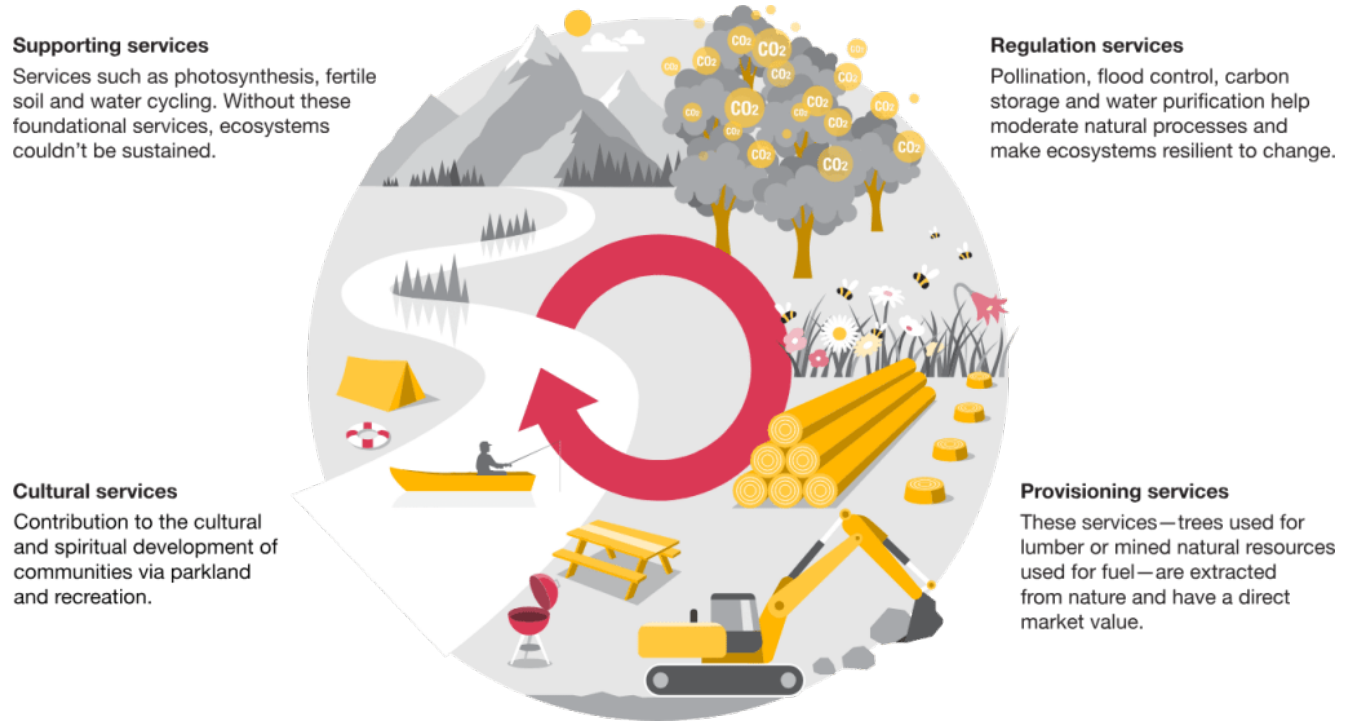
Business and Biodiversity: How Do We Assess The Impacts?

Biodiversity is disappearing at an alarming rate with species extinction and ecosystem degradation accelerating owing to human activities. With projections indicating that biodiversity loss, particularly rising species extinctions, will likely persist without substantial intervention. Weak or poorly enforced environmental laws allow prolific biodiversity loss. Individual consumption patterns lead to high demand for products that rely on environmentally damaging industries such as forestry. At the heart of this crisis is the private sector. Businesses play a crucial role, both as contributors to biodiversity loss and as potential drivers of change. From large-scale land clearing for agriculture to carbon emissions from supply chains, corporate activities shape the health of our planet. But how do we measure and assess these impacts? Understanding the relationship between business operations and biodiversity is essential for creating solutions that promote thrivability and balance economic growth with ecological responsibility.

The Links Between Business And Biodiversity Loss

There is increasing demand from consumers for businesses and organisations to more carefully consider the impact their operations have on the planet. This is driven primarily by a shift in priority from the public and private sector, policy makers, and new guidelines, including a specific target (Target 15) in the Kunming-Montreal Global Biodiversity Framework (KMGBF) which calls upon companies to more vigorously measure and report their impacts on biodiversity. Target 15 aims to reduce the negative impacts of business on biodiversity and the material, reputational, regulatory, and related risks that arise from this impact. The Taskforce for Nature-related Financial Disclosures (TNFD) sets out a framework for businesses to understand, disclose, and respond to their impacts on biodiversity and the risk this poses to business, with the expectation that disclosure will drive positive transformations that will reduce the negative biodiversity impacts of business.



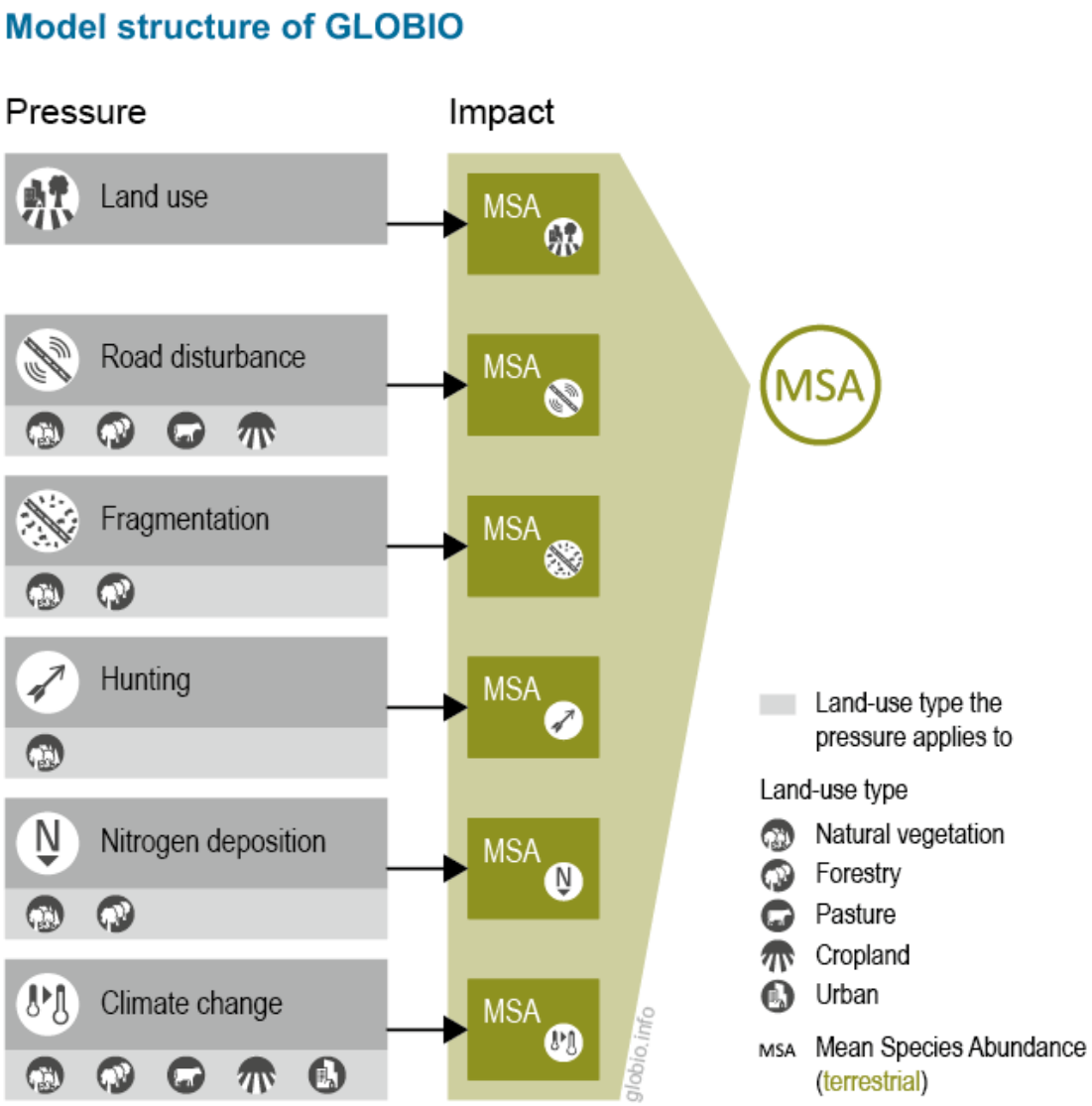
Biodiversity provides fundamental ecosystem services that many businesses rely on for their operations.
Image Source: PWC

Business and Biodiversity Impact Metrics

Biodiversity impact metrics help quantify the effects of business activities and operations, translating them into a measurable biodiversity footprint. Currently, there exist several biodiversity metrics that offer businesses a more concise way to consider their impacts. However, developing meaningful metrics is challenging as measuring biodiversity is difficult and its links to business are complex. Additionally, metrics often take different approaches to assessing biodiversity impact (scale and temporal resolution, ecological scope, etc.). Some metrics take a top-down approach; assessing biodiversity at a broader, aggregate level, while others are bottom-up; assessing biodiversity based on specific threats and often considering the individual needs of species. Amongst the selection of existing metrics, there exists no consensus on which metric should be used for which purpose. This lack of consensus may result in erroneous conclusions about a business's impact on biodiversity, hindering efforts to conserve biodiversity, posing risk to business, and opening avenues for greenwashing.

The Top-Down Approach

A top-down biodiversity impact metric uses factors such as ecosystem condition as a proxy for biodiversity intactness. Take for example the GLOBIO model, for which the metric is Mean Species Abundance (MSA). Top-down metrics also exist in life cycle impact approaches (LCIA) such as IMPACT World+. In these models, results are expressed in terms of the Potentially Disappeared Fraction (PDF) of species metric. These metrics utilise explicit pressure-impact relationships involving environmental pressures like land-use, habitat fragmentation, hunting, and CO2 emissions to arrive at a score reflecting the current condition of the ecosystem being assessed. The data driving such metrics comes from a broad range of empirical studies, or meta-analyses of species monitoring data, alongside other expert opinion. Tools like the WWF Biodiversity Risk Filter utilise top-down metrics such as MSA and PDF to provide spatially explicit estimates of companies' biodiversity risk.



The environmental pressures considered in the calculation of MSA through the GLOBIO model. Other top-down approaches utilise similar environmental pressures.
Image Source: GLOBIO

Shortcomings of A Top-Down Approach

While top-down metrics present a convenient approach to measuring biodiversity impact, they come with notable limitations.

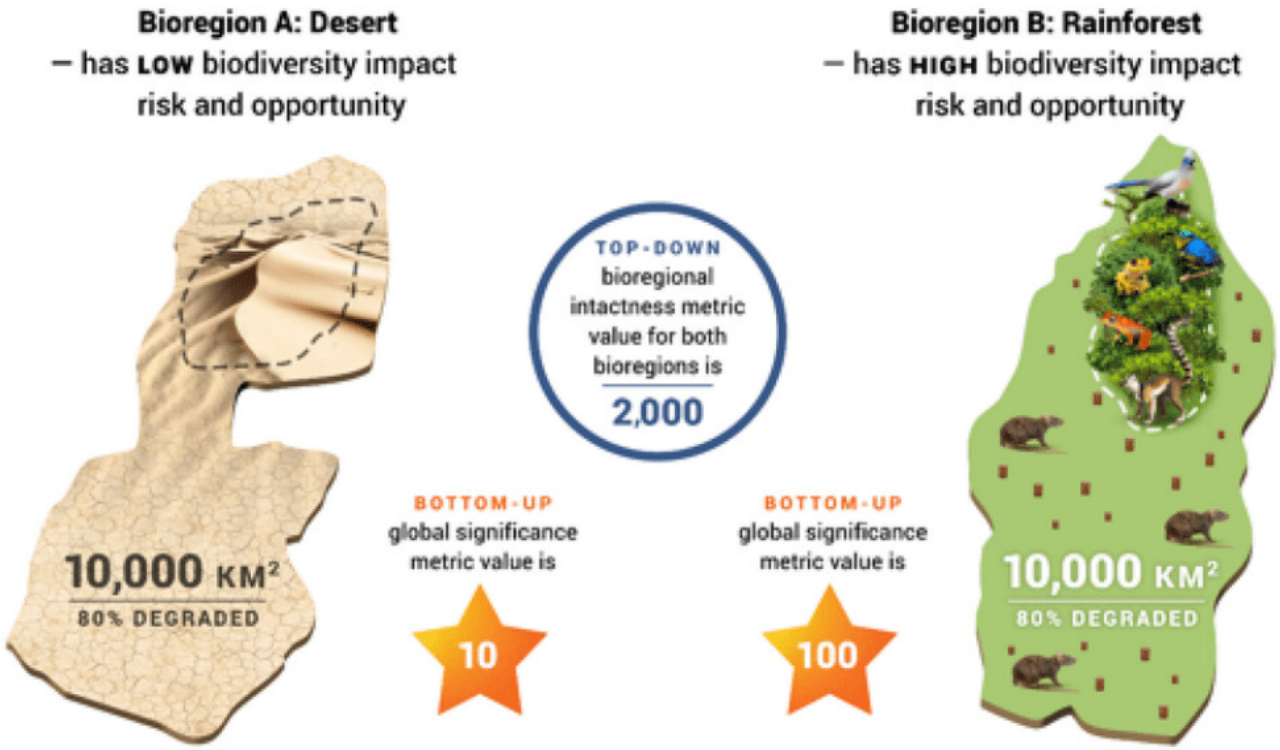
One major drawback is that they assign the same impact scores to bioregions regardless of their biological significance. This can be misleading, as conservation and restoration efforts are far more critical in regions with vulnerable species or ecosystems and should be prioritised accordingly. Additionally, these metrics rely on field data that may be incomplete or inconsistent across different parts of the

world. These inconsistencies can lead to gaps in representation for certain bioregions and threats. Lastly, while many top-down models incorporate key environmental pressures, some still fail to account for critical factors such as invasive species—one of the most significant drivers of biodiversity loss.

Owing to these shortcomings, top-down approaches to biodiversity impact assessment may underestimate, or overestimate, a business's or organisation's impact on biodiversity. These errors would be near impossible to correct without on-site visits to the assessed areas. These on-site visits would prove to be very costly and time-intensive.

The Bottom-Up Approach

A complementary approach to biodiversity impact assessments are bottom-up impact metrics. An example here is the Species Threat Abatement and Restoration (STAR) metric. Instead of assessing biodiversity intactness through a proxy such as ecosystem condition, STAR utilises the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species which contains specific threatened species occurrence datasets from around the globe. STAR has two components, providing a score for both threat abatement and habitat restoration potential. The STAR metric helps map out which threats are most responsible for species extinctions worldwide. This makes it easier to see how different species are affected, what's putting them at risk, and how business activities can influence these threats. Alongside STAR, other bottom-up metrics such as the Global Persistence Score achieves global coverage by using a selection of species that have available data on their habitat and the threats they face.



Comparison of biodiversity footprinting using top-down and bottom-up approaches. This illustrates how conservation importance differs between two hypothetical bioregions: a desert with low biodiversity impact risk and a rainforest with high biodiversity impact risk.
Image Source: (Hawkins et al., 2024)

Although comprehensive, metrics like STAR currently have their own limitations too. STAR, for example, does not contain information on all taxonomic groups (e.g. no plant data). Additionally, STAR relates only to threatened species. Any species considered non-threatened (not included on the IUCN Red List of Threatened Species) is not included in the calculation.

Business and Biodiversity: Metric Investigation

Metric Comparison Table						
Metric	Data source	Number of tools which utilise metric (TFND)	From systematic review			
			Most utilised sector	Spatial resolution	Ecological scope	Environmental pressure relationship
MSA	Meta-analysis of species monitoring data	21	Agriculture	300 x 300 m	Current ecosystem condition	Pressure-specific (6 pressures)
PDF	Broad range of empirical studies	10	Agriculture & Forestry	A-spatial	Change in ecosystem condition	Pressure-specific (11 pressures)
STAR	IUCN Red List of Threated Species	3	Mixed	5 x 5 km	Threatened species status	Pressure-generic

Information from a systematic review of **76** scientific publications linked to the MSA, PDF, and STAR metrics. And, findings from a separate review of the TNFD toolbox.
Image Source: Web of Science

The study conducted a systematic review of scientific literature on three widely-used biodiversity metrics. This included two top-down approaches (MSA & PDF) and one bottom-up (STAR). The study showed that resource-intensive sectors like agriculture and forestry most commonly apply these three metrics. Their use in other sectors is less widespread. This raises concerns that biodiversity impacts from many industries may be underreported. Additionally, the review of the TFND toolbox, involving **102** tools (e.g. GLOBIO) linked to biodiversity, found that MSA was found to be the most frequently used metric, whereas STAR appeared in only three tools. These findings highlight the need for greater integration of bottom-up metrics like STAR into biodiversity footprinting. This would ensure businesses can more accurately and thoroughly assess and manage their environmental impacts.

The research also highlights the varying scopes of these biodiversity metrics. Including different data sources, spatial resolution, ecological scopes, and environmental pressure relationships. This highlights the importance of businesses selecting a metric that aligns with their specific needs. A practical

solution could be the development of a checklist to help businesses assess and choose the most suitable metric for their unique context.

The Importance of Context in Business and Biodiversity

Biodiversity metrics utilise different data sources, resolutions, and varying ecological scopes. Consequently, businesses must carefully select the most appropriate metric for their specific needs. To do this it is critical that selected metrics are fit for the purpose that a business selects them for. Ensuring that a chosen metric is fit-for-purpose is essential for meaningful biodiversity assessments. More broadly, context-based decision-making is a key principle in environmental management, extending beyond biodiversity metrics to all areas of sustainability. The THRIVE Framework highlights this through one of its Foundational Focus Factors (FFFs) on Context-Based Sustainability Metrics (CBM). CMB emphasises the need to assess environmental impacts relative to ecological thresholds and societal needs. By applying this approach, businesses can move beyond one-size-fits-all assessments and ensure their biodiversity footprinting aligns with real-world ecological contexts.

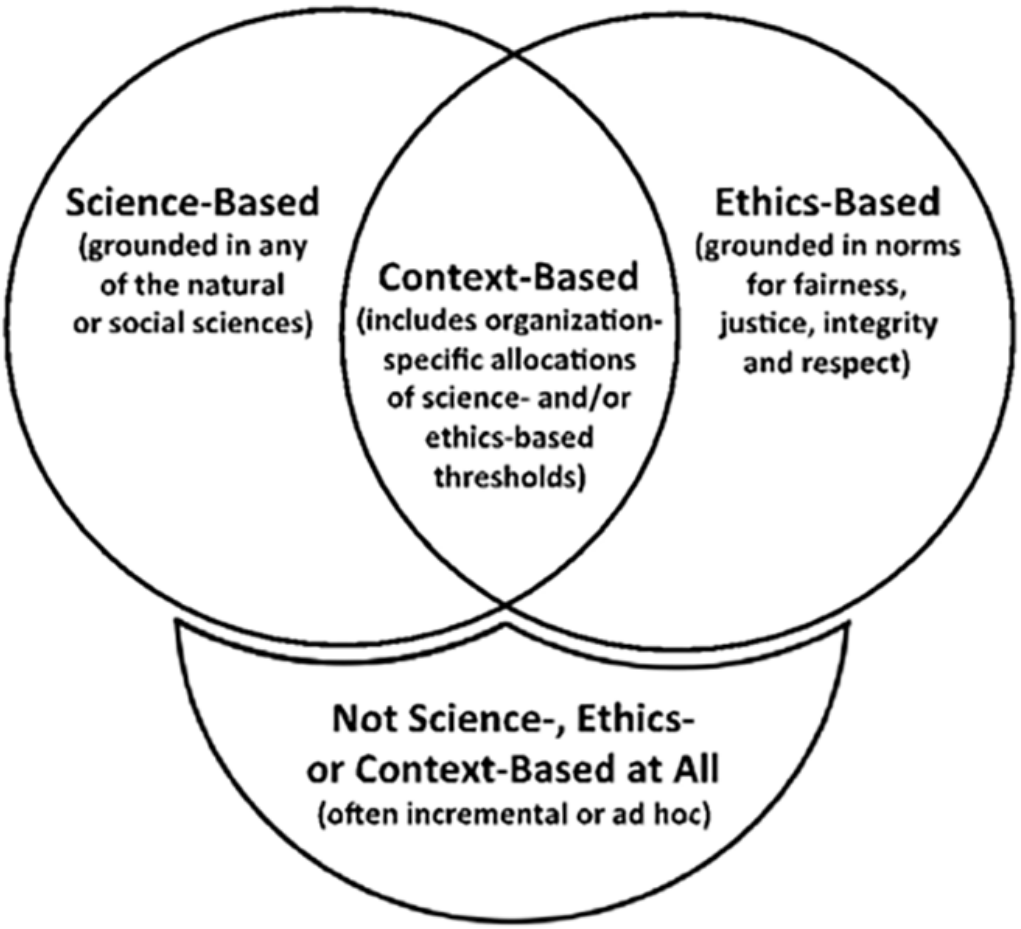


Figure 1 – Science-, Ethics- and Context-Based Metrics

The relationship between science-based, ethics-based, and CBM. CBM integrate both scientific and ethical considerations, ensuring that assessments of environmental impacts align with ecological limits and societal responsibilities. Image Source: Sustainable Brands

A Thrivable Framework

As accountability for environmental impacts increases, businesses must accurately assess their biodiversity footprints more than ever. From deforestation linked to supply chains to the depletion of ecosystems owing to resource extraction, corporate activities can have profound and lasting effects on biodiversity. However, without robust and context-specific assessment methods, businesses risk overlooking their true ecological footprint, allowing us to move towards a future in which all life can thrive.

THRIVE (The Holistic Regenerative Innovative Value Entity) Project actively promotes 'thrivability'. Rooted in this concept of thrivability, THRIVE goes beyond

traditional sustainability, exploring solutions that balance environmental and social well-being without compromise. The THRIVE Framework tackles pressing global issues, offering actionable insights for meaningful change.

Discover more about thrivability by visiting our website, where you'll find blog posts, whitepapers, and information on our free monthly webinars and newsletters. You can also follow the THRIVE Project on LinkedIn to stay updated on our latest initiatives and insights.