hectares have reduced by approximately 20 per cent.

Table 2: Biodiversity Impact score with lower land use intensity values

Country	Tonnes sourced	Yield (kg/ha)	Land area (ha)	Proportion of biodiversity lost (with 1 representing 100% loss)	Biodiversity importance (range rarity)	Metric results	
						Impact/ tonne (weighted hectares)	Impact-weighted hectares
Côte d'Ivoire	5,000	522	9,579	0.90	1.33	2.29	11,431
Ghana	5,000	510	9,804	0.70	1.37	1.88	9,416
Dominican Republic	100	461	217	0.90	1.53	2.98	298
Nigeria	100	180	556	0.90	0.96	4.80	479
Cameroon	50	403	124	0.90	1.31	2.92	146
Liberia	50	142	352	0.90	1.40	8.87	444
Sierra Leone	50	361	139	0.70	1.29	2.50	125
Company total	**10,350**		**20,770**			**2.16**[a]	**22,340**
Global average		436		0.90	1.35	2.79	

[a] Weighted average across all source countries

Data sources
Tonnes sourced: Business data.
Yield (kg/ha): From credible sources including a business's own data, otherwise FAO country-level yield estimates used.
Land area (ha): Estimated using the volume of raw material purchased (tonnes)/agricultural yield (tonnes per hectare).
Proportion of biodiversity lost: Global Mean Species Abundance values for different land use types and intensities.
Intense (0.90) used for the global average as detailed intensity and land use information is unknown.
Biodiversity importance: Range rarity for cocoa-producing regions (an average that is weighted according to the land area used for production in each region).

Integrating the Biodiversity Impact Metric into a biodiversity strategy

The Biodiversity Impact Metric is of most value when a business uses the results to inform decisions that support the delivery of a wider strategy for biodiversity. Together with Kering and Biodiversify, CISL has published an eight-step guide to developing a **biodiversity strategy** that provides a pathway for businesses to understand their impacts and set ambition on how to address these (Figure 5).[20] The Biodiversity Impact Metric can help a business move through the steps of the strategy, particularly Steps 4–6. Below we set out how the Biodiversity Impact Metric can be integrated into this process.

Step 4: Understand your impacts and dependencies

The Biodiversity Impact Metric is an accessible tool for a business to start identifying *where* they may be causing impacts and prioritise where to take action. It can also serve as a baseline for assessing the impact of the biodiversity strategy once it is implemented. After identifying where its impacts are occurring, a business may want to revisit the motivation, scope and context of its strategy defined in **Steps 1–3**.

Step 5: Explore your options, select a portfolio of actions, set targets

The Biodiversity Impact Metric can help identify where actions need to be *prioritised* and gives some indication on what types of actions are likely to be beneficial. It can also be used to inform a target: eg 'The impact of all commodities sourced is less than the global average impact for that commodity.'

Step 6: Set out a monitoring strategy

The Biodiversity Impact Metric might form part of a business's *monitoring strategy* and inform the sorts of data that the business either wants to continue to collect, or to start collecting (eg more precise information on production intensity). However, at this point a business may also decide to use metrics that are more suited to detecting on-the-ground impacts. The Biodiversity Impact Metric might help prioritise where more granular metrics and monitoring should be applied (eg particularly high-risk locations or commodities).

Step 1:
Identify your
motivations

Step 2:
Set your
scope

Step 3:
Consider the
context

Step 4:
Understand your impacts
and dependencies

What does the
company want out
of the strategy?

What decisions
will the strategy
aim to affect?

How can the
strategy be most
relevant to those
using it?

Where are your largest
impacts and which
natural systems does the
company depend on?

Step 5:
Explore
your options

Select a
portfolio of actions

Set
targets

Step 6:
Set out a
monitoring strategy

Populate the
hierarchy with
potential actions

Use the hierarchy to select
a portfolio of actions
which deliver meaningful
headline goals

For some
companies this
may be when
pledges are made

Deliver theories
of change and
identify metrics

Step 7:
Draw it all
together

Step 8:
Start
Implementing

Monitor, review, learn
and iterate

Deliver biodiversity
benefits

Strategies
need to be kept
relevant through
regular iteration
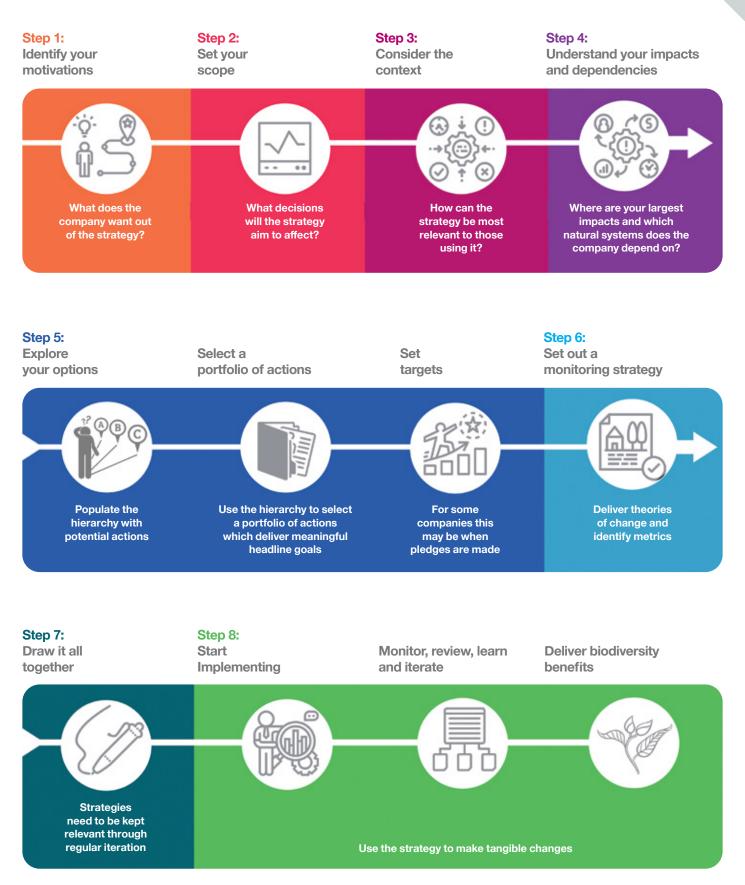
Use the strategy to make tangible changes

**Figure 5: Summary of the process to develop a corporate biodiversity strategy, taken from
Developing a Corporate Biodiversity Strategy: A primer for the fashion industry'[20]**

Case study: integrating the Biodiversity Impact Metric into a strategy for Kering's cotton supply

Kering is implementing all of the steps of the Conservation Hierarchy across its supply chains, as well as focusing on biodiversity as a priority and setting up on-the-ground programs. This case study is a deep dive on Steps 4 – 6 and for Kering's cotton supply chain in particular. This is a key material for the business and the sector as a whole, and is associated with a number of environmental impacts, particularly soil degradation, water use and agrochemicals input.[21] This case study works through how the Biodiversity Impact Metric can inform the development of a strategy to address the environmental impacts of the supply chain.

Step 4: The results of the Biodiversity Impact Metric applied to Kering's cotton sourcing (Figure 6) highlight that current cotton sourcing is having a higher biodiversity impact in India compared to other sourcing regions. Impacts are also higher than the global average in Turkey and the United States. Low yields were one of the primary factors driving high impacts in these cotton systems.

Step 5: Kering has adopted a framework based on the Conservation Hierarchy to guide its action on biodiversity[20] and is engaging in the process to develop and start using Science Based Targets for Nature.[22] The Conservation Hierarchy is a framework that can help decision-makers structure their knowledge about biodiversity impacts and work through the options for action.[20] As an example, the company might decide to set a headline goal of 'Net positive impact resulting from the sourcing of natural fibres on biodiversity', with a sub-target for cotton of 'A Biodiversity Impact Metric score 10 per cent lower

than the global average'. They can then identify a portfolio of options that can help them achieve these goals, guided by the results of the Biodiversity Impact Metric.

A company may wish to implement action across all its cotton sourcing, or it could target interventions to where they are most needed, for example, requiring farmers in high-risk regions to comply with a biodiversity-friendly certification.

In line with the Science Based Targets for Nature,[16] businesses should be looking to account for their direct impacts through the Avoid, Minimise and Restore stages. However, it may be that a company is unable to achieve a goal of net-positive through direct action in its supply chains. In this instance they may decide to supplement their direct action by supporting initiatives that enable more systemic change in the commodity supply chain through the Transform stage.

Step 6: The type of monitoring required will depend on the goals and actions that Kering decides are most appropriate. An assessment of whether the Biodiversity Impact Metric is appropriate will be made and it is possible that more granular or targeted metrics will be required. As one benefit, Biodiversity Impact Metric results can be used to identify where greater investment in monitoring might be most appropriate, for example, the high-risk regions such as India. Businesses may want to refer to the guidance that can guide the selection of metrics relevant to different business applications.[23]

This case study illustrates the approach for applying Steps 4-6 (Figure 5) for one commodity and shows how the Biodiversity Impact Metric is a practical, easy-to-use tool that enables prioritisation of key commodities and locations.
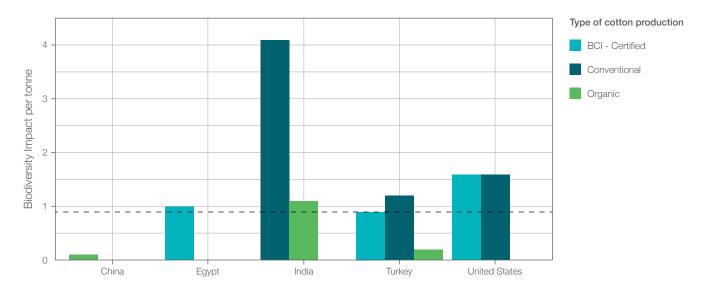

Figure 6: Biodiversity Impact per tonne sourced from Kering's cotton supply chain, which can be used to shape sourcing decisions. The global average impact score per tonne of cotton produced is shown with the dotted line. BCI – Certified is responsible cotton production sourced through the Better Cotton Initiative. Organic cotton is produced, and certified, according to organic agriculture standards (no toxic chemicals, pesticides, fertilisers or genetically modified seeds). Conventional cotton is not produced under any sustainability standard.

Table 3: Potential actions to reduce a fashion company's Biodiversity Impact Metric score and reduce impact of their cotton supply chain

Stages	Actions	Feasibility/risks
Avoid impacts	Stop sourcing from high-risk regions and/or producers.	This is often the simplest way to reduce biodiversity impact for an individual company. However, this approach will do little to reduce the impact of cotton production globally. If the company does not have traceability to the farm level, this approach might penalise good producers if they happen to be operating in high-risk regions.
	Avoid using cotton; substitute for a material with a lower average impact.	This may not be feasible to implement across all products for a fashion company.
	Eliminate products using cotton from the portfolio.	This is not likely to be feasible for a fashion company.
	Avoid purchasing cotton when there is not good traceability.	Traceability of cotton is notoriously difficult, particularly to the farm level.
Minimise impacts	Reduce the intensity of production: through the purchase of certified cotton, or by providing training to existing producers in high-impact regions.	Certified cotton represents a small percentage (~10%) of total cotton available on the market. Capacity building could require a large investment from the business. Without traceability it is difficult to target the right farmers.
	Reduce the land footprint: by providing training to farmers to increase yields through sustainable intensification.	Capacity building could require a large investment from the business. Without traceability it is difficult to target the right farmers.
	Reduce the land footprint: by improving the efficiency of material use. For example, through less waste, recycling and adopting a circular economy approach.	May require greater up-front investment in innovation.
	Get better granularity/traceability of sourcing to ensure that productive areas do not overlap with ranges of threatened species.	This level of granularity/traceability may be difficult to obtain.
Restore	Restore agricultural land to improve productivity, reducing the need to expand into new areas.	Difficulty identifying where restoration would be most appropriate given a lack of information about where the supply is coming from, and where the restoration potential is greatest.
	Encourage certification that has restorative principles.	Certification may bring additional costs for the producers. There may not be a scheme with relevant criteria.
	Support the protection and creation of natural habitats equivalent to those displaced by cotton production.	Difficulty identifying suitable areas for compensation. Difficult building the business case for the costs of doing so.
Transform	Engage with sourcing countries and jurisdictions to strengthen regulation and enforcement, potentially through business-led coalitions.	Difficult as a single company to have enough leverage. Lobbying for policy changes requires nuanced knowledge of regulation and specialist skills.
	Support initiatives that provide access to cheap finance for producers, eg by acting as guarantors for loans so that lower interest rate loans are enabled.	Difficult to find appropriate and effective initiatives, particularly those related to cotton.
	Work with certification standards to help 'raise the bar' for environmental criteria, for example, making biodiversity-related criteria essential rather than optional.	Difficult as a single company to have enough leverage.
	Invest in broader efforts to improve supply chain transparency and traceability.	Return on investment in terms of impact is unclear.
	Support philanthropic programmes that provide training on sustainable agricultural practices.	Return on investment in terms of impact is unclear.
	Work across the sector to address the consumption of cotton more generally, eg by targeting fast fashion or developing technology for better recycling.	Difficulty in working across the sector as companies have different priorities and business models.

The wider landscape of biodiversity measurement and business

The development and extractives sectors, as a result of regulation, access to finance and reputational pressures, have well-established approaches for measuring and mitigating for biodiversity impacts.[24] These sectors, being focused on particular locations (eg mines, building sites), have the benefit of knowing their actual area of impact, making the measurement of biodiversity a simpler proposition. In contrast the application of biodiversity metrics to supply chains is relatively novel, as different methods are needed when businesses source from many thousands of sites and do not have traceability to the farm level. The Biodiversity Impact Metric aligns with the principles of site-based measurement approaches but adapts these to the context of the value chain. Other methods applicable to supply chains include the Global Biodiversity Score, the Species Threat Abatement and Recovery metric and the Agrobiodiversity Index.[23]

Whilst the Biodiversity Impact Metric is currently of most use to businesses with global supply chains, it can also be adapted for other sectors. For example, Anglian Water a UK-based company, used the metric as a framework for a more granular approach to biodiversity measurement, applied across the 7000 sites they manage.[25]

The 'Aligning Biodiversity Measures for Business' project aims to form a common view among key stakeholders on the measurement, monitoring and disclosure of corporate impact and then communicate this into key reporting and disclosure mechanisms and global policy frameworks.[26] Forthcoming guidance from the Capitals Coalition that builds on the Aligning Measures work will include a decision-tree to help to guide users towards the metric most appropriate for their sector and desired application.

Science Based Targets help businesses align their actions with what is needed to address global challenges such as climate change. These Targets are based upon the Planetary Boundaries framework, which represents nine interacting processes that determine the condition or state of the Earth System.[27] A climate target of 1.5 degrees has been set. One of the other Planetary Boundaries focuses upon the biosphere's integrity, which relates to nature and biodiversity. Once finalised, the Science Based Targets for Nature will help businesses align their own goals with the Planetary Boundary for the biosphere and prioritise their actions.

Given that many businesses lack complete data on the context of their supply chains, the Biodiversity Impact Metric provides an accessible starting point using alternative data when necessary. This provides an ideal entry point to measurement for businesses at the start of their biodiversity journey, but it can also be used by businesses with more precise knowledge of their operations. It is also one of the few metrics to have already been piloted with several companies, and as such is ready now for wider application by the business community.[23] The Biodiversity Impact Metric is also well aligned with the proposed framework for the Science Based Targets for Nature, so has the potential to be integrated with this approach as it evolves.

Corporate disclosure and biodiversity

Businesses are expected to face increasing pressure to disclose their impacts on biodiversity. From a regulatory perspective, the mandatory disclosure of corporate biodiversity footprints is currently being proposed. For example, the EU's Green New Deal is proposing to "take measures, both regulatory and otherwise, to promote imported products and value chains that do not involve deforestation and forest degradation".[8] Independently, France has already put in place measures to address imported deforestation.[28]

In the world of finance, the Task Force on Climate-related Financial Disclosures provides a framework for companies to develop climate-related financial disclosures through their existing reporting processes.[29] Recently, there have been discussions between central banks, regulators and politicians on how to measure environmental risk exposure, and price natural capital and the ecosystem services they provide.[30] The proposition for the development of a Task Force on Nature-related Financial Disclosures is gaining momentum.[6]

Businesses may also face reputational pressure to disclose their biodiversity impacts, and actions to mitigate. For example, initiatives like Supply Change and Forest 500 assess the strength of corporate commitments to the environment, publicly scoring and comparing businesses to each other.[31]

The Biodiversity Impact Metric can support business disclosure on biodiversity impacts, particularly when integrated into strategy and regular reporting cycles that allow performance and progress to be tracked. It also has potential to help assess and align company commitments to external policy goals and targets such as the Sustainable Development Goals and the emerging post-2020 global biodiversity policy framework.

Concluding remarks

Business cannot operate on a dying planet. But the private sector can act to help reverse the unprecedented decline of biodiversity and nature. The first step companies can take to restore biodiversity and nature is to understand the impacts they are responsible for. For those companies that take action and leadership there are clear opportunities to reduce risks, create differentiation and increase resilience.

Business has a vital role to play in addressing the current crisis, and there is a clear need for credible metrics and tools that guide appropriate strategies and action. Biodiversity has been a key gap in corporate measurement and disclosure to date. Whilst direct field-level measurements are the gold standard for identifying impacts, high-level metrics can provide useful insights into a business's impact in different regions of the world for different commodities. Given that many businesses lack complete data on the precise context in which they operate, the Biodiversity Impact Metric developed by the Natural Capital Impact Group provides an accessible starting point using alternative data when necessary.

The Biodiversity Impact Metric is a practical risk-screening tool for supply chain businesses that source agricultural commodities. The approach allows businesses to proactively manage risks relating to the degradation of biodiversity and its wider societal impacts. By highlighting potential high-risk commodities, contexts or practices, businesses can prioritise where they would benefit from better visibility of their supply chain and collection of more accurate data on their operating practices.

By taking an evidence-based approach to reducing and reversing impacts on biodiversity, a business can achieve reputational and operational benefits. In addition, by safeguarding the wider benefits biodiversity and nature provide to society, a company can ensure their licence to operate is maintained.

Metrics will not drive positive impact by themselves – to be effective they need to be included in corporate decision-making processes. The integration of the Biodiversity Impact Metric into a strategy with clear targets will help guide and prioritise actions, ensuring businesses achieve their goals in relation to biodiversity and nature and in so doing improve their resilience.

The Natural Capital Impact Group welcomes further engagement as it seeks broader adoption and uptake of this approach. The ambition is that the Biodiversity Impact Metric will empower business to deliver on bold, ambitious targets that protect and restore biodiversity and nature around the world.

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