A-Track

Embedding nature in business: *A primer on biodiversity and ecosystem footprint assessments for products and supply chains*

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Introduction

Raw material extraction drives half of global greenhouse gas emissions and up to 90% of biodiversity loss[1], while linear business models continue to waste valuable resources. Because ***product*** design determines up to 80% of life-cycle impacts[2], integrating biodiversity footprinting into ecodesign strategies is essential to reducing nature-related risks, improving resource efficiency, and creating long-term business value. This is true whether your company is responding to biodiversity reporting requirements, seeking market opportunities in sustainable products, or aligning with global or EU nature-related goals.

Throughout this primer, the term ***product*** refers both to goods and services. Unless otherwise specified, any reference to ***product*** includes both[3].

1 United Nations Environment Programme (UNEP) International Resources Panel (2019). Global Outlook 2019 – Natural Resources for the Future We Want.

2 https://op.europa.eu/en/publication-detail/-/publication/4d42d597-4f92-4498-8e1d-857cc157e6db.

3 International Organization for Standardization (ISO) (2006). ISO 14040:2006 Environmental management – Life cycle assessment – Principles and framework.

This primer therefore focuses on applying life-cycle assessment (LCA) to two core business needs: product improvement and stakeholder communications. For product improvement, an LCA – and biodiversity and ecosystem footprinting in particular – helps identify nature-related hotspots across product life cycles and supply chains, enabling you to evaluate and select the most effective ecodesign strategies to reduce nature-related impacts and develop more resilient, future-fit products. For stakeholder communications, it provides the credible, science-based foundation needed to articulate your organisation's nature performance to investors, customers and other audiences.

This primer helps your company answer practical questions that guide day-to-day business decisions:

- Which materials your company sources and from where;
- What the focus of your operations is and what transformations along the supply chain you are responsible for;
- Why you should apply a nature lens to the ecodesign of products and how to do it.

We've designed this primer for business functions that rely on science-based biodiversity and ecosystem evidence to inform strategies and decision-making, particularly product development teams (including R&D and design), as well as sustainability, procurement, operations and marketing professionals.

As part of the Embed Nature[4] learning resources, this resource complements A-Track's primer on location-focused decision-making[5] and builds on A-Track's biodiversity and ecosystem footprint approach, adapting it specifically for business applications[6]. A few real-world case studies throughout the document demonstrate how other companies have successfully applied biodiversity and ecosystem assessments along their supply chains and the competitive value this has generated for their portfolios.

The primer provides practical guidance on the methods, tools and applications available to support biodiversity footprinting without requiring extensive technical expertise or unlimited resources. As the A-Track project progresses, we will develop additional resources covering data requirements, methodological refinements, and lessons learned from testing the framework in demonstration cases.

4 A-Track. Embed Nature.

5 A-Track (2025). What nature means for your business role: A primer on location-focused decision making.

6 A-Track (2025). A Biodiversity and Ecosystem Services Footprint: the A-Track approach.

How this resource can help you

This resource helps your company understand the business case for embedding nature into supply chains and product design. It equips your organisation with the knowledge and tools to embed nature-related considerations into everyday decisions regarding sourcing, production, logistics and product design. And it helps you meet evolving regulatory demands while capturing business opportunities in an increasingly nature-conscious market.

Box 1: Contexts where your company will find the primer useful

- **Seeking alignment with targets and goals in the** Kunming Montreal Global Biodiversity Framework[7] and the EU Biodiversity Strategy[8] to halt and reverse biodiversity loss by 2030; in particular, with the **need for sustainable supply chains and consumption patterns** and the use of environmental footprinting measures to integrate biodiversity considerations into public and business decision making.
- **Using the data compiled through biodiversity reporting** (European Sustainability Reporting Standards (ESRS), Global Reporting Initiative (GRI), Science Based Targets Network (SBTN), Taskforce on Nature-related Financial Disclosure (TNFD), etc.), **as an entry point to a biodiversity and ecosystem footprint assessment.**
- Expanding carbon footprint assessments, or wider LCAs, **to incorporate biodiversity and ecosystem aspects.**
- Answering specific questions from your customers and investors on biodiversity risk management.
- Understanding supply chain impacts on biodiversity to inform the nature strategy.
- Defining biodiversity-related hotspots along the supply chain to identify operational risks, prioritise resources for further assessments and action points, and make improvements to have a greater positive impact.
- Improving product design options, taking into consideration different material options from a more nature-positive perspective.

7 Convention on Biological Diversity (2022). Decision adopted by the Conference of the Parties to the Convention on Biological Diversity 15/4. Kunming-Montreal Global Biodiversity Framework.

8 European Commission (2020). COM (2020)380: EU Biodiversity Strategy for 2030- Bringing nature back into our lives.

How to navigate this resource...

You can read the full report sequentially or move directly to the sections most relevant to you. ***Click below to jump:***

Access the **What** section for the basics. Learn what nature-related issues are, building on LCA, and why they matter to your business.

Navigate to the **Why** section to understand the way in which biodiversity and ecosystem footprinting can help you manage risks (and leverage opportunities) related to product improvement and communication, supported by real-world case studies.

Read the **How** section to learn more about the novel biodiversity and ecosystem footprinting framework and how to start applying it. It introduces a geographically explicit assessment of nature-related issues along the value chain. It explains the different levels of its structure, aligned with the desired application of the assessment, scope and type of data available. The methods and tools allow you to learn more from examples or to start directly on your journey.

Life-cycle assessment and the A-Track biodiversity and ecosystem footprint

Life-cycle assessment (LCA) is a well-established and standardised methodology for assessing the environmental burdens of products (goods and services) along their life cycle, from the extraction of resources to the end of their lives. ***It comprises four main phases:***

1. **Definition of the goal and scope of the LCA;**
2. **Life-cycle inventory (LCI) analysis;**
3. **Life-cycle impact assessment (LCIA);**
4. **Life-cycle interpretation.**

The European Commission's Environmental Footprint[9] is an LCA-based method that harmonises the assessment of the environmental impacts of products (product environmental footprint, PEF) and organisations (organisation environmental footprint, OEF), building on ISO 14040 and ISO 14044[10]. Unlike the ISO standards, it prescribes 16 environmental footprint impact categories, each with its own assessment method for calculating the corresponding indicator[11].

The current version (v3.1) does not include a dedicated biodiversity impact category, as no internationally agreed life-cycle impact assessment method yet exists that can comprehensively capture biodiversity impacts. It does, however, include several categories closely linked to biodiversity and ecosystem degradation: climate change, freshwater, marine and terrestrial eutrophication, acidification, water use, land use, and freshwater ecotoxicity. The next version, due by the end of 2026, is expected to include a recommendation for LCA-related biodiversity indicators.

Footprints more broadly evaluate the pressures of human activities on the environment, usually in relation to a single impact category such as climate change or, here, biodiversity. As with the environmental footprint method described above, footprint quantification builds on the life-cycle assessment of a product across its whole supply chain – all of the upstream and downstream activities associated with producing it, including consumer use of the sold product and its end-of-life treatment[12].

9 European Commission (2021). Commission recommendation (EU) 2021/2279 of 16.12.2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations.

10 International Organisation for Standardisation (ISO) (2006). ISO 14040:2006 Environmental management – Life cycle assessment – Principles and framework; ISO, ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines.

11 Andreasi Bassi, S. *et al.* (2023). Updated characterisation and normalisation factors for the Environmental Footprint 3.1 method. Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/798894, JRC130796.

12 Definition adapted from European Commission recommendation 2021/2279 on the use of the Environmental Footprint methods to measure and communicate the life-cycle environmental performance of products and organisations. European Commission (2021). Commission recommendation (EU) 2021/2279 of 16.12.2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations.

Building on this LCA foundation, and complemented by nature-related approaches such as the SEEA EA[13] framework, A-Track has developed the biodiversity and ecosystem footprint: a consistent calculation framework to quantify the impact of human activities on biodiversity and ecosystems. It is structured as two single-indicator scores. **The Biodiversity Footprint** covers, at a minimum, impacts on biodiversity arising from habitat destruction (land use, land-use change and water use), pollution (acidification, eutrophication and ecotoxicity), and climate change (global warming potential). **The Ecosystem Footprint** addresses the condition and integrity of ecosystems that underpin their capacity to provide regulating (soil and water condition) and provisioning (resource condition) services. Each indicator score can be disaggregated into a footprint (assessing pressures) and a handprint (quantifying the potential positive contributions of the assessed product).

Further detail is available in *A Biodiversity and Ecosystem Services Footprint: the A-Track approach*[14]. The forthcoming *Operationalising the Biodiversity and Ecosystem Services Footprint: data and tools*[15] report will specify relevant impact category indicators and the data, methods and models used to calculate them.

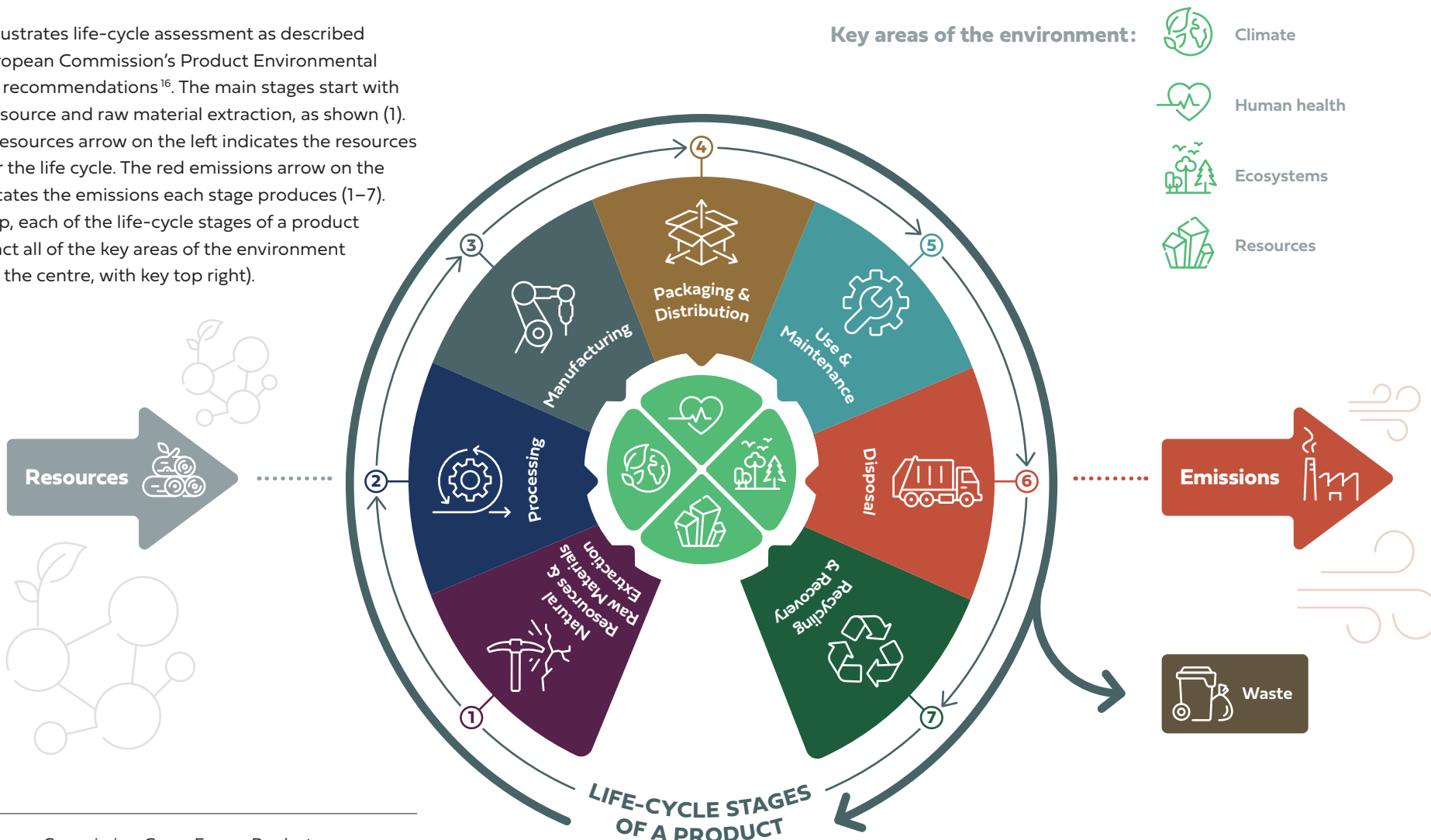
13 United Nations. System of Environmental-Economic Accounting – Ecosystem Accounting (SEEA EA).

14 A-Track (2025). A Biodiversity and Ecosystem Services Footprint: the A-Track approach.

15 A-Track (forthcoming). Operationalising the BES footprint: data and tools.

Figure 1: Scope of the Product Environmental Footprint

Figure 1 illustrates life-cycle assessment as described in the European Commission's Product Environmental Footprint recommendations[16]. The main stages start with natural resource and raw material extraction, as shown (1). The gray resources arrow on the left indicates the resources that enter the life cycle. The red emissions arrow on the right indicates the emissions each stage produces (1–7). In the loop, each of the life-cycle stages of a product may impact all of the key areas of the environment (shown in the centre, with key top right).



16 European Commission. Green Forum. Product Environmental Footprint method. Understanding key concepts and how to implement them.

What?: Using LCA to determine your company's dependencies and impacts on nature

While companies have made progress on sustainable production in recent years, the environmental impacts of consumption are still pushing the Earth outside its safe operating space. Your company can play its part in halting biodiversity loss and help ensure business continutity.

To enhance business resilience and secure long-term resource access, companies can build ecodesign strategies. The first step is identifying value chain hotspots with the highest resource consumption, emissions and nature-related dependencies, as well as assessing their impacts on biodiversity and ecosystems. Quantifying these impacts and their location across the value chain is crucial to monitoring environmental degradation and designing effective mitigation strategies, including ecodesign.

In industrial contexts, LCA is the most common method of assessing environmental sustainability. It focuses on impact drivers generating environmental pressures along the value chain (such as land-use change, resource overexploitation and climate change). It then transforms these pressures into ecosystem and biodiversity impacts via scientifically developed characterisation factors.

> The A-Track biodiversity and ecosystem footprint expands conventional LCA to include location-specific, nature-related information, and provides a more comprehensive assessment of biodiversity and ecosystem impacts across the value chain.

Dependencies are environmental assets and ecosystem services that a person or an organisation relies on to function.

Impacts are a change (positive or negative) in the state of nature (quality or quantity), which may result in changes to the capacity of nature to provide social and economic functions. They can be the result of an organisation's or another party's actions[17].

17 Source: Taskforce on Nature-related Financial Disclosures (TNFD) (2026). Guidance on the identification and assessment of nature-related issues: the LEAP approach.

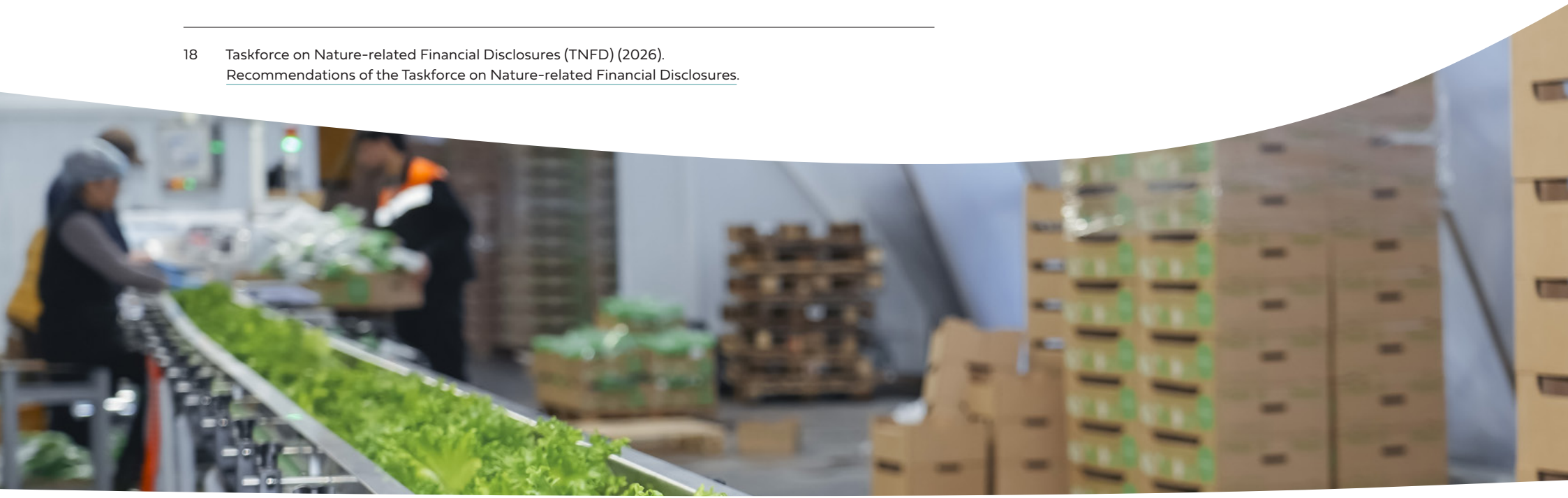
LCA is useful when answering questions like:

- What is the ecosystem and biodiversity impact of a product?
- Are the biodiversity and ecosystem impacts of product A larger or smaller than those of product B?
- Are the biodiversity and ecosystem impacts of process design A larger or smaller than those of process design B?
- Are the ecosystem and biodiversity impacts of agricultural process A larger or smaller than those of agricultural process B?
- Which processes in the value chain have the largest impact on the environment, and ecosystems and biodiversity in particular?
- What is the relative magnitude of different environmental impacts (such as carbon footprint vs biodiversity footprint) in the production process?
- How can one efficiently mitigate the environmental – and ecosystem and biodiversity – impacts of production and consumption?

Why?: Nature-related risks and opportunities along your supply chains

If your company fails to identify and manage its nature-related dependencies and impacts – especially in complex global supply chains – it may face physical, regulatory, reputational and other risks. You can learn more about nature related risks and their classification in *Recommendations of the Taskforce on Nature-related Financial Disclosures*[18].

18 Taskforce on Nature-related Financial Disclosures (TNFD) (2026). Recommendations of the Taskforce on Nature-related Financial Disclosures.



According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) *Methodological Assessment of the Impact and Dependence of Business on Biodiversity and Nature's Contributions to People*[19], biodiversity is both an environmental concern and a fundamental asset underpinning business value creation. While all economic sectors depend directly or indirectly on biodiversity and nature's contributions to people through their global value chains, these dependencies are particularly high in agriculture, fisheries, forestry, food and beverage, pharmaceuticals, tourism, construction and finance. At the same time, business activities are among the principal drivers of biodiversity loss through land- and sea-use change, the overexploitation of natural resources, pollution, invasive alien species and climate change. These impacts generate significant physical, financial, regulatory and reputational risks for businesses, as ecosystem degradation undermines productivity, supply chain resilience and long-term profitability.

Assessing biodiversity and ecosystem impacts across the supply chain is essential to informing corporate decision-making. It can enable you to understand how your company's activities depend on and affect nature, identify risks and opportunities, and implement strategies that support long-term resilience and sustainability, including the development of more sustainable products. Integrating biodiversity and ecosystem footprinting into ecodesign strategies can also substantially reduce pressures on nature while supporting more circular and resource-efficient value chains. ***Table 1*** summarises the business case for biodiversity and ecosystem assessment along the supply chain.

19 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2026). Summary for Policymakers of the Methodological Assessment Report on the Impact and Dependence of Business on Biodiversity and Nature's Contributions to People. IPBES Secretariat, Bonn, Germany. DOI: 10.5281/zenodo.15369060.

Table 1: The business case for assessing biodiversity and ecosystems in your products and supply chains

Strengthening corporate reputation and brand value

Transparent, evidence-based communication enables companies to demonstrate environmental performance, differentiate their products and services, and support informed decision-making by stakeholders, while avoiding the financial and reputational costs associated with greenwashing.

Evolving regulatory frameworks, such as in Europe, require companies to disclose standardised, auditable information on their environmental impacts, risks and opportunities. They also prohibit vague, misleading or unsubstantiated environmental claims.

An effective way of communicating verified environmental information about your product and value chains is via the development of a life-cycle-based environmental declaration, such as an environmental product declaration (EPD) or product environmental footprint.

The Counting the Cost of Nature-Related Risks report[20] profiles 10 companies that incurred financial losses because of poorly handled interactions with nature and inadequate reporting.

20 BloombergNEF (2023). When the Bee Stings: Counting the Cost of Nature-Related Risks.

Identifying efficiency and innovation opportunities

By integrating biodiversity and ecosystem assessment into the LCA framework, companies can identify processes or materials with the greatest biodiversity impacts and evaluate alternative designs or sourcing options.

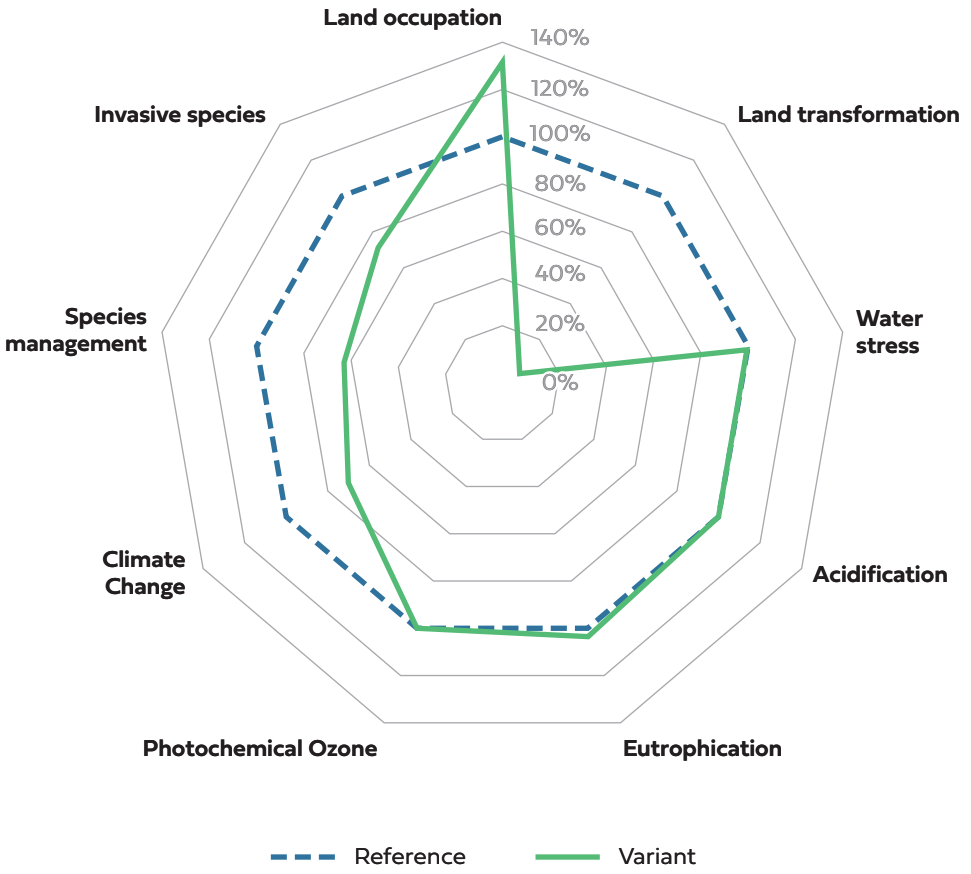
You can use biodiversity and ecosystem footprint results to:

- Identify biodiversity hotspots across your product's life cycle;
- Compare alternative raw materials and manufacturing processes;
- Inform purchasing and sourcing strategies improving supply chain efficiency;
- Stimulate and support ecodesign by redesigning products and selecting lower-impact variants while maintaining performance.

These improvements can reduce operational costs while lowering environmental impacts.

A business case study focusing on L'Oréal[21] uses a product biodiversity footprint to quantify biodiversity impacts throughout a product's life cycle and compares different product variants to identify where the company could make improvements. ***Figure 2*** *(shown opposite)* compares the results of two variants of a product under different environmental impact categories, including invasive species.

Figure 2: Comparison of the results of two variants of a product under different environmental impact categories



21 Asselin, A. *et al* (2020). Product Biodiversity Footprint – A novel approach to compare the impact of products on biodiversity combining Life Cycle Assessment and Ecology. *Journal of Cleaner Production*. Volume 248, 2020, 119262, ISSN 0959-6526, doi.org/10.1016/j.jclepro.2019.119262.

Enhancing long-term business resilience

By integrating biodiversity and ecosystem considerations into decision-making, companies can:

- Develop more resilient supply chains;
- Secure access to critical raw materials;
- Trigger product innovation, attracting more customers with more responsible products;
- Anticipate environmental risks;
- Reduce climate change exposure;
- Align with global sustainability goals.

This approach supports the transition to nature-positive business strategies, where economic growth is compatible with ecosystem protection and restoration.

Managing the risks and leveraging the opportunities identified

Your company might apply LCA differently depending on the business risks and opportunities identified. For example, when your company designs a product, assessing environmental impacts – including on biodiversity and ecosystems – along all the stages of its supply chain helps you mitigate the risks and ensure you identify opportunities for efficiency, innovation and long-term business resilience.

The primer groups the real-world applications of LCA under two overarching business purposes: 1 ***product improvement*** and 2 ***stakeholder communications.*** It also indicates the function leads involved in each application, their responsibility in the process, and the decisions they are involved in taking. The case studies illustrate LCA applications responding to each of these business needs.

1 *Product improvement*

Why this matters

To be able to modify the design of products to optimise their environmental performance and suggest innovations to improve your business resilience, you first need to understand the environmental impacts of products along their life cycle.

Use LCA to:

- Identify environmental hotspots or significant environmental impacts of products – or of your organisation – along the supply chain (upstream and downstream), including biodiversity.
- Track and improve environmental performance by evaluating the environmental performance of a product or product portfolio, including biodiversity and ecosystem aspects.
- Prioritise products or commodity categories that require further assessment.

Then use the results of the LCA to make better material and design choices:

- Support ecodesign – product design that minimises environmental impacts along the life cycle – by informing the selection of low-impact materials and packaging to minimise the environmental impact, including biodiversity, in product design.
- Assess different business models to embed circularity, reusability or biodegradability criteria into the product design.

Who is responsible

- Sustainability managers ensure alignment with the sustainability strategy and compliance and take on suggestions from the product development teams; and they make recommendations to higher management for further LCA studies for product improvement.
- CEO/board/senior management respond to recommendations from sustainability managers and provide the tools for these managers to succeed in their delivery.

Who is involved

- Procurement, sales and operations teams provide data to the sustainability team to inform the LCA.
- The product development teams (including R&D and design teams) interpret the results of the LCA, potentially exploring alternative product and process options for improved performance while maintaining functionality.

How to get started (quick wins)

Whether you are doing the LCA yourself or using a third party, you can start applying LCA for internal purposes and compiling the necessary environmental data on the value chain of the products you want to assess.

- Start with a reduced scope, focusing only on a particular phase of your value chain, such as the agricultural phase. Data could include low granularity country-level information, for example.
- Use these initial studies as high-level screening and internal prioritisation to help you identify environmental hotspots and their location in the supply chain.
- Start to define internal strategies and collaborations for product and process improvement.

How to go further

- Since an LCA is iterative in nature, you can go into more detail in subsequent studies, increasing the comprehensiveness and accuracy of the information gathered for a specific hotspot.
- You can also use these results to suggest alternative business models seeking to embed circularity, reusability and biodegradability criteria into design standards and briefs, to produce better outcomes for biodiversity and ecosystems.

The following case studies present examples of different LCA applications for product improvement.

Case studies: HENKEL – *Product improvement*

Understanding the nature-related impacts of your products

Location-specific data help identify impacts and risks related to the feedstocks in a company's upstream value chain.

Who

Henkel is active globally in industrial and consumer businesses, with a portfolio including hair care, laundry detergents, fabric softeners, adhesives, sealants and functional coatings.

The need

Henkel operates downstream in the value chain and needs to localise the original source of the feedstock (such as the country of origin) to assess location-specific risks and impacts on nature.

The solution

Henkel combined the results derived from the environmental footprints of the feedstocks (looking into climate change, freshwater ecotoxicity, ionising radiation, water use and land-use change), global production data from agricultural statistics, and country-specific environmental risk data to develop a single Nature Impact Factor.

The company uses the single factor internally to compare several feedstock options. With this data, Henkel created the Feedstock Evaluation Dashboard, which identifies the location-specific impacts that feedstocks have on nature.

The application of the results and functions involved

Henkel only uses the results of the Dashboard internally, no external disclosure, for two main applications:

- The selection of lower impact and risk feedstocks: The purchasing team can use this data to explore alternative sourcing locations with suppliers, prioritising countries with lower environmental impacts. The risk assessment team can identify feedstocks with limited sourcing locations, flagging them as higher risk for supply chain disruptions.
- The assessment of alternative feedstocks: Product development teams can use these insights to evaluate and select alternative feedstocks with lower environmental impacts. Supply chain teams can factor in production locations to optimise logistics and minimise environmental impacts.

Further information

Location matters: How Henkel applies location data for feedstock assessment (A-Track)

Case studies: Jerónimo Martins – *Product improvement*

Making better material and design choices (ecodesign)

Applying and promoting the ecodesign of packaging helps companies reduce upstream (scope 3) emissions and optimise resource use.

The need

For Jerónimo Martins, and many food retailers, the biggest carbon footprint contribution comes from the production, use and end of life of products sold in stores. Jerónimo Martins applies and promotes the ecodesign of its packaging options as one measure to reduce upstream emissions (part of scope 3) and to optimise resource use.

The solution

Since the company launched the ecodesign of packaging project in 2011, it has made more than 2,300 changes to its packaging, including some 1,000 switched to certified packaging. These changes have avoided the use of more than 50,000 metric tons of materials. According to the company's calculations, the ecodesign packaging project has also helped avoid nearly 7,000 metric tons of CO_2e through increased transport efficiency.

Some of the criteria included in the ecodesign strategy and decision-making include:

- Reducing the number of materials used;
- Integrating recycled materials;
- Preferring mono-material packaging or colors that recyclers' optical readers can easily distinguish;
- Reworking size, shape and weight to increase the amount of product quantities transported in each journey.

For packaging components comprising vegetable fibers, such as paper and wood, Jerónimo Martins implemented additional measures aimed at the regeneration of natural systems and ensuring that these commodities do not come from areas associated with deforestation or the conversion of high conservation value ecosystems linked to the production of some of the main commodities (paper/wood, in this case). To ensure this, the company's signed public commitments certify that it is not associated with deforestation.

The application of the results and functions involved

By incorporating ecodesign criteria in packaging and applying LCA to different scenarios, organisations can use the results to make informed decisions oriented toward the objectives or reducing the resource and carbon footprints. In this way, they contribute to the identification of efficiency and innovation opportunities and enhance long-term business resilience.

The results are therefore relevant for its product design, procurement and sustainability teams.

Further information

Annual Report 2024 (Jerónimo Martins, 2025)

2 *Stakeholder communications*

Why this matters

Your company might want to publicly disclose its efforts to measure its value chain impacts in order to show responsibility and gain credibility and the trust of consumers, stakeholders and investors, for example.

Additionally, your company might be required to produce and disclose reliable environmental information for consumers, public administrations, suppliers and investors to comply with regulations such as the European Union's Construction Products Regulation [22] or the Ecodesign for Sustainable Product Regulations [23]. These regulations require carbon footprint disclosures and other information, such as product durability, reusability, upgradability and reparability.

Use the LCA to communicate honestly and effectively:

- Develop footprint indicators for a specific product, such as a biodiversity and ecosystem footprint, water footprint or carbon footprint, for public disclosure.
- Use the results in reputational schemes, giving visibility to products that calculate their life-cycle environmental performance.
- Develop a life-cycle-based environmental declaration, such as a PEF study or an EPD, for a specific product.
- Develop product category rules or a similar specific guide for a product group.
- Respond to consumer and customer demands.
- Apply or comply with policies.

22 European Union (2024). Construction Products Regulation (CPR).

23 European Union (2024). Regulation (EU) 2024/1781 on establishing a framework for the setting of ecodesign requirements for sustainable products.

Who is responsible

- Sustainability managers, encouraged by marketing and communication functions, produce science-based pieces of information reporting the business's efforts to develop more sustainable products. They translate this need to the CEO or managers.
- CEO/board/senior management respond to recommendations from sustainability managers and provide the tools for these managers to succeed in their delivery.

Who is involved

- An external third party verifies the LCA.
- Then the communication and marketing functions can communicate the results to stakeholders, such as value chain partners, customers, competitors and regulators.

How to get started

Whether you are doing the LCA yourself or using a third party, start compiling the necessary environmental data on the value chain of the products you want to assess.

→ Start with a reduced scope, focusing only on a particular phase of your value chain, such as the agricultural phase. Data could include low-granularity, country-level information, for example.

→ You can use these initial studies as high-level screening and internal prioritisation to help you identify environmental hotspots and their location in the supply chain.

→ They will also help you start to define internal strategies and collaborations for product and process improvement.

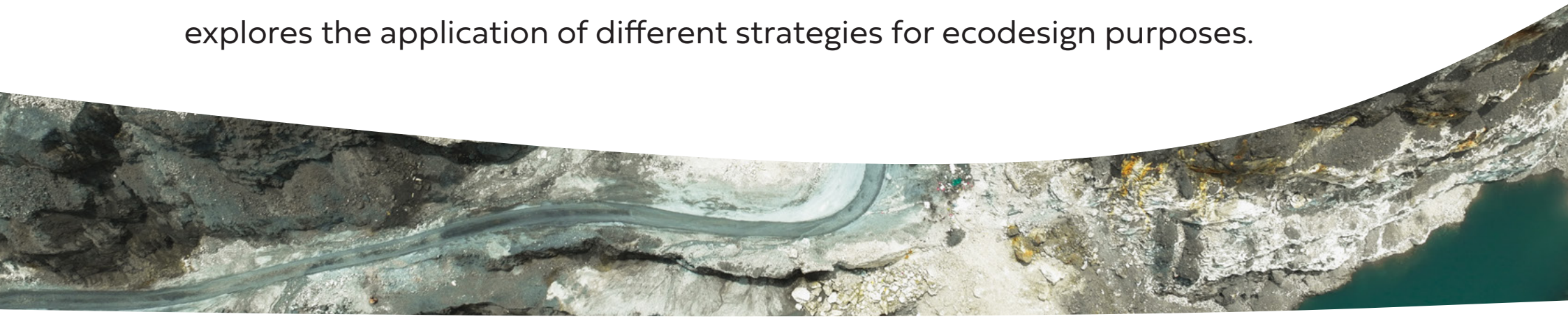
How to go further

You can use third-party verified assessments for sustainability communication and to report environmental information on products. You can also use LCAs to undertake comparative assertions for marketing or public or private procurement purposes. In doing so, the data and methods used must be consistent, robust, verifiable and comparable.

How?: Understanding nature-related hotspots along your company's supply chains

Many tools apply a life-cycle perspective and thus can help you assess the impacts of your product along its supply chains.

The novel biodiversity and ecosystems footprint being developed by A-Track takes into account the use of spatially explicit land-use-related data at different levels for specific country, region and local assessments. It also suggests the clustering of different midpoint impact indicator results to transparently arrive at a biodiversity and ecosystem footprint. The A-Track method further explores the application of different strategies for ecodesign purposes.



The levels of assessment of the biodiversity and ecosystem footprint

The structure of A-Track's Biodiversity Footprint and Ecosystem Footprint allows for various levels of assessment – screening, partial or full – considering different assessment goals, data availability and the decision-making context ***(Figure 3)***.

You can find more information on these footprints in the **Life-cycle assessment and the A-Track biodiversity and ecosystem footprint section.**

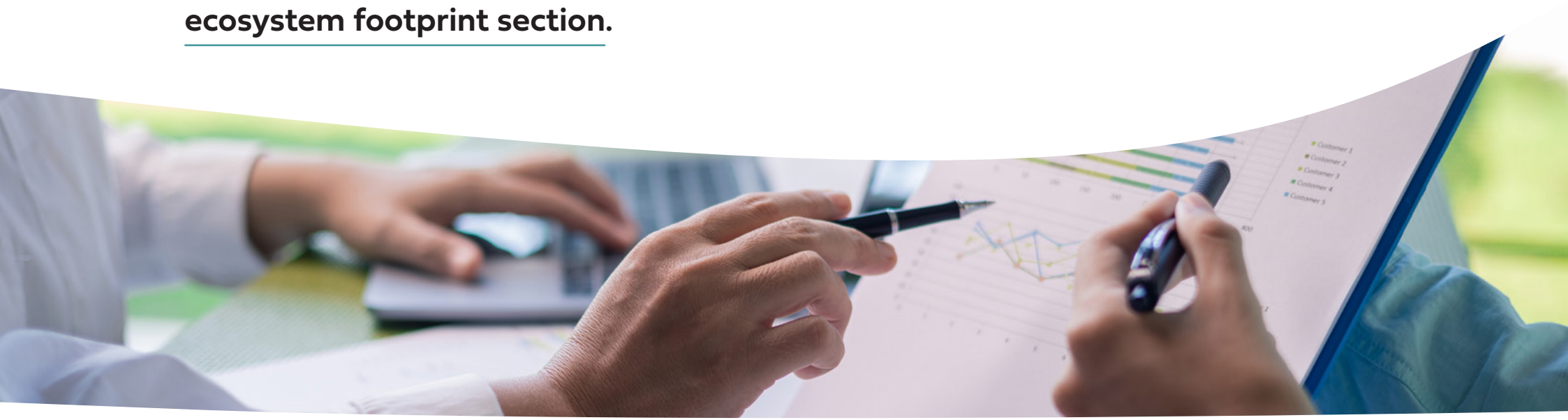
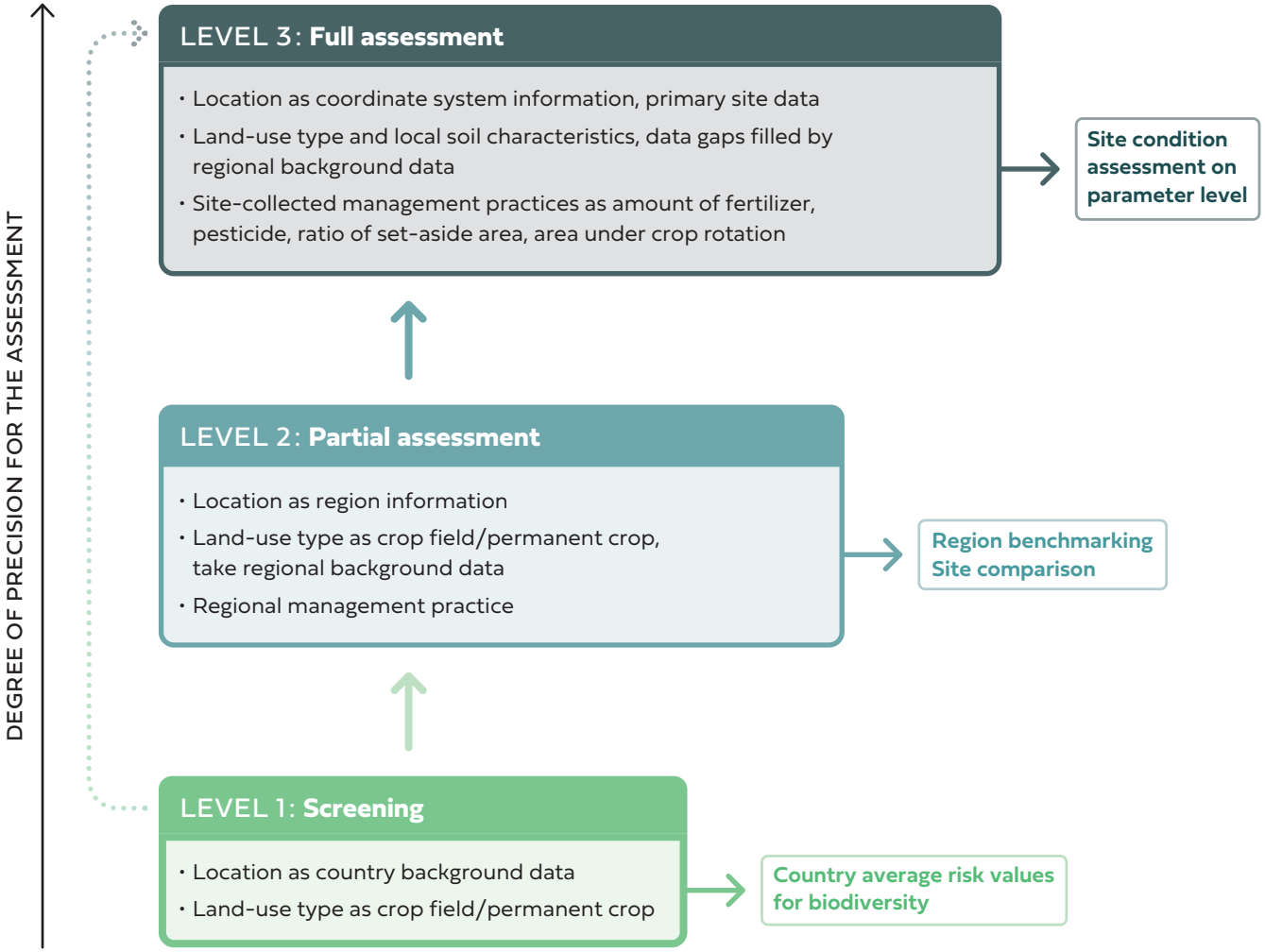


Figure 3: Three-level assessment for the biodiversity and ecosystem footprints



The three levels correspond to increasing details, precision and methodological rigor. They also aim to support different use cases, ranging from high-level screening and internal prioritisation (Level 1) to focused assessments of specific assets or impacts (Level 2) and comprehensive decision-making or external reporting (Level 3).

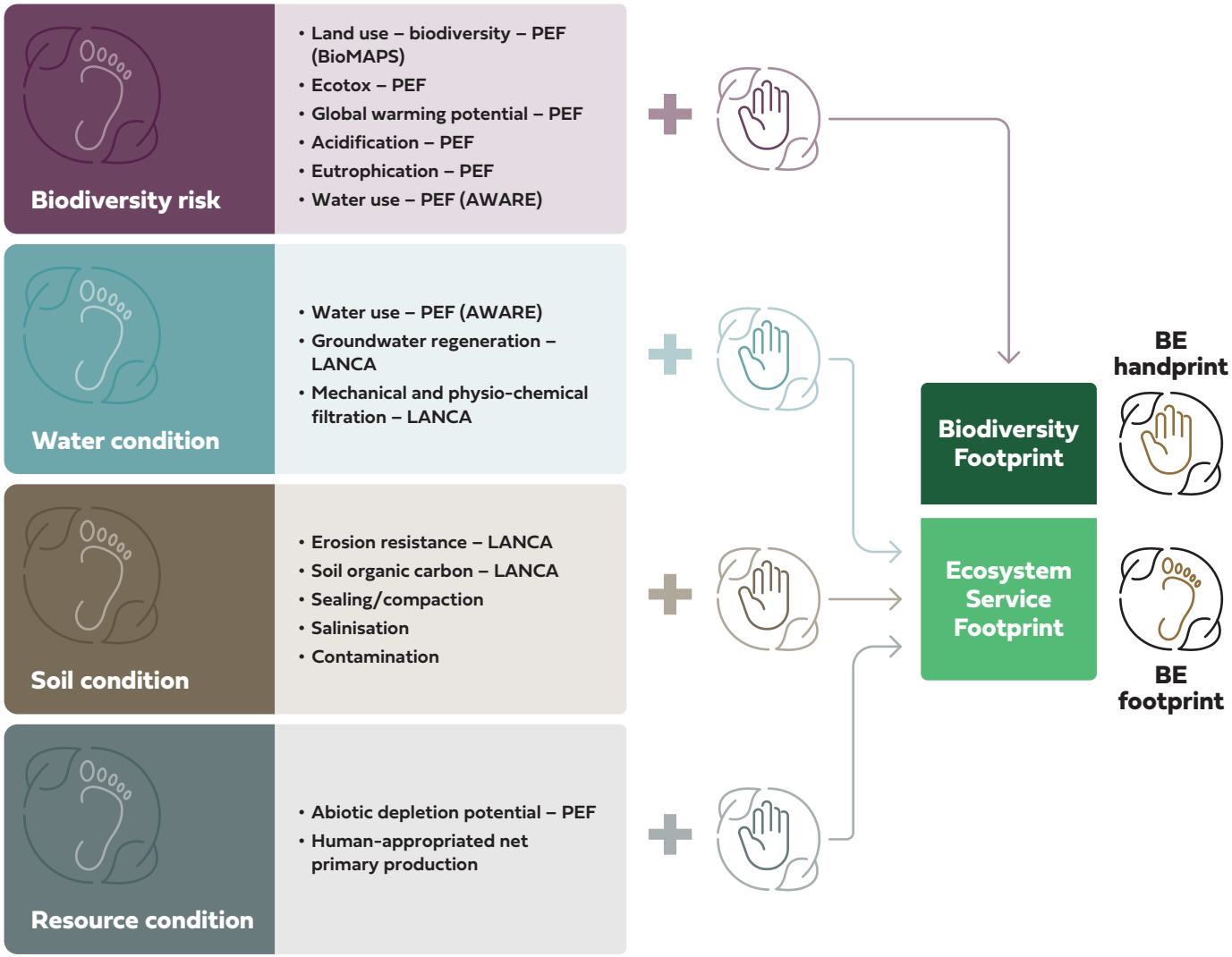
The biodiversity and ecosystem footprint has four core components: biodiversity risk; water availability and condition; soil condition; and resource condition. Each contributes to either Biodiversity Footprint or Ecosystem Footprint, as illustrated in *Figure 4 (overleaf).*

- **The Biodiversity Footprint** covers, at a minimum, impacts on biodiversity derived from habitat destruction (land use, land-use change, water use), pollution (acidification, eutrophication, ecotoxicity), and climate change (global warming potential) pressures.
- **The Ecosystem Footprint** addresses impacts on regulating (soil and water condition) and provisioning (resource condition) ecosystem services.

The footprint framework also allows for the consideration of positive contributions or opportunities to reverse negative impacts via the handprint approach.

A-Track provides further detail in *A Biodiversity and Ecosystem Services Footprint*[24]. Specifications about relevant impact category indicators, available data, methods and models to calculate them will be available in the forthcoming *Operationalising the BES footprint: data and tools* report[25].

Figure 4: Combination of suggested footprint and handprint methods for the biodiversity and ecosystem footprints



Note: In the Figure "PEF" refers to Product Environmental Footprint as described in the Commission recommendation (EU) 2021/2279 of 16.12.2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organizations. The acronyms AWARE and LANCA refer to methods for calculating the environmental impact indicators for water and land categories in PEF, respectively.

BioMaps refers to Biodiversity Multi-Scale Assessment of Product Systems, a method developed on the basis of LANCA® for the assessment of biodiversity impacts across the entire supply chain (Maier, S. 2023. Biodiversity multi-scale assessments of product systems – the BioMAPS method).

24 A-Track (2025). A Biodiversity and Ecosystem Services Footprint: the A-Track approach.

25 A-Track (forthcoming). Operationalising the BES footprint: data and tools.

Level 1: Screening biodiversity and ecosystem footprint assessment (country level)

This simplified assessment is for the following purposes and applications.

- **Product improvement, identifying efficiency and innovation opportunities.** Designed for the identification of initial hotspot or the most relevant impact categories, life-cycle stages and processes of your product or organisation along supply chains, use the results of this screening assessment for internal applications. You can communicate the results internally for high-level communications.

How to use Level 1 to simplify Level 3 in scope and data.
A Level 1 assessment simplifies the application of the full or Level 3 footprint assessment to more specific aspects.

- **Scope:** In Level 1, screening or country-level assessment, you apply assessment with a reduced scope in the coverage of life-cycle stages. This means focusing only on a specific life-cycle stage of your assessed product, such as the agricultural phase in the production of a bottle of wine.

- **Data:** Level 1 data is largely country-level data. For the bottle of wine above, this means using the country background data for the location of the agricultural phase of its production (such as Spain). You can also use lower granularity and region-specific data inputs.

Tools to aid with level 1 Screening

The purpose of screening in footprinting is to start with the application of life-cycle thinking to products in an incremental way. This allows the identification of potential significant environmental impacts along the supply chain, including impacts on nature.

- Screening can start with the description of the product, its supply chain and relevant stakeholders involved.
- The next step is to get familiar with the materiality concept from the EU's CSRD, ESRS, and Corporate Sustainability Due Diligence Directive (CSDDD) to identify potentially relevant (meaning material) environmental matters along the supply chain that would require more in-depth investigation.

The identification of material matters constitutes an entry point for a full and more detailed assessment of the product supply chain's environmental impacts and risks using life-cycle assessment and footprint approaches. ***Many tools can help:***

- Those for the identification of nature-related matters include the ENCORE tool (Exploring Natural Capital Opportunities, Risks and Exposure) and the SBTN's materiality screening tool (which relies on underlying data from ENCORE). They provide a qualitative assessment of the potential materiality of economic activities against pressure activities.
- Those for the identification of material aspects along the value chain of a product, include the ORIENTING project's ORIENTING entry level tool developed in the context of EU projects.
- PEF guidance that can help with a quantitative indication of the environmental impact categories or material aspects that contribute the most (meaning those with at least 80% of the single environmental indicator score)[26].
- Another source of data and information is certification schemes for commodities, such as the Forest Stewardship Council (FSC) for forests and the Aluminium Stewardship Initiative (ASI) for aluminum. Typically, these schemes relate to environmental performance and can help set priorities to refine the inventory, in particular where data about the exact location is missing.

26 European Commission (2021). Commission recommendation (EU) 2021/2279 of 16.12.2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations.

Level 2: Partial biodiversity and ecosystem footprint assessment (region level)

The simplified assessment is for the following purposes and applications.

- **Product improvement, identifying efficiency and innovation opportunities.** Use the results of this partial assessment for internal applications. In addition to the applications for Level 1, the results from the application of Level 2 assessment allow for the comparison between different sites and their management practices, reflecting differences in the biodiversity impact, for example. You can communicate the results internally to raise awareness or for high-level communications, for example.

Using Level 2 to simplify Level 3 in scope and data. A partial Level 2 assessment simplifies the application of the full or Level 3 footprint assessment to more specific aspects.

- **Scope:** In Level 2, partial or regional level assessment, apply the footprint assessment with a reduced life-cycle phase coverage scope, following Level 1. In this case, however, you have greater knowledge about your owned assets, for example, and materiality assessment results. Therefore, you can choose your selected life-cycle phases accordingly.

For example, you might focus on the location of your owned assets or specific life-cycle phases, including all upstream processes. As a result of the materiality assessment, and if this shows that downstream processes are relevant, you can choose these for further impact measurement. You can also limit the scope of the impact assessment to focus only on the biodiversity footprint indicator or specific ecosystems, rather than the full footprint assessment, as illustrated in ***Figure 3.***

- **Data:** In this case you have greater knowledge about your owned assets compared to Level 1, but you can still use lower granularity and region-specific data compared to Level 3. For the bottle of wine example, this means using regional information for the location-specific land-use-related data and regional management practices.

Level 3: Full biodiversity and ecosystem footprint assessment (local level)

The full biodiversity and ecosystem footprint strictly follows a life-cycle analysis approach according to ISO 14040. This includes the standard phase iterative process defined in ISO 14044 (goal and scope, inventory, impact assessment and interpretation) and covers the full life-cycle stages in ***Figure 1,*** from material extraction and processing through to the different end-of-life processes (cradle-to-grave) of your product.

The full assessment presented in Level 3 is for the following purpose and application.

- **Stakeholder communication.** Use the results of the assessment undertaken in Level 3 for sustainability communication and reporting purposes, including the development of environmental declarations, such as a PEF or an EPD, for a specific product.

Key features of the full assessment

- **Scope:** In Level 3, consider the full cradle-to-grave scope for your assessment, including all life-cycle stages. Cover the assessment of the full biodiversity and ecosystem footprint as included in ***Figure 4.***

- **Data:** In the full biodiversity and ecosystem footprint assessment, use primary data wherever practicable. At this level, you have greater knowledge about your product's system. For the bottle of wine, for example, this means using site-specific foreground data for the location of the agricultural phase of the wine's production (such as specific plots of land in Spain's La Rioja region). Also, collect site-specific data on the management practices and transparently report the sources of information you have used and the methods applied for modelling and impact assessment.

Tools to aid with levels 2 and 3: partial and full assessments (on-going work)

There are also different tools, data sources, impact categories, calculation methods and indicators available for the partial and full assessments of the biodiversity and ecosystem footprint. Assessing the footprint needs to follow the 4 main steps of the LCA framework: (1) goal and scope definition, (2) inventory analysis, (3) impact assessment and (4) interpretation.

You can use the following standards and guidance documents to apply LCA to assess your products:

- ISO 14040:2006 Environmental management – Life cycle assessment – Principles and framework.
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines.
- ISO 14026:2017 Environmental labels and declarations – Principles, requirements and guidelines for communication of footprint information.
- The European Commission's Environmental Footprint methods (2021)
- The Handbook from the International Reference Life Cycle Data System (ILCD), a common basis for consistent, robust and quality-assured life-cycle data and studies. It includes detailed methodological specifications concerning the life-cycle inventory (LCI) and life-cycle impact assessment (LCIA) phases.
- LCA databases (such as ecoinvent, GaBi, sector-specific databases) can be applied as secondary data sources.
- LCA software (such as GaBi, SimaPro, OpenLCA, SULCA) can be of help when conducting the calculations.

A-Track is developing specific details on available data and tools for the biodiversity and ecosystem footprint. You can expect to see further details on this in the forthcoming *Operationalising* the *BES footprint: data and tools* report[27], planned for the end of 2026.

The report will include:

- A comprehensive overview of indicators for the Ecosystem Footprint and Biodiversity Footprint.
- The identification and description of indicators required for the calculation of the impact categories for each footprint.
- The documentation of data sources, including spatial resolution and alternative datasets.

27 A-Track (forthcoming). Operationalising the BES footprint: data and tools.

Ecodesign strategies to make better material and design choices

Ecodesign means the integration of environmental sustainability considerations into the characteristics of a product and the processes taking place throughout the product's value chain [28]. For the ecodesign strategies to be effective in terms of nature impact reduction, they need to be integrated with a biodiversity and ecosystem footprint assessment. While ecodesign helps identify opportunities to improve products and reduce environmental pressures, the biodiversity and ecosystem footprint provides a science-based approach to assess whether these design changes effectively reduce impacts on biodiversity and ecosystems.

28 European Union (2024). Ecodesign for Sustainable Products Regulation (ESPR) – Regulation (EU) 2024/1781, Article 2(1).

These ecodesign strategies help you explore alternative ways to design, manufacture and use products to improve environmental and biodiversity performance. Subsequently, they aid in evaluating any product alternatives developed through these ecodesign strategies using the biodiversity and ecosystem footprint. The goal is to verify that they deliver measurable improvements over the original design and to ensure that environmental impacts are not unintentionally shifted between life-cycle stages, impact categories or geographical locations in the value chain.

By integrating ecodesign strategies with biodiversity and ecosystem footprinting assessments, you can make more informed product development decisions, substantially reduce pressures on nature while supporting more circular and resource-efficient value chains, and strengthen compliance with emerging sustainability expectations and regulatory requirements.

Product component level

Strategy 1: Select low-impact materials

Material choices directly influence resource extraction, pollution, habitat loss, and biodiversity risks across the value chain. Using materials with lower environmental impacts can promote sustainability by being renewable, recyclable or requiring less energy to produce, which benefits ecosystems and biodiversity.

Specific actions for strategy 1 include:

- Avoid materials whose supply chains affect sensitive ecosystems or promote intensive extraction and monocultures.
- Integrate no-expansion criteria, especially in sectors such as biomaterials, bioenergy or mining.
- Use certified materials: e.g. FSC, Marine Stewardship Council (MSC), Programme for the Endorsement of Forest Certification (PEFC), responsible mining, etc.
- Prioritise recyclability and circularity to reduce primary resource extraction.

Strategy 2: Reduce the materials used

Reducing the materials used reduces resource extraction, which decreases environmental degradation, pollution and biodiversity loss. This, in turn, supports the regeneration of ecosystems and promotes a more sustainable balance between business activities and nature.

Product structure level

Strategy 3: Optimise production techniques

Optimising production techniques reduces environmental impacts by minimising resource consumption, lowering greenhouse gas emissions, and decreasing waste generation, among others. These improvements help protect natural ecosystems and promote sustainability in manufacturing processes.

Strategy 4: Optimise distribution systems

Optimising distribution systems reduces the ecological footprint by minimising greenhouse gas emissions through efficient transportation routes and the use of low-emissions vehicles. Additionally, streamlining processes promotes sustainable practices such as reducing packaging waste and growing renewable energy use.

Specific actions for strategy 4 include:

- Select local materials and suppliers.
- Optimise packaging and logistics to reduce emissions and habitat fragmentation.

Strategy 5: Reduce impacts during use

Reducing impacts during use conserves energy and water, lowers greenhouse gas emissions and decreases pollution, which in turn protects ecosystems and biodiversity. Such efforts can also minimise resource depletion, allowing natural systems to regenerate and maintain balance.

Specific actions for strategy 5 include:

- Design products that minimise emissions, noise, waste and light pollution, especially those operating in natural environments.
- Improve energy efficiency and reduce resource consumption to lower pressure on ecosystems.

Product system level

Strategy 6: Optimise the service life

Optimising the service life of products reduces waste and lowers resource consumption, which benefits the environment by minimising pollution and conserving natural resources.

Specific actions for strategy 6 include:

- Design for durability, repairability and modularity.

Strategy 7: Optimise end-of-life systems

Improving end-of-life systems reduces waste, recovers resources, preserves biodiversity, lowers carbon emissions, and promotes engagement with local communities. Optimising these systems also strengthens business models and the business case.

Specific actions for strategy 7 include:

- Design for circularity to maximise the value and longevity of materials and components throughout their life cycle.
- Promote circular business models (remanufacturing, reuse, product-as-a-service).
- Reduce waste that may enter and contaminate ecosystems.
- Link the product's business model to habitat restoration, reforestation or ecological recovery actions (such as towards nature positive).

Turning assessment results *into action*

Life-cycle assessment, when complemented with location-specific nature-related information, can provide a practical basis for the identification of biodiversity- and ecosystem-related hotspots in products and supply chains. By applying biodiversity and ecosystem footprint assessments, your company can move from broad awareness of nature-related risks to more targeted, evidence-based decision-making. These assessments help you prioritise products, materials, sourcing regions, production processes and life-cycle stages where action is most needed and where improvement can deliver the greatest benefits.

Ecodesign is important as a practical route to turn assessment results into action. Once you have identified your hotspots, ecodesign strategies will help you select lower-impact materials, reduce material use, improve production and distribution systems, extend product service life, and optimise end-of-life solutions. In doing so, biodiversity and ecosystem footprinting becomes more than an assessment exercise: it becomes a tool for innovation, risk management and business transformation.

Effective implementation requires collaboration across business functions. Sustainability teams may lead the assessment process, but procurement, product development, R&D, operations, marketing, communications and senior management all have a role to play in interpreting results and embedding them into decisions. This cross-functional approach is essential for nature-related insights to influence sourcing choices, product design, supplier engagement, investment priorities and credible communication with customers, investors and regulators.

A-Track

A-Track is a four-year, €11 million project that will accelerate action for nature by business, financial institutions and government.

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