D9.2 Draft guidance material for private sector decision-making uptake

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Lead Author/s: Justine Saunders, Martine van Weelden
Contributing Author/s: David Barton, Ceire Booth, Claire Brown, Rafal P. Chudy, Jarumi Kato Huerta, and Inge Liekens

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2 Introduction

The objective of this guidance is to outline the steps involved in integrating ecosystem services into private sector decision-making and to highlight what existing guidance and tools are available to support each step, including that from the SELINA project itself. By the integration of ecosystem services information, we also refer to the process of natural capital assessment and valuation in relation to private-sector natural capital accounting (see the SELINA Glossary for definitions).

In particular, this guidance note aims to:

1. Support scaling up of natural capital assessment in the private sector by providing a background to the development of natural capital assessment and why companies are motivated to undertake this;
2. Align biodiversity and ecosystem services science with existing private sector decision-making frameworks by providing a current state of play in ecosystem services and natural capital assessment and valuation uptake by the private sector;
3. Support the practical uptake of natural capital assessment in decision-making by outlining the steps involved and highlighting existing resources available and planned outputs from SELINA – a "meta-guidance";
4. Providing insight into where the SELINA project can add value in terms of supporting the integration of natural capital in decision-making;
5. This draft guidance is meant to provide direction to the work that will be done over the course of the rest of the SELINA project and is intended to be a working document. A final version will be integrated in the SELINA Compendium of Guidance.

3 Background

3.1 The history of natural capital assessment in the private sector

The application of natural capital assessments in the private sector is relatively more recent than that for the public sector. Several decades ago, for most companies, their interaction with nature did not affect their market value, their risk profile, the price of their products and materials that they use, or cash flows. If there were impacts, they were not visualized on a company's profit and loss statement, they were simply "externalities" or issues without consequence for the business. Although Environmental, Social and Governance (ESG) reporting took root in 2004 with the United Nations - Global Compact report, *Who Cares Wins*[1], it is still, to this day, largely focused on issues that impact the business (ie. a single materiality perspective) and rarely includes impacts to wider society (ie. double materiality perspective).

However, as awareness around environmental issues increased and as the public sector expanded their own use of natural capital assessments in policy development (e.g. The Economics of Ecosystems and Biodiversity (TEEB, 2010) and the inclusive wealth of nations

[1] https://www.unepfi.org/fileadmin/events/2004/stocks/who_cares_wins_global_compact_2004.pdf

reports (UNEP, 2014)), there was increasing regulatory and legal pressure on the private sector to do the same. Companies also started to realise that their exposure to increasing environmental change and dependency on natural resources could pose a financial risk to their business which they needed to better understand and bring into formal accounting processes. The Guide to Corporate Ecosystem Valuation (WBCSD, IUCN, ERM and PwC, 2011) and the Corporate Ecosystem Services Review (Hanson et al, 2012) were developed along with other methods to help guide the private sector in understanding their impacts and dependencies on natural capital.

The eventual proliferation of approaches, methods and tools was confusing to the private sector and hence the Natural Capital Protocol was developed and published in 2016 to harmonize these approaches. This was led by the then-named Natural Capital Coalition – an initiative that was born out of TEEB. The terms and concepts in the Natural Capital Protocol were therefore aligned with the existing public sector guidance of TEEB and were sensitive to concepts developing under IPBES at the time. Supporting the Protocol, are Biodiversity Guidance and sectoral guidance for finance, apparel, forest products and food & beverage companies. Most recently, in August 2023, the TEEBAgriFood Operational Guidelines for Business were published (Capitals Coalition, 2023). These Guidelines support agrifood businesses in conducting a multi-capitals approach. The protocols and guidance were widely piloted and have since been applied by over 100 companies. Many of these cases are described in the case study database[2] of the now-named Capitals Coalition.

3.2 Key pressures to embrace natural capital thinking in the private sector

Businesses impact and depend on natural capital and the ecosystem services it provides. Business impacts can be negative or positive, resulting in both costs and benefits for society, and risks and opportunities for business and financial institutions. There are therefore increasing drivers for businesses to measure and report on their impacts and dependencies. These include regulations, market forces (consumer pressure), reputation, securing operational efficiencies and ability to access finance.

3.2.1 Regulatory Drivers

Recently, the international and national regulatory systems have been gathering pace and there is now increasing mandatory requirements globally for reporting and disclosures by companies on their impacts and dependencies on nature.

The Kunming-Montreal Global Biodiversity Framework (GBF) under the Convention on Biological Diversity (CBD) is the overarching driver leading to transposition into regional and national level regulations. Target 15 of the GBF requires businesses to assess and disclose their dependencies, impacts and risks on biodiversity which was supported by the Make it Mandatory campaign in 2022. Target 14 also requires the integration of the value of biodiversity into policy and Target 11 requires actors to restore, maintain and enhance nature's contributions to people.

[2] https://capitalscoalition.org/impact/case-studies/

Also under the CBD, National Biodiversity Strategies and Action Plans NBSAPs were required to be implemented back in 2000 and updated in 2015. All member states (196 at last count[3]) should submit new or updated NBSAPs before COP16 in Oct 2024, aligning them with the GBF. There is therefore an opportunity to strengthen them by bringing in the private sector on Targets 10, 15 and 18. Overall, they are currently weak in this cross sectoral approach.

In the EU, there has been much development under the European Green Deal which encourages development of business natural capital accounting approaches. Here, the Corporate Sustainability Reporting Directive will lead to greater biodiversity disclosures in the EU, following the European Sustainability Reporting Standards. Other guidance are being developed to support these regulatory drivers (see **Table 1**). At national levels, in France for example, corporate biodiversity footprinting is expected to become mandatory under the French Biodiversity National Plan.

In contrast with developments across Europe, up until recently, there was no stand-alone mandatory sustainability reporting in the US. The United States Securities and Exchange Commission (SEC) only required companies to report on information that may be material to investors, which includes ESG-related risks. Since 2021 there has been increasing progress by both the SEC and the White House to make this mandatory. However, it would likely only cover climate disclosures, not biodiversity, and likely have a single materiality perspective (ie. Only reporting what might impact the business and finance, not wider society).

Across Asia, the picture is mixed. The 'E' in ESG reporting is largely focused on climate: South Korea phased in mandatory ESG disclosures 2019-2020, China and Hong Kong have mandatory environmental or 'green' disclosure metrics for high polluters, otherwise reporting is voluntary.

[3] https://www.cbd.int/nbsap/ [Accessed 7th Dec 2023] There are currently 185 NBSAPs, 178 were updated in 2015.

Table 1. *Key Private Sector Regulatory Drivers in Europe for natural capital accounting*

Project name	Lead organisation	Link to Assessment of ES
EU Taxonomy	European Commission	Adopted July 2020. Provides a classification system to clarify which investments are environmentally sustainable. Covers 6 aspects: climate change mitigation, climate change adaptation, the circular economy, pollution, effect on water, and biodiversity.
The Corporate Sustainability Reporting Directive (CSRD)	European Commission	Adopted by the European Parliament on November 11, 2022. Companies subject to the CSRD will have to report according to the ESRS below
European Sustainability Reporting Standards (ESRS)	European Financial Reporting Advisory Group (EFRAG)	Adopted as delegated acts in June 2023. Largely guided by the ISSB and GRI standards to deliver a double materiality perspective – impact to the business and society (see Table 3). Only ESRS1 and 2 are mandatory – the ten topical standards are voluntary and include climate, pollution, water and marine resources, biodiversity and ecosystems.
The Sustainable Finance Disclosure Regulation (SFDR)	European Commission	Applied from 10 March 2021 as a delegated act; more precise disclosure standards yet to be adopted.

3.2.2 Internal Drivers

There is also internal private sector pressure that has culminated in the ACT-D framework[4] (**Figure 1**) which is an acronym for the following high-level business actions for nature:

- Assess – measure, value and prioritize your impacts and dependencies on nature;
- Commit – set science-based targets to put your company on the right track towards operating within the earth's limits;
- Transform – Contribute to systems transformation: avoid and reduce negative impacts, restore and regenerate, shift business strategy and models, and advocate for policy ambition;
- Disclose – Track performance and prepare to publicly report material nature-related information throughout your journey.

[4] https://capitalscoalition.org/business-actions/#:~:text=ACT%2DD%20guides%20businesses%20through,and%20disclosing%20nature%2Drelated%20information.

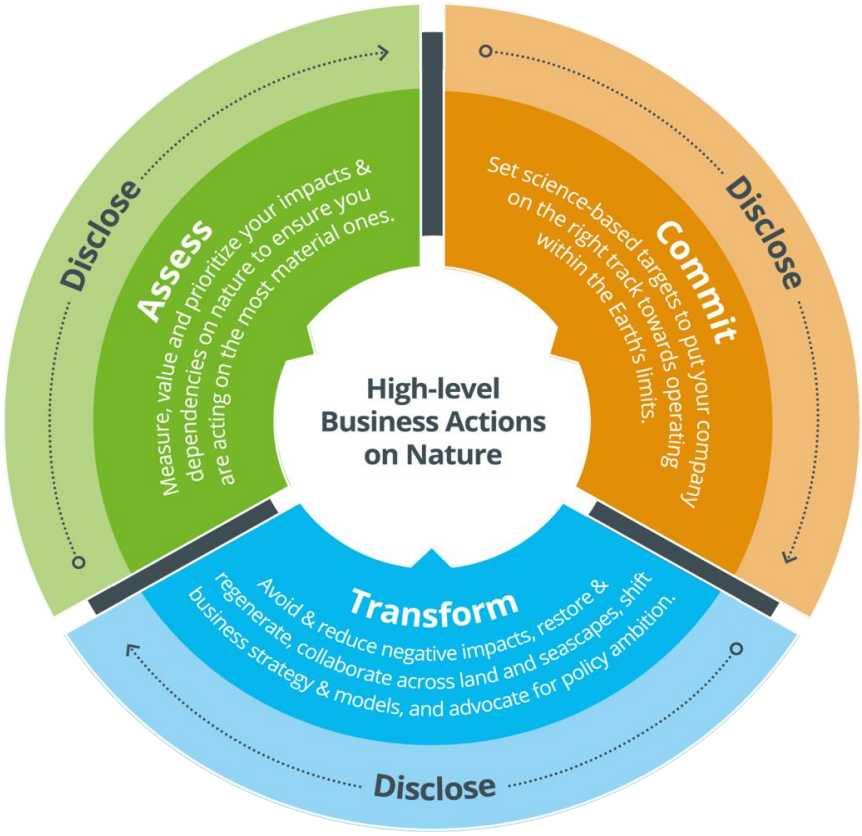

Figure 1 . *High-level Business Actions on Nature (ACT-D framework), Business for Nature*

In the wake of the newly agreed Global Biodiversity Framework which committed governments to require all large and transnational businesses to assess and disclose their risks, impacts and dependencies on nature, the Capitals Coalition wanted to understand if and how businesses integrate the ACT-D approaches into their decisions.

This resulted in a report of ACT-D case studies (Metabolic and Eftec, 2023) that demonstrate business action for nature, and illustrates specific elements of ACT-D in a way that has altered their business model. The examples highlight the interconnectedness between business, finance and government action and how actions by each group can drive ambition towards nature-positive.

4 Current natural capital assessment uptake by the private sector

4.1 Private sector decision-making framework

The integration of ecosystem services into private-sector decision-making, regardless of business application, typically follows a four-stage process as outlined by the Natural Capital Protocol (Figure 2). The Natural Capital Protocol is a decision-making framework that enables organizations to identify, measure and value their direct and indirect impacts and dependencies on natural capital.

The Protocol framework explores four Stages broken down into nine Steps which contain questions to be answered when integrating the value of natural capital into organizational

processes. The Protocol is iterative and allows users to adjust and adapt their approach as they progress through the framework.

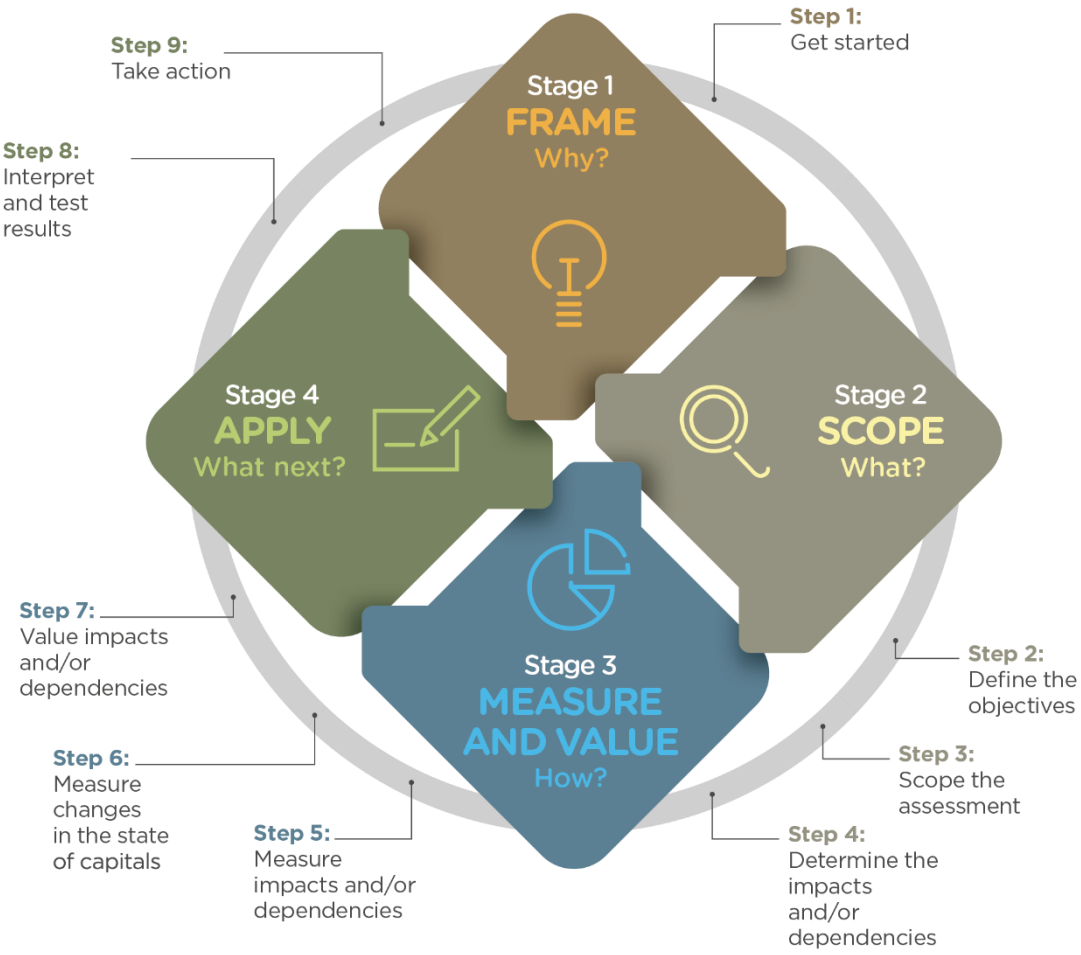

Figure 2. *The Capitals Coalition Protocol Framework*

As a practitioner progresses through each of these stages, they are dependent on other guidance, tools, data, and resources. 'Chapter 5. Resource mapping' in this document provides an insight into the main resources used within each of the assessment stages. This decision-making framework mostly supports the 'Assess' action of the abovementioned ACT-D framework for business action. The assessment that can be conducted by following the framework should provide relevant, robust, replicable and consistent outputs to inform commitments, transformations and disclosures of business action.

4.2 Windows of Opportunity – Business Applications

The windows of opportunity to integrate ecosystem services into private sector decision-making are viewed under the following "Business Applications" from the Natural Capital Protocol (2016):

- Assess risks and opportunities.
- Compare options.
- Assess impacts on stakeholders.
- Estimate total value and/or net impact.
- Communicate internally or externally.

Feedback from companies through case studies and surveys (Natural Capital Coalition, 2017) include the following motivations and drivers for undertaking a natural capital assessment:

- To mitigate impacts and protect future access to natural resources
- To assess and reduce risks
- To understand net value
- To explore future impacts and scenarios
- To inform approaches to investment planning
- To engage stakeholders and colleagues
- To identify opportunities, e.g. to improve sustainability, optimize performance or improve functions within the company that present the greatest risk to natural capital
- To contribute to global initiatives like the SDGs

These motivations and drivers align well with the business applications identified in the Natural Capital Protocol. Ultimately the integration of natural capital information leads to better insight into the company, improved decision making, enriched project appraisals, enhanced resilience and strengthened reporting and company reputation.

4.3 Current uptake by private sector

The uptake of natural capital accounting by business isn't common practice yet. The Capitals Coalition maintains a case study database[5] of organizations that have conducted capitals assessments and have been willing to share these. From an analysis of this database, 106 organizations have conducted a corporate or finance-sector related natural capital assessment. Approximately a third (39) were international studies focused across the entire company or supply chain. Another third (33) were based in Europe.

The Business application (Figure 3) indicates the question that the natural capital assessment sought to address or support. Each case study could only select one option and some did not select any option leaving a total of 76. Almost half of the studies so far have been to estimate the total value and/or net impact from the company's impact on natural capital (34). Over a

[5] https://capitalscoalition.org/impact/case-studies/?fwp_filter_tabs=case_study [accessed October 2023]

third (21) have been conducted to assess risks and opportunities linked to the company's dependency on natural capital.

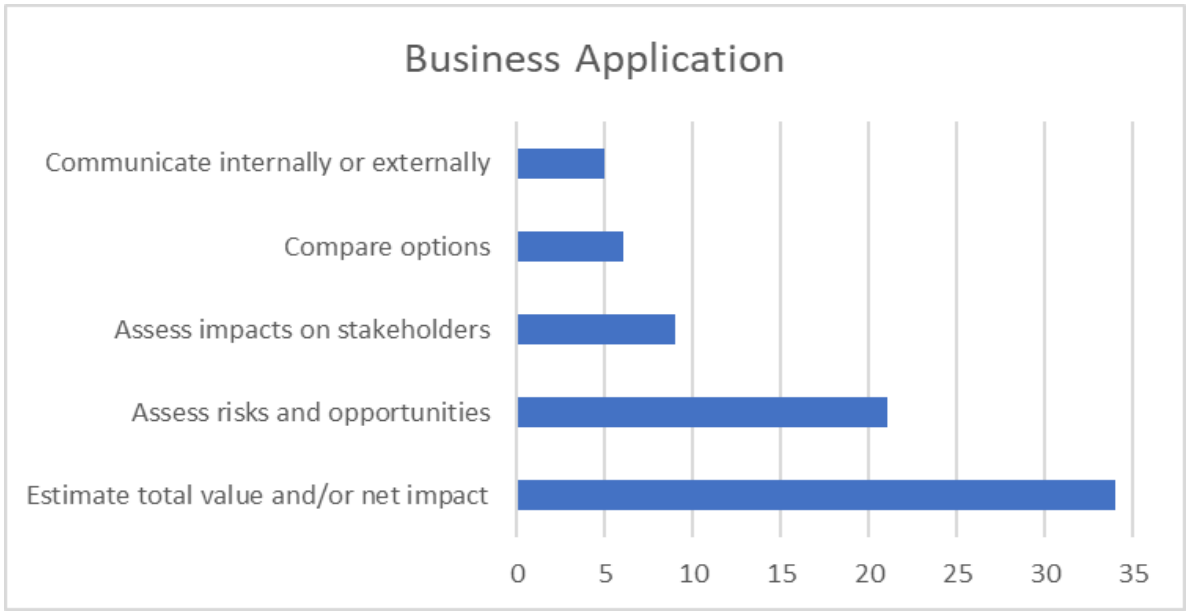

Figure 3. *Focus of natural capital assessments in the private sector. N=76 (Source: Capitals Coalition Case Study Database as at Nov 2023)*

All of the 106 case studies indicated their sectoral focus (Figure 4). The most widely covered was Food and Beverage sector with 24 cases, followed by forest products (13), consumer goods (13 including discretionary items, staples, apparel and cosmetics) and the chemical/pharmaceutical sector (10).

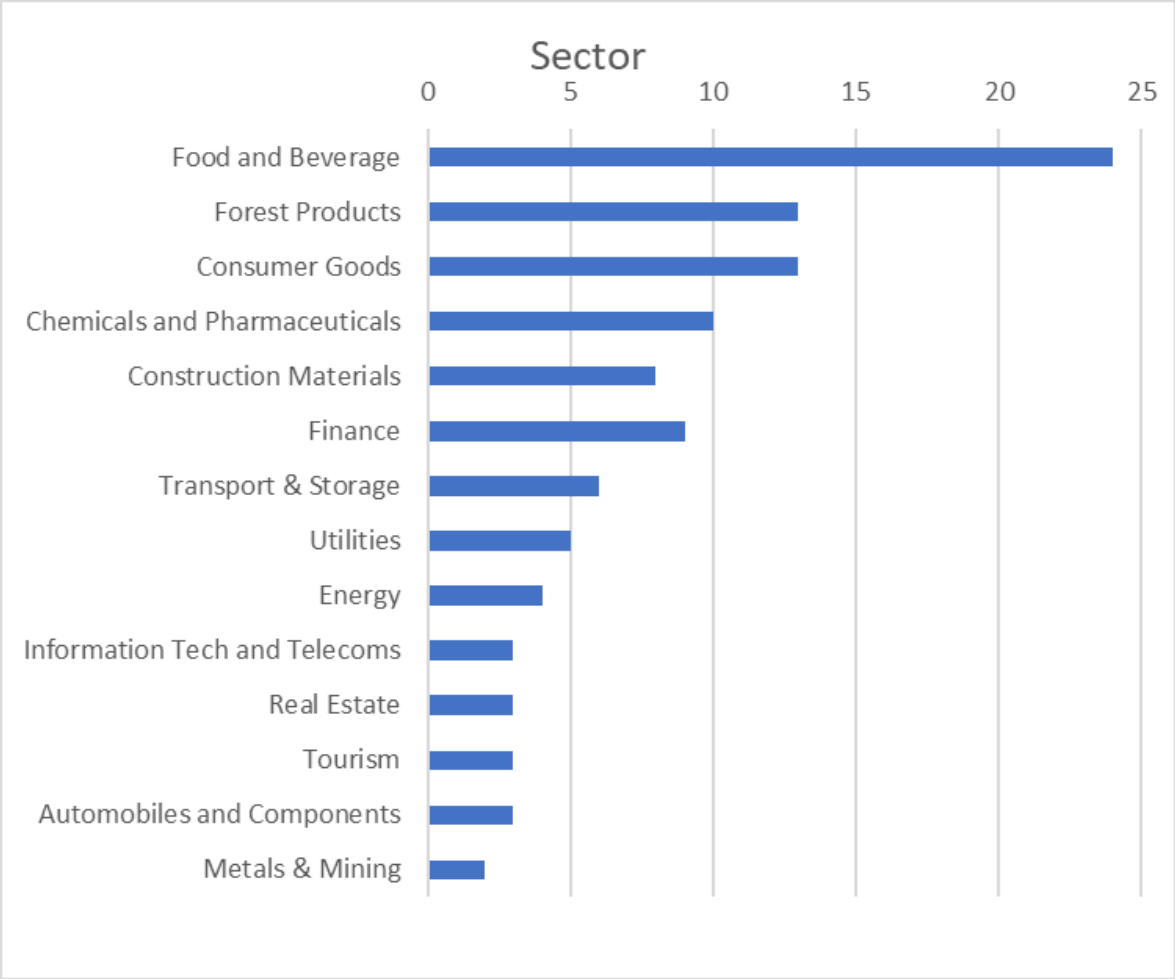

Figure 4. *Focus of natural capital assessments in the private sector. N=106 (Source: Capitals Coalition Case Study Database as of Nov 2023)*

5 Resource mapping

As outlined in Figure 2 the decision-making framework that is included in the Natural Capital Protocol consists of four stages and nine steps that are iterative. To support a natural capital assessment, various resources are referenced in the Protocol. Since its publication in 2016 many advancements in tools and methodologies to support these stages have been made. This section provides insight into the main resources used to support the assessment stages. Annex B provides an overview of current relevant resources and will be updated as the SELINA project progresses.

5.1 Stage 1. Frame – Why?

This stage focuses on defining the business application or context that you wish to apply natural capital information to and familiarizing yourself and your organization with the terminologies and science underpinning a natural capital assessment.

In starting out on a natural capital assessment, a range of resources are relevant including overall guidance (such as the Natural Capital Protocol) which elaborate on the steps and decisions involved in an assessment and the considerations needed. There are numerous glossaries of terms and often the glossary chosen may depend upon your business application and the preferences of your stakeholders. These are outlined in Annex B: Stage 1. Frame.

Importantly, your chosen business application will often determine the level of detailed analysis required and hence the resources, skills and tools needed to undertake the analysis. This is explored in Stage 2. Scope.

5.2 Stage 2. Scope – What?

This stage supports the articulation of the assessment objective and sets out considerations needed before undertaking an assessment including:

- the organizational focus - corporate, project or product;
- the value-chain boundary - upstream, direct operations, downstream;
- the value perspective – business or society or both;
- which impacts and/or dependencies;
- types of value to assess;
- other technical aspects such as baselines, spatial and temporal boundaries; and
- other key planning issues such as how to deal with uncertainty.

The guidance in the Natural Capital Protocol is helpful to lead you through each of these considerations. In addition, during the previous stage you will have identified the business application that you are attempting to inform. This might in turn direct you to more specific guidance such as those related to biodiversity (e.g. Align by UNEP-WCMC et al, 2022), environmental profit and loss accounting (e.g. Transparent by Value Balancing Alliance et al 2023), or reporting and disclosure (e.g. guidance from the Taskforce on Nature related Financial Disclosures (TNFD, 2023a)). At this stage more explicit sectoral guidance can help you to scope the typical impacts and dependencies associated with your sector (see Annex C).

In addition, this Stage supports a materiality[6] assessment, which enables an organization to understand what their most important impact drivers or dependencies are in relation to the set objective(s). The view of what is 'important' can be taken from the business point of view, and/or what is important to society, i.e. the value perspective.

[6] Materiality is an accounting and reporting concept that determines whether the omission or misstatement of information in a financial report would impact a reasonable user's decision-making.

There are scoping tools as well such as the ENCORE tool (Exploring Natural Capital Opportunities, Risks and Exposure). This guides users in understanding how businesses across all sectors of the economy potentially depend and impact on nature, and how these potential dependencies and impacts might represent a business risk. Although developed primarily for the financial sector, it is a useful tool for any organization wanting a high-level scoping of potentially impactful activities. ENCORE includes a database of values, guidance in application and case studies. This tool is currently being updated as part of the EU-funded SUSTAIN project.

Uncertainty is a planning issue for which there is a lack of information at present in the private sector. If uncertainty is addressed in a guidance document, it is usually via methods such as scenario or sensitivity analysis to uncertain future outcomes (TNFD, 2023b[7]). There are also some guides in the public sector which may be useful in a private sector context (e.g. 2023 Circular A-4 section "Treatment of Uncertainty" by the US Office of Management and Budget).

5.3 Stage 3. Measure and Value – How?

This stage involves the detailed assessment of the business':

- State of natural capital
- Pressures or impact drivers,
- Impacts on natural capital, and/or dependencies
- Value of the natural capital impacts and/or dependencies.

There are many tools available and some sectors or topics have their own. The Capitals Coalition Natural Capital Toolkit[8] hosted by MIT Shift lists 86 different private sector tools and guidance. TNFD also provides a non-exhaustive overview of data and tool availability (TNFD, 2022). Both resource curators agree that the next development needed is in directing companies on what tool to use in what situation and for what purpose. The MAES (Mapping and Assessment of Ecosystem Services) Methods Explorer from the EU ESMERALDA project provides a wider range of general scientific approaches, although not specific to the private sector application focus. Annex D provides a list of tools and guidance under the following themes above: state, pressures, impacts and/or dependencies and valuation. All of these tools have been used by the private sector.

[7] "To better account for the uncertainty in physical and systemic risk estimates, uncertainty could be accounted for through sensitivity analysis around specific physical risks, such as the potential implications of reaching selected tipping points" (TNFD, 2023)

[8] https://shift.tools/contributors/551

5.4 Stage 4: Apply – What next?

This is the stage where results are interpreted, tested and acted upon. It also includes how the values produced in Stage 3 are integrated into the accounting and reporting systems of the business to enable decisions to be made. Further analysis at this stage could include optimization and trade-off analysis, and multi-criteria analysis to support decision-making. Financial scenario and sensitivity analyses, if not already conducted may be used here to test the results and economic outcomes. More complex economic models such as the Global Trade Analysis Project (GTAP) model (based on an input-output accounting framework) can be used to look at the economic impact of scenarios (e.g. climate change or fisheries collapse) on entire sectors (e.g. World Bank 2021). Guidance here comes from the ACT-D framework, specifically under Transform by contributing to systems transformation: avoid and reduce negative impacts, restore and regenerate, shift business strategy and models, and advocate for policy ambition.

6 Gaps to address by the SELINA project to facilitate private sector uptake

As the Protocol has been piloted and applied by many businesses already, we understand from their feedback that there are various challenges for the private sector to effectively apply a capitals assessment to their business (Annex F). We would like to highlight here where the SELINA project has scope to address some of these challenges.

In addition, SELINA hopes to illustrate through public and private sector Demonstration Projects and Test Sites the application of SELINA outputs in practice. The private sector Demonstration Projects in Work Package 9 cover a wide range of Business Applications and Ecosystems (Figure 5 and 6). Their potential contribution to understanding is further elaborated under each Stage below.

				Business Application				
Code	Country	Lead Organisation(s)	Decision-making context	Assess risks & opportunities	Compare options	Assess impacts on stakeholders	Estimate total value and/or impact	Disclose and report
DP08	Bulgaria	NIGGG-BAS & Aerographica	Urban Heat Islands	√	√	√	√	NA
DP09	Norway	Asplan Viak	NbS in urban planning	√	√			NA
DP10	Malta	EcoINN	Nature-based tourism	√	√	√	√	√
DP11	Finland	SYKE	Nature-based island tourism	√	√			√
DP12	Global	NINA	Biodiversity metrics for nature risk in finance	√				√
DP13	Italy	SEACoop & Coldiretti	Biodiversity-based agricultural practices	√	√		√	√
DP14	Europe	Denkstatt & Coca Cola	Water replenishment	√	√	√	√	√
DP15	The Netherlands	Grant Thornton & Dunea	Water extraction	√	√		√	√

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Figure 5. Business Applications of the private sector Demonstration Projects (DPs) in SELINA. Colours refer to different business sectors

				Broad Ecosystem Types						
Code	Country	Lead Organisation (s)	Decision-making context	Forest	Agro-ecosystems	Urban ecosystems	Soil ecosystems	Wetlands	Freshwater	Marine & Coastal
DP08	Bulgaria	NIGGG-BAS & Aerographica	Urban Heat Islands			√				
DP09	Norway	Asplan Viak	NbS in urban planning			√				√
DP10	Malta	EcoINN	Nature-based tourism	√	√	√		√	√	√
DP11	Finland	SYKE	Nature-based island tourism							√
DP12	Global	NINA	Biodiversity metrics in finance	√	√	√	√	√	√	√
DP13	Italy	SEACoop & Coldiretti	Biodiversity-based agricultural practices	√	√		√		√	
DP14	Europe	Denkstatt & Coca Cola	Water replenishment	√	√		√	√	√	
DP15	The Netherlands	Grant Thornton & Dunea	Water extraction	√				√	√	

Urban planning | Coastal & Marine | Finance | Agriculture & Water

Figure 6. Broad ecosystem types covered by the private sector Demonstration Projects (DPs) in SELINA. Colours refer to different business sectors

Annexes B to E provide a more detailed list of planned SELINA outputs relevant to each of the Natural Capital Protocol stages.

6.1 Stage 1

A key need noted by the private sector (see Annex F) is a large skills gap, both in internal organizational staff but also their consultants preparing natural capital assessments. Courses are helpful to improve capacity building in your organization, as well as capacity building networks for shared learning. The SELINA glossary of key terms is useful for those starting out and needing to familiarise themselves with the language used.

Another challenge is simply in keeping up with a rapidly changing landscape of standards and guidance related to biodiversity assessment and reporting. That is where a meta-guidance such as this, and the final Compendium of Guidance from the SELINA project will prove extremely helpful.

Selling the case to business managers to undertake a natural capital assessment can be problematic due to resource and time constraints (Annex F). Case study databases can help with inspiration and understanding the motivations, enabling factors and barriers behind undertaking a natural capital assessment. From the SELINA project itself, Work Package 2 deliverables analysing the enabling factors and barriers for biodiversity and Ecosystem Services uptake in decision-making processes will help to improve integration. In addition Work Package 9 seeks to co-design incentives for information sharing on different application levels, leveraging between business applications, financial information, public sector regulation, and science. Improved information flows will increase capacity for natural capital assessments by the private sector as well as identifying regulation and incentive mechanisms to promote or require private sector implementation of natural capital approaches.

A decision-making template was developed to guide the private sector Demonstration Projects. The completed templates will provide useful to others looking to map out and plan their own assessments. A list of planned SELINA outputs relevant to this stage is provided in Annex B.

6.2 Stage 2

Conducting a materiality assessment is the main activity as part of step 4 of the Protocol. Although the protocol suggests that a business measures and values impacts and dependencies related to both the business as well as to society, as part of the piloting of the framework within the TEEBAgriFood for Business project it was evident that businesses are much more inclined to look at their impacts and dependencies in their direct operations than to assess their interaction within the wider value chain and/or landscape.

It would be interesting to analyze how business could be motivated to assess beyond their direct impacts and dependencies. We suggest to conduct a more thorough analyses of the Capitals Coalition database to understand what impacts and dependencies are considered to be most material by business and what the scope is of these assessment.

Furthermore, SELINA can contribute understanding on what is material (for example what are the most impactful pressures and what are the ecological resources that companies are dependent on that are most at risk). In addition, companies need to select in this stage the ecosystem service indicators to inform their analysis. SELINA can provide a steer on what ecosystem service indicators meet key criteria: e.g. what is scientifically credible, what is salient or relevant to the business application and analysis, what is legitimate with respect to interested and affected stakeholders and what is feasible (van Oudenhoven et al., 2018). The Demonstration Projects and Test Sites have a key role to play here.

A list of planned SELINA outputs relevant to this stage is provided in Annex B.

6.3 Stage 3

Areas where there are gaps or under-utilisation by the private sector include in the integration of different ecosystem services and capitals in a holistic, systems-based approach (Annex F). Typically, organizations still focus on single issues in a piecemeal fashion. The Capitals Coalition has recently undertaken a review of integrated approaches to capitals assessment (i.e. considering social, human, produced and natural capital) and has produced a paper setting out principles and approaches (Capitals Coalition, 2023). In addition, an entire work package (WP6) within SELINA is focussed on integrated ecosystem assessments.

Organizations still struggle with the basics with respect to biodiversity measurement, such as access to data, need for biodiversity indicators that are linked to ecosystem service flow, lack of benchmarks or reference values and needing to find a balance between metrics which are feasible to measure and oversimplification of metrics that are not sensitive to change (Annex F). There are a large number of planned SELINA outputs that are relevant to Stage 3 (see Annex D) covering all measurement and valuation aspects such as how to measure ecosystem condition, use of satellite data in ecosystem accounts and integrated ecosystem approaches.

The private sector Demonstration Projects will be helpful tests of these technical outputs, particularly with respect to application in different ecosystem types and at different scales.

Valuation (of all types of value including non-monetary) remains a challenge with many different approaches and is time and resource expensive. There are particular gaps in data and suitable methodologies for the quantification and valuation of cultural ecosystem services.

This guidance note clarifies which tools are available for what purpose, which has been a need expressed by stakeholders and various initiatives. In addition, it would be valuable if the SELINA project could make various measures and valuation techniques more easily applicable by practitioners who lack the background of for instance environmental economists. We foresee that visualizations, decision trees, etc., would help practitioners to navigate more efficiently and effectively. Overall, we think that the SELINA project can contribute mostly to improving Stage 3 Measure & Value, as this is generally a challenging stage for practitioners.

An analysis of the case study database could also provide insight into which tools and methods are most widely used by the private sector currently. Often we see that tools and methods describe well what they do, but not so much how these can be of benefit to the user. Furthermore, it is not always clear what level of technical expertise is required in order to use any of the tools in Annex D. This communication gap could be addressed.

A lack of quality control measures and transparency criteria is another barrier to the integration of capitals assessment information. The Capitals Coalition has set up a Value Commission to address this issue. SELINA consortium members are welcomed to support consultations when these are being published.

6.4 Stage 4

Within the Apply stage, as part of pilots conducted in the TEEBAgriFood Operational Guidelines for Business, we noticed that businesses often skipped the verification process of the valuation that should be part of Step 8. This makes information less reliable and challenging to understand whether the general principles as set out within the Protocol are adhered to. In order to avoid green washing claims verification of results is vital. It would be interesting to see whether the largely scientific community represented within the SELINA consortium could contribute to better verification means.

Step 9 supports the Take Action. The Capitals Coalition recognizes that Stage 4 and Step 9 in particular, are the weakest part of the framework. In practice it proves to be difficult to translate assessment results into actionable decisions that transform the way a business acts. These decisions and transformation might not always be reported on either, as it is often hard to continuously track and monitor the impact certain decisions have on business conduct. Efforts within the SELINA project such as the community of practice (WP2) and the final Compendium of Guidance (WP10) could support a better uptake of ecosystem services information.

A general note for opportunities is that the Capitals Coalition is advancing work on integrated assessments, meaning that we are looking into how natural, social, human and produced capitals can be assessed in an integrated way. Especially as natural and social issues that the private sector deals with are often related. The SELINA project could potentially see where linkages could be made towards these broader issues.

7 References

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Annex A. Decision-Tree of Resources

The decision-tree (Figure 5) below provides a first draft and suggestion for a visual representation of how a user could progress through the stages of a natural capital assessment (following the Natural Capital Protocol) and what resources might be explored at each step. These match the detailed guidance and tools detailed in the ensuing annexes.
This decision tree doesn't reflect the iteration in the Protocol Framework yet and is a first draft to guide future thinking and advancement to support the uptake of ecosystem services and natural capital in private sector decision-making.

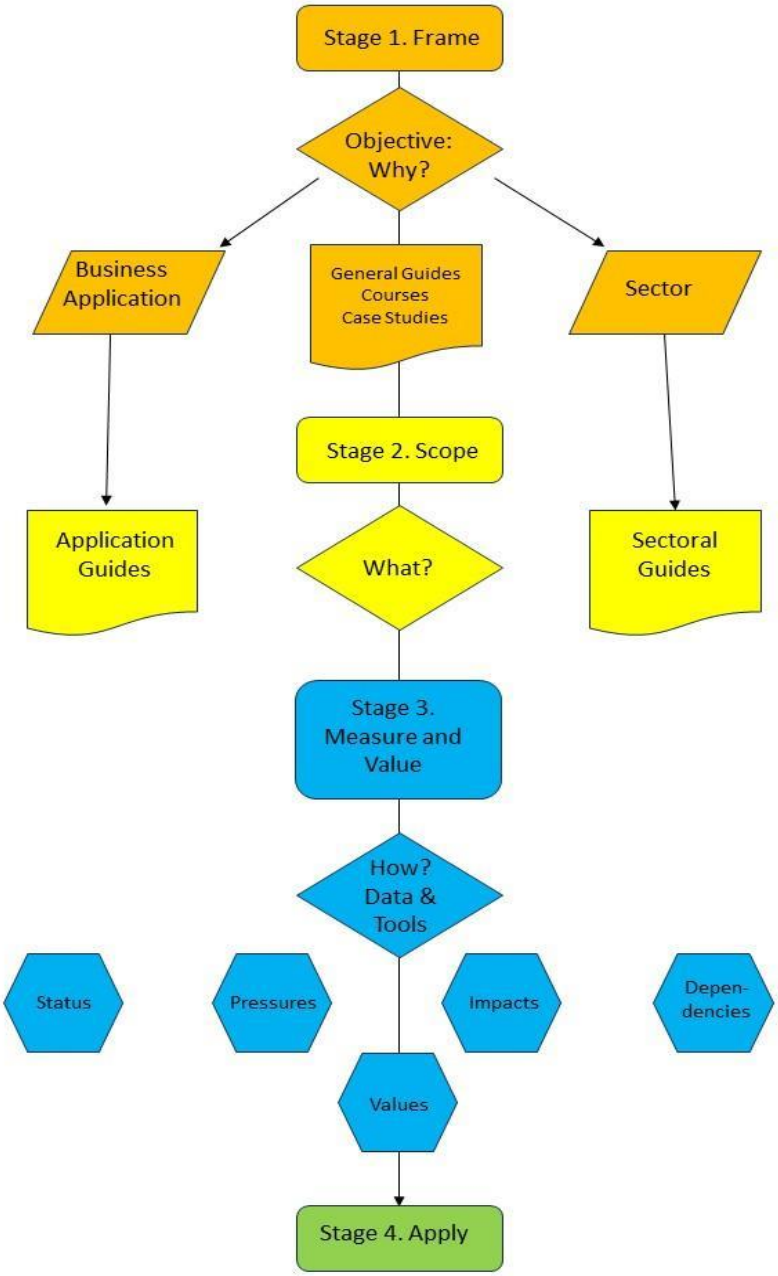

***Figure 7**. Draft decision tree to guide users through available resources, tools and data*

Annex B: Stage 1. Frame

These are resources for the general framing of a natural capital assessment. For specific applications such as external reporting and disclosure or accounting, please see Stage 2. Scope.

Existing Resources:

- The Natural Capital Protocol -step by step guidance and glossary for the private sector.
- TEEBAgriFood Operational Guidelines for Business
- We Value Nature – Natural Capital Journey Tool - this tool illustrates, through a mountain infographic, the natural capital journey of a business and some of the typical barriers and challenges it might face to integrate nature into decision-making along this journey.
- UN SEEA Business Accounting - This working group aims to contribute to the harmonization of natural capital accounting by the public and private sectors and promote collaboration between the public and private sectors on natural capital data and accounting.
- IPBES is preparing a Business and Biodiversity Assessment: Methodological Assessment of the Impact and Dependence of Business on Biodiversity and Nature's Contributions to People. It is a global assessment of the private sector due in Q4 2025 with a Summary for public policy makers.
- Coursera course: Valuing nature and people to inform business decision-making
- Key case study databases which can help with inspiration and objectives – MAES Case Studies, Capitals Coalition, WBCSD, We Value Nature, TNFD, SBTN and Business for Nature.
- Capacity building networks - We Value Nature, Ecosystem Services Partnership
- Glossaries of terms: UN SEEA, IPBES, ESMERALDA. TNFD

Planned SELINA Resources:

- The SELINA Glossary of terms
- D2.5 - Enabling factors and barriers for biodiversity and Ecosystem Services uptake decision-making processes in EU Member States
- D9.2a - The SELINA decision-making template developed under WP9 to guide the Demonstration Projects (Annex B)
- D9.3 Report on ES evidence generation and uptake within the DPs

Annex C: Stage 2. Scope

Existing Resources:

The guidance in the Natural Capital Protocol is helpful to lead you through each of these considerations. In addition, during the previous stage you will have identified the business application that you are attempting to inform. This might in turn direct you to more specific guidance such as those related to biodiversity (e.g. Align), environmental profit and loss accounting (e.g. Transparent), or reporting and disclosure (e.g. TNFD) (see Table 2). The ENCORE tool (Exploring Natural Capital Opportunities, Risks and Exposure) is a key tool used by the private sector (We Value Nature, 2022) and can be used to help guide in the scoping of impacts and dependencies.

Table 2. *General guidance relevant to the Scoping Stage*

Name	Organisation	Description
Recommendations for a standard on biodiversity measurement and valuation (2022)	Align (UNEP-WCMC, Capitals Coalition)	An EU-funded project providing an agreed set of principles and technical criteria setting out 'what' elements of biodiversity should be measured and valued and 'how' this should be done in different decision-making contexts. Also specific guidance on application at site-level and for supply chains.
Standardized Natural Capital Management Accounting: A methodology promoting the integration of nature in business decision making (2023)	Transparent (Value Balancing Alliance, Capitals Coalition, WBCSD)	An EU-LIFE funded project providing a standardized natural capital management accounting methodology for the development of Environmental Profit and Loss Accounts. Also a general guidance with more technical information and sectoral guides
Nature-related Risk and Opportunity Management and Disclosure Framework (2023)	Taskforce on Nature related Financial Disclosures (TNFD)	ES are one of TNFD's "building blocks for understanding nature." Ecosystem integrity is part of their status assessment.
Sustainability Reporting Standards including GRI 304: Biodiversity (2016) and other environmental pressures	Global Reporting Initiative (GRI)	Global Standards for sustainability impacts. Biodiversity indicators released June 2022
Questionnaires (2016) and Guidances 2023	CDP	CDP is a not-for-profit charity that runs the global disclosure system for public/private sector to manage their environmental impacts.
Principles for Responsible Investment (PRI)	UNEP FI	Principles for setting targets and analyzing and disclosing impacts
Performance Standard 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources	International Finance Corporation	The IFC Performance Standards apply to business projects. PS6 covers the scoping for impacts on biodiversity and conservation and sustainable management approaches

Name	Organisation	Description
ISO 14007:2019 Environmental management	International Organization for Standardization	Guidelines for organizations on determining environmental costs and benefits and dependencies associated with their activities
14008:2019 Monetary valuation of environmental impacts and related environmental aspects	International Organization for Standardization (ISO)	A methodological framework for the monetary valuation of environmental impacts and related environmental aspects. Environmental impacts include impacts on human health, and on the built and natural environment. Environmental aspects include releases and the use of natural resources.
BS 8632:2021 Natural Capital Accounting for Organizations.	British Standards Institute	Provides specifications and guidance on the process of preparing natural capital accounts. It includes minimum requirements for defining the scope of an account and the material impacts and dependencies, and for documenting the data and process used to prepare the natural capital account.
Initial Guidance for Business (2020)	Science Based Targets for Nature (SBTN)	Assists companies in setting science-based targets
77 Sectoral Sustainability Accounting Standards – revised in 2023 to align with the IFRS standards.	Sustainability Accounting Standards Board (SASB) - now part of IFRS	Most include biodiversity impacts where relevant. Metrics include description of environmental management policies and practice and how to assess the area impacted
CDSB Framework application guidance for biodiversity-related Disclosures (2021)	International Sustainability Standards Board (ISSB – part of IFRS)	Non-mandatory biodiversity guidance released Nov 2021. Took over and consolidated the SASB guidances.
General Requirements for Disclosure of Sustainability-related Financial Information		(in progress – due 2023)
ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure)	Natural Capital Finance Alliance, UNEP-WCMC	Guides users in understanding how businesses across all sectors potentially depend and impact on nature. ENCORE includes a database of values, guidance in application and case studies.

Planned SELINA Resources:

- D9.2a - The SELINA decision-making template developed under WP9 to guide the Demonstration Projects which includes the scoping stage
- D9.3 Report on ES evidence generation and uptake within the DPs

Annex D: Stage 3. Measure and Value

Existing Resources

Status

The following guidances and tools are useful for calculating ecosystem status aspects such as abundance and distribution, ecosystem integrity, status of ecosystem services and identifying threats or areas at risk:

Data:

- Biome location data: ArcGIS's WWF Terrestrial Ecoregions of the World tool
- National Biodiversity Network Atlas: Live and searchable database of biodiversity data for areas and species of interest including threat status and the main impact drivers.
- Ecosystem integrity/health: IUCN Red List of Ecosystems database, Tree cover loss - Emerging Hot Spots (to identify significant clusters of primary forest loss by country);
- Integrated Biodiversity Assessment Tool (IBAT), which contains data on Threatened Species, including the Species Threat Abatement and Restoration metric, and Key Biodiversity Areas:
- WWF Priority Ecoregions: to identify a set of the Earth's terrestrial, freshwater and marine ecoregions that harbour exceptional biodiversity and are representative of its ecosystems;
- For more granular local biodiversity data: Global Biodiversity Information Facility.

Mapping and status assessment tools:

- Mapping Europe's ecosystems – presents progress in the spatial mapping of broad ecosystem types and their associated habitats at European level. Interactive maps and data viewers are also available via the EEA.
- UN-DESA (2022) Guidelines on Biophysical Modelling for Ecosystem Accounting
- MAIA (2022) Guidance for the Biophysical Modelling and Analysis of Ecosystem Services in an Ecosystem Accounting Context
- Tools for spatially mapping environmental features are collated under the MAES Methods Explorer including biophysical surveys, geo-tagged photo-series analysis, remote-sensing and earth observations, spatial proxy methods. And statistical inference models. Other models explore relationships among and between biophysical units, such as ecological connectivity, which influence the resilience and therefore status of a system. Nearly every single consultancy or research institute involved in biophysical modelling has their own models so there are potentially hundreds. Commercial ones include MIKE Powered by DHI, Delft3D by Deltares, and Nature Braid. See also a review by Lof et al., (2022).
- ARIES for SEEA allows users anywhere in the world to produce ecosystem accounts for their area of interest that are consistent with the SEEA Ecosystem Accounting framework.

- Species extinction risk: Species Threat Abatement and Restoration (STAR);
- Environmental asset status: ENCORE (contains natural capital depleted hotspots),
- Global Critical Habitat screening layer: to identify critical habitat for marine (Martin et al., 2015) and terrestrial (Brauneder et al., 2018) realms, as defined by the International Finance Corporation (IFC) Performance Standard 6 (PS6);
- Biodiversity Net Gain Calculator (BNGC) by Arcadis provides insight into the actual and potential land-use related, biodiversity value of the different spatial units of a company's operational sites by means of a metric built on extent, condition and significance.

Ecosystem services status:

- The MAES Methods Explorer also covers tools used to assess ecosystem services status
- InVEST, TESSA, ESII, ESTIMAP, Data4Nature, i-TREE, Ocean Wealth, and many more.

Pressures

For the specific step of outlining a project's spatial area of influence, there are several good practice guidelines in the private sector, including the International Finance Corporation's Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources and Good Practices for the Collection of Biodiversity Baseline Data (Gullison et al, 2015) prepared for the Cross Sector Biodiversity Initiative. Table 3 outlines tools useful for a range of specific pressures.

Table 3. *Tools for assessing specific pressures:*

Pressure	Tool Name	Developer	Description
Air pollutants	EMEP/EEA	EEA	European air pollutant emissions
GHG emissions	Greenhouse Gas Protocol	WRI & WBCSD	Guidance for preparing a corporate-level GHG emissions inventory covering the accounting and reporting of seven greenhouse gases.
Land / Seabed Use	LANCA® - Land Use Indicator Value Calculation in Life Cycle Assessment	Fraunhofer Institute for Building Physics	The LANCA® calculations are based on geo-ecological classification systems and make use of site-specific input data. The ecosystem functions of erosion resistance, mechanical filtration, physicochemical filtration, formation of new groundwater, and biotic production potential can be taken into account by this method within an LCA framework.
	Practitioner's and User Guide	Economics of Land Degradation Initiative (ELD)	Principles of economic valuation for sustainable land management with a 6+1 step approach to assessment.

Pressure	Tool Name	Developer	Description
	#Countmitment (updated from #INCA method)	Creando Redes	Combines CICES + MAES indicators + quantitative enviromental impact assessment metrics. Metrics are calculated using open source data (mainly Landsat and Sentinel). The methodology considers negative or positive impacts on natural capital, differentiating between reversible and irreversible (restorable) impacts. Natural capital net loss is obtained from ecosystem services variation between a baseline state and a post-construction or post-operation phase.
	Biodiversity Impact Metric (BIM) – now B-INTACT	Cambridge Institute for Sustainability Leadership, Natural Capital Impact Group	The Biodiversity Integrated Assessment and Computation Tool (B-INTACT) can be used to assess and track how sourcing affects nature through biodiversity loss as a result of land and habitat transformation for agricultural production and land use intensity.
	Healthy Ecosystem Metric	Cambridge Institute for Sustainability Leadership	The metric is based upon the area of land use.
	Local Ecological Footprinting Tool (LEFT)	University of Oxford	A web-based decision support tool to help industry evaluate patterns of relative ecological value across a landscape to inform land use planning and minimize environmental impact.
	PREDICTS (Projecting Responses of Ecological Diversity in Changing Terrestrial Systems)	Natural History Museum and UNEP-WCMC	The PREDICTS project analyses ecological studies from around the world to understand how human activities - especially those related to land use change and intensification - are changing biodiversity.
Water Consumption	Aqueduct - Water Risk Atlas	World Resources Institute	Helps companies, investors, governments, and other users understand where and how water risks and opportunities are emerging worldwide.
	Water Footprint Calculator and Water Footprint Assessment Tool	Water Footprint Network	Provides comparable quantification of water consumption and pollution and robust analytics that can be used to understand water dependencies in direct operations and supply chains, for products, facilities and companies and at different geographic scales.
	Water Calculation Tool for the Textile	United Nations Industrial Development	Supports companies to evaluate their water footprint in stages of a product life cycle, from agricultural production

Pressure	Tool Name	Developer	Description
	Wet Processing Sector	Organization (UNIDO); DNV GL	through processing and production up to the factory gate
	Water Risk Filter	WWF	This tool helps companies and investors to assess risks of water supply and offers guidance on what to do in response. More than 2,900 organizations from 32 industry sectors have assessed facilities. You can look at specific facilities or agricultural commodities, each with an automated basin assessment and questionnaire to evaluate direct operations.
	Global Water Tool	WBCSD	A module that helps companies compare their water use, wastewater discharge, and facility information with validated watershed and country-level data
	Business Guide to Water Valuation	WBCSD	Guidance on the main concepts and techniques associated with water valuation
	Water Risk Monetizer	Ecolab USA and Trucost	Estimates the value of water scarcity in monetary terms at site level.
	Achieving Abundance: Understanding the Cost of a Sustainable Water Future	Valuing Nature and World Resources Institute (WRI)	A method paper based on the concept of "mitigation cost"
	Local Water Tool	Global Environmental Management Initiative (GEMI)	Quantify water-related impacts caused by a facility's exposure to water-related risk and identify helpful management responses
	India Water Tool	WBCSD & WRI	The first country-specific tool developed to support businesses in assessing Water risks at their sites in India
Waste	Eurostat	European Commission	Statistics on waste generation and treatment
	Marine Plastic Footprint	IUCN	2020 framework to measure the inventory of marine plastic leakage, step-by-step and using a life-cycle perspective.

For specific sectors

The Natural Capital Toolkit can be filtered for a range of sectors. A selection is provided here of key ones.

Table 4. *Tools for assessing specific sectors:*

Sector	Name	Developer	Description
Various	Draft sector guidance	TNFD	Sectors include Oil and Gas, Metals and mining, Forestry and paper, Food and

Sector	Name	Developer	Description
			agriculture, Electric utilities and power generators, Chemicals, Biotechnology and pharmaceuticals, Aquaculture and Financial institutions.
AgriFood	Agro-biodiversity Index	Biodiversity International	Creates a score for agri-food companies and projects/products. Several indicators relate directly to biodiversity distribution and conservation inc. multiple measures of the status of agricultural biodiversity (species richness and/or diversity of crops from national statistics), land-use and land-use change.
	Biodiversity Performance Tool (BPT)	Global Nature Fund, Lake Constance Foundation, AUF!, Solagro, agoodforgood, Fundacion Global Nature, and Instituto Superior Tecnico	The BPT facilitates the assessment of the potential for functional biodiversity at farm level. The BPT supports farmers and farm assessors to identify the current situation regarding biodiversity on the farm, to operationalize biodiversity criteria and to select effective measures for a Biodiversity Action Plan (BAP).
	Cool Farm Tool	Cool Farm Alliance	An online greenhouse gas, water and biodiversity calculator for farming
	Natural Capital Measurement Catalogue (NCMC)	Climateworks Australia	Natural capital, production and financial measures to be measured at the property level. It currently focuses on agricultural land use (broad-acre cropping and grazing) with the intent to include other land use types in the future.
Water Management (see also Water use pressure above)	Achieving Abundance: Understanding the Cost of a Sustainable Water Future	Valuing Impact, WRI	A methodology report based on the concept of "mitigation cost". It explores the costs of actions to meet certain targets for drinking water and sanitation.
	B£ST (Benefits of Sustainable Drainage Systems)	Susdrain, CIRIA	Assessing the financial, environmental and social benefits of water management interventions, particularly sustainable drainage and natural flood management. Assesses benefits of biodiversity and ecology, and account for their change in size and type due to the project carried out through local habitat surveys and biodiversity action plans.
Energy	Biodiversity and Ecosystem Services Fundamentals	IPIECA	Guidance for the management of biodiversity and ecosystem services (BES) impacts, dependencies, risks and opportunities in the oil and gas sector. It

Sector	Name	Developer	Description
			sets out a management framework comprised of six interrelated BES management practices along with an overview of tools for application within these practices, examples (case studies) of how these are being applied, and references for more detailed guidance.
Construction & Materials	Biodiversity Management Plan Guidance	Cement Sustainability Initiative (WBCSD)	The aim of this document is to guide cement companies on how to better manage biodiversity by recommending a methodology and including many sources of information which the companies can use to develop tailored solutions.
Forestry	Woodland Benefits Tool	Forestry Commission, developed by AECOM	A tool designed to help investors in new woodland to assess the social, environmental, and economic benefits of their investment.

Impact

For the specific step of outlining a project's spatial area of influence, there are several good practice guidelines in the private sector, including the International Finance Corporation's Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources and Good Practices for the Collection of Biodiversity Baseline Data (Gullison et al, 2015) prepared for the Cross Sector Biodiversity Initiative.

There are numerous tools for Life Cycle (Impact) Assessment (ReCiPe 2016, openLCA, Eco-Indicator 99, EPS Method, LIME, and Impact 2002+) covering a range of pressures (climate change, non-GHG emissions, eutrophication, acidification, ecotoxicity (freshwater only), waste, land and resource use). However, the methods and data underpinning LCA are often not site specific and rely on sector level aggregated data; they therefore do not always connect well to drivers of biodiversity change which are location sensitive (TNFD, 2023).

Name	Developer	Description
The Biodiversity Metric 3.1	Natural England	Used to calculate biodiversity losses and gains for terrestrial and/or intertidal habitats. Tool includes a calculation tool, a user guide, GIS data import tools and guidance, FAQs, and case studies. Defra is currently working towards a consultation on the principles for marine net gain.
GLOBIO	PBL Netherlands Environmental Assessment Agency	Impact on biodiversity is modelled for six human pressures: land use, road disturbance, fragmentation, hunting, atmospheric nitrogen deposition and climate change. GLOBIO uses a relative biodiversity indicator, the Mean Species Abundance of original species (MSA)
Global Biodiversity Score	CDC Biodiversity	A corporate biodiversity footprint assessment tool used to evaluate the impact or footprint of companies and investments on biodiversity. It uses the Mean Species

Name	Developer	Description
		Abundance metric characterising the intactness of ecosystems. To link activity, pressures and impacts, the GBS uses peer-reviewed tools such as EXIOBASE, an environmentally extended multi-regional input-output model, or GLOBIO, a model assessing the impact of various pressures on biodiversity intactness.
Biodiversity Footprint Methodology (BFM)	PLANSUP, Wageningen Environmental Research, Netherlands Environmental Assessment Agency (PBL)	Calculation of the biodiversity footprint of a company or product, both for a current and alternative or future situation, to assess changes in impact and effectiveness of mitigation and pro-biodiversity actions. It is based on the GLOBIO model for land use and climate change but implemented on a local scale.
Corporate Biodiversity Footprint (CBF)	Iceberg Data Lab	Guide to assess the annual biodiversity impact of Corporates, Financial Institutions and Sovereign issuers. Designed to support the needs of financial actors related to their investment strategies (portfolio or index development, exclusions, risk management), reporting requirements, stewardship, and engagement policies.
Biodiversity Indicators for Site-based Impacts (BISI)	UNEP-WCMC, Conservation International, Fauna & Flora International	A methodology for aggregating biodiversity impact and performance data at a site level to provide indicators of biodiversity management performance at corporate level. The work was tested prior on Extractive Companies in 2017
Biodiversity Estimated Impact Value	LIFE Institute	An instrument that enables a clear and objective analysis of pressure, impacts (positive and negative), risks, dependencies and opportunities in business' relationship with biodiversity.
Biodiversity Footprint for Financial Institutions (BFFI)	The Partnership for Biodiversity Accounting Financials (PBAF) - includes ASN Bank, CREM, PRé Consultants	Used to calculate a bank's biodiversity footprint and monitor progress. The BFFI combines a quantitative footprint calculation and a qualitative analysis. The footprint result is expressed as the number of hectares where all biodiversity is lost. The qualitative analysis focuses on impacts which cannot yet be covered by the quantitative calculation and serves as an interpretation guide.
Organization / Product Environmental Footprint (OEF/PEF)	EU	Life cycle assessment (LCA) based methods to measure and communicate the potential life cycle environmental impact of products (goods or services) and organisations, respectively.
GIST Impact Intensity Database (GIID)	GIST	Proprietary methodologies to enable companies to measure their multi-capital impacts across all four capitals. Additionally, GIST has developed proprietary data crawling tools that help gather publicly disclosed data from annual reports and sustainability reports to generate estimated impacts for publicly listed companies (currently covering MSCI ACWI)

Name	Developer	Description
Methodology Impact Statement General Paper	Value Balancing Alliance	The methodology employs a monetary metric to discern business impacts in the local context of the activity, to understand the significance and weighting of individual sustainability aspects.
Harvard Impact Weighted Accounts	Harvard Business School	A methodology to derive comparable and scalable monetized environmental impact estimates by applying characterization pathways and monetization factors to organization level environmental outputs, including carbon emissions, water use, and other emission types. Included are a number of guidance documents, data and visualization tools.
Total Impact Measurement and Management (TIMM) framework	PwC	Business guide to natural capital valuation - it incorporates and values a number of non-financial impacts. It's a holistic view of what businesses need to understand risk, identify opportunities and maintain a positive impact on society. Includes guidance, data and models
openLCA	GreenDelta	Open source and free software for Sustainability and Life Cycle Assessment, identifies main drivers throughout the life cycle, by process, flow or impact category, visualizes results and locates them on a map
ReCiPe 2016	PBL	A method for life cycle impact assessment (LCIA) with 18 midpoint indicators and 3 endpoint indicators.
MiLCA	Japan Environmental Management Association for Industry (JEMAI)	An LCA support system. The default database supports users to quantify an amount of water and other abiotic resources use and emissions (e.g. CO2 and SOx). These resource use and emissions can be converted to monetary value by using LIME2 method.
Ecoinvent Database	Ecoinvent	Lifecycle Inventory Database on the environmental impact for thousands of products
World Food LCA Database	Quantis	High quality emissions factors and environmental footprint data (including for carbon, water and land).
OPAL	Natural Capital Project	OPAL is a tool for quantifying the impacts of development and the value of potential protection or restoration activities to biodiversity and ecosystem services. OPAL combines widely available ecological and social data with the Natural Capital Project's spatially explicit InVEST ecosystem service models.
READS	Repsol	The READS tool is based on the GEMI methodology, which allows for the quantification and valuation of environmental impacts on Natural Capital by following the approach suggested in the Natural Capital Protocol and the Biodiversity Guidance.

Valuation

There are general approaches to valuation which are curated in the MAES Methods Explorer. Valuation databases provide valuation estimates for individual applications and studies, which might be transferable to different applications. Below are listed databases,

guidances and tools which have been used specifically by the private sector and can be used to assist the valuation stage.

Table 5. Methods, Data and Guidance to support Valuation

Name	Developer/Contact	Description
MAES Methods Explorer	Leibniz University Hannover	General approaches to qualitative, quantitative and monetary valuation such as choice modelling, contingent valuation, deliberative assessment and replacement costs.
TEEB Valuation Database	TEEB	A database on monetary values of ecosystem services which now contains over 1350 data-points from over 300 case studies.
Ecosystem Services Valuation Database (ESVD)	ESVD	Gathers information on economic welfare values related to ecosystem services measured in monetary units.
EVRI	Environmental Valuation Reference Inventory (EVRI)	searchable storehouse of empirical studies on the economic value of environmental assets and human health effects
The Value Commission	Capitals Coalition	Over 30 expert Commissioners from around the world aim to drive transparency and accountability across the application and use of value factors by organizations. They have drafted Transparency Criteria; a detailed set of standards that can be used to improve user confidence in the application of a value factor.
Social Value Self Assessment Tool and Guidance	Social Value UK	A free tool designed to help users judge how well they are measuring and reporting on their social value, in line with the Principles of Social Value.
Social Values for Ecosystem Services (SolVES)	U.S. Geological Survey (USGS)	Designed to assess, map, and quantify the perceived social values of ecosystem services. Social values, the perceived, nonmarket values the public ascribes to ecosystem services, particularly cultural services, such as aesthetics and recreation can be evaluated for various stakeholder groups.
Integrated Natural Capital Accounting (INCA)	European Commission	INCA is consistent with and fed into UN-SEEA but additionally built pilot accounts at EU level on ecosystem extent, condition and on nine ecosystem services supporting integrating into economic decision-making.
Environmental Value Look-up (EVL)	Economics for the Environment (EFTEC)	A searchable database which contains indicative monetary values for a range of environmental impacts.
ISO 14007:2019 Environmental management	International Organization for Standardization	Guidelines for organizations on determining environmental costs and benefits and dependencies associated with their activities
14008:2019 Monetary valuation of environmental impacts and	International Organization for Standardization (ISO)	A methodological framework for the monetary valuation of environmental impacts and related environmental aspects. Environmental impacts include impacts on human health, and on the built

Name	Developer/Contact	Description
related environmental aspects		and natural environment. Environmental aspects include releases and the use of natural resources.
BS 8632:2021 Natural Capital Accounting for Organizations.	British Standards Institute	Provides specifications and guidance on the process of preparing natural capital accounts. It includes minimum requirements for defining the scope of an account and the material impacts and dependencies, and for documenting the data and process used to prepare the natural capital account.
Guidance for Assessing Changes in Environmental and Ecosystem Services in Benefit-Cost Analysis (2023)	White House, US	Public sector guidance in undertaking an ecosystem services analysis including valuation and one of the few guidances explicitly dealing with uncertainty
Conceptual Framework for Impact Accounting (2023) and Impact Measurement Valuation (IMV)	International Foundation for Valuing Impacts (IFVI) https://ifvi.org/	Aim to develop one common impact accounting methodology in partnership with the Value Balancing Alliance. Impact is defined from the perspective of the well-being of people, consistent with an ecosystem services approach.
Guidelines for the Valuation of Corporate Ecosystem Services (GVces)	GVces Centre for Sustainability Studies of Getulio Vargas Foundation	The impacts and dependencies on eight ecosystem services are covered: water provision, water quality regulation, wastewater assimilation, climate regulation, pollination regulation, soil erosion regulation, biomass fuel provision, and recreation and tourism.
Methodology Impact Statement General Paper	Value Balancing Alliance	The methodology employs a monetary metric to discern business impacts in the local context of the activity, to understand the significance and weighting of individual sustainability aspects.
Marine Natural Capital Asset and Risk Register	University of Plymouth, Plymouth Marine Laboratory, Fauna & Flora International, WWF-UK, North Devon Biosphere, Marine Management Organisation	The methodology can be used to quantify and value (biophysical and/or monetary) the nutrient remediation and carbon sequestration and storage value of coastal marine habitats. A Natural capital risk register can also identify which habitats and ecosystem services are at most risk or degradation from anthropogenic pressures. This can support recovery and restoration activities by businesses.
Environmental Prices Handbook EU28	CE Delft	Environmental prices are constructed for the social cost of pollution. The book also provides guidance on values and calculations
NEVO (Natural Environment Valuation Online)	SWEEP University of Exeter	An easy to use online system for supporting and improving decisions regarding the use of, and investments in, the natural environment. Includes report, models and data

Name	Developer/Contact	Description
Total Impact Measurement and Management (TIMM) framework	PwC	Business guide to natural capital valuation - it incorporates and values a number of non-financial impacts. It's a holistic view of what businesses need to understand risk, identify opportunities and maintain a positive impact on society. Includes guidance, data and models
Co$ting Nature	UNEP-WCMC and King's College London	Provides information on and access to spatial modelling and mapping tools for mapping ecosystem services, water resources and the impacts of climate and land use change upon them, including the effects of policy interventions.

Planned SELINA Resources

Within the Measure and Value Stage there are a large number of technical outputs from the SELINA project that will contribute to filling important gaps in knowledge as follows:

- D3.1 Integrating data streams to define and map ecosystem types
- D3.2 Key condition indicators per ecosystem type
- D3.3 Definition of reference conditions that describe good ecosystem condition
- D3.4 Scientific decision framework to support the designation of EC levels
- D4.1 Systematic review of ecosystem assessment model uptake for decision-support
- D4.2 Diagnostic of ES model decision-support capabilities
- D4.3 Guidelines for enabling ES uptake in project and policy cycles
- D4.4 ES model uptake lessons learned in Demonstration Projects
- D5.1 Specifying and testing how externalities and disservices can be included in accounts
- D5.2 Enhancing the temporal resolution of ecosystem accounts using satellite data
- D5.3 Monetary valuation in SEEA EA
- D6.1 Indicator review, selection and integration
- D6.2 Operational database implemented and updated
- D6.3 Mapping and assessment of interrelations between ecosystem condition and services
- D6.4 Integration of EC and ES assessment with ecosystem accounting
- D6.5 Integrated ecosystem assessment
- D9.3 Report on ES evidence generation and uptake within the DPs
- D9.4 Scalable ES solutions to enhance private sector decision-making

Annex E: Stage 4. Apply

As well as the ACT-D framework mentioned in Chapter 2. Background, Business for Nature also outline the actions that companies can apply to improve outcomes for nature, including:

- Reducing the company's negative impact on nature,
- Investing in protecting and restoring nature;
- Innovating and scaling up products and technologies with a lower impact.

Action can take place across a company, through supply chains or collaboratively within a sector. The Convention on Biological Diversity has a portal listing actions, commitments and pledges that stakeholders have made, of which 223 have come from the private sector. Specific tools that might be utilized here include those used for economic scenario and sensitivity testing, as well as further decision-analysis tools such as cost-benefit analysis or multi-criteria analysis. This Annex cannot possibly list all such tools. Please refer to Table 9.2 in the Natural Capital Protocol for a summary (Natural Capital Coalition, 2016) as well as the MAES Methods Explorer.

Existing Resources:

Table 6. *Decision analysis tools*

Name	Developer	Description
MAES Methods Explorer	Leibniz University Hannover	General approaches to qualitative, quantitative and monetary valuation Decision-analysis tools such as Cost-Benefit Analysis and Cost-Effectiveness Analysis.
Global Standard for Nature-based Solutions	IUCN	Provides a consistent approach to defining, designing, assessing and scaling up nature-based solutions as a particular application for ecosystem services assessment. The guidance includes aspects such as assessing trade-offs and adaptive management.
Restoration Opportunities Optimization Tool (ROOT)	Natural Capital Project, IUCN	A tool to perform optimization and trade-off analysis. It uses information about potential impact of restoration or management change activities together with spatial prioritization or services maps to identify key areas for ecosystem service provision. Multi-objective analysis allows users to consider how to best manage trade-offs between different project goals. It's unclear from the guide which activities (or impact drivers) are included in the tool although land use (LULC map) appears to be one.

Table 7. *Accounting:*

Name	Developer	Description
Natural Capital Accounting	UN-SEEA	Although designed for country level application, many of the principles and concepts apply to private sector accounting
BS 8632: Natural Capital Accounting for Organisations	The British Standards Institution	This British Standard provides specifications and guidance for the process of preparing natural capital accounts for organizations.

Table 8. *Target Setting:*

Name	Developer	Description
Initial Guidance for Business (2020)	Science Based Targets for Nature (SBTN)	Assists companies in setting science-based targets along with more detailed step-by-step guidance. Other resources on the website include understanding the foundation of target-setting. SBTN also guidances for 14 different sectors including aviation, maritime and steel.
Planetary Boundaries	Rockström et al (2009) updated by Steffen et al (2015)	Can be applied at a landscape level to measure the extent of exceedance of the carrying capacity of the ecosystem.
One Planet Approaches	Metabolic for WWF	A method that supports companies and governments to work within the safe boundaries of our planet. The review evaluates models and methodologies for identifying key tipping points and translating global boundaries down to company or sector levels
Sustainable Development Goals (SDGs)	United Nations	The application of the UN SDGs in a business context have been studied and applied by many including Association of Chartered Certified Accountants (2017), Corporate Reporting Dialogue (2019), KPMG (2018) and PwC (2015).

Table 9. *Reporting:*

Name	Developer	Description
Sustainability Reporting Standards	Global Reporting Initiative (GRI)	Global Standards for sustainability impacts. Biodiversity indicators released June 2022 including GRI 304: Biodiversity (2016) and other environmental pressures
Questionnaires (2016) and Guidances 2023	CDP	CDP is a not-for-profit charity that runs the global disclosure system for public/private sector to manage their environmental impacts.
Integrated Reporting Framework (IIRC)	IFRS	Guidance to promote a more cohesive and efficient approach to corporate reporting that assesses the full range of factors that materially affect the ability of an organisation to create value over time
S1. General Requirements	IFRS	General Requirements for Disclosure of Sustainability-related Financial Information.

Name	Developer	Description
		Prescribes how an entity prepares and reports its sustainability-related financial disclosures

Table 10. *Taking Action:*

Name	Developer	Description
The Accountability Framework	Acountability Framework Initiative	A practical roadmap for addressing deforestation, conversion, and human rights in the agriculture and forestry sectors. It provides a guide for setting goals, taking action, and reporting progress.
Sector Transitions to Nature Positive	World Economic Forum	Identifies priority actions for sectors to reduce negative impacts and unlock opportunities across the value chain. The first phase focussed on Chemicals, Household and personal care products, Cement and Concrete. More is coming in 2024.
Sector Actions Towards a Nature-Positive Future	Business for Nature	Specific actions for 12 different sectors which build on the high-level actions businesses should take to help halt and reverse nature loss and contribute to an equitable, nature-positive economy.
The Mitigation Hierarchy	The Biodiversity Consultancy	This is a general approach used in many environmental assessments of development projects. However, TBC provides a guide for its implementation in sectors with reference to achieving net positive.
Sectoral Roadmaps to Nature Positive	WBCSD	
Actions and Landscape of Impact Management	Impact Management Platform (IMP)	A collaboration between the leading providers of international public good standards, frameworks and guidance for managing impact. Together, the Platform Partners are working to: • clarify and build consensus on the meaning and practice of impact management; • work towards a complete and coherent system of impact management resources; and • have coordinated dialogue with policymakers.

Planned SELINA Resources

D6.6 Best use of methods and data for evidence-based decision-making
D9.3 Report on ES evidence generation and uptake within the DPs
D9.4 Scalable ES solutions to enhance private sector decision-making

Annex F: Natural Capital Assessment Needs of the Private Sector

In the Align project webinars, attendees (largely from the corporate and consultancy sector) were asked the question: Which are the main challenges you see in the application of natural capital approaches? Overall, the challenges differ depending on the level of maturity of the business. The following is a summary of answers:

- Skills gap in staff or consultants capable of undertaking a natural capital assessment.
- Keeping up with the changing standards/guidance landscape of biodiversity related reporting standards, such as TNFD, SBTN, ESRS
- Complexity of the science of biodiversity and the language around it including related concepts such as ecosystem services, natural capital, and nature-based solutions.
- The level of awareness of the topic of biodiversity and its materiality in the private sector is limited.
- Motivating top management to take up valuation approaches due to the costs and perceived complexity – institutional inertia.
- Not necessarily tied to markets, i.e. if everyone adopts NCA then there is no competitive advantage. You create a premium product that costs farmers, but then market is flooded and returns go down but costs still sit with farmer.
- Awareness of consumers is limited: hard to get consumers to pay for biodiversity.
- Lack of urgency around biodiversity loss compared to that associated with carbon and climate change.
- Companies tend to focus on single issues like climate, energy and water rather than a holistic ecosystem approach.
- Competing assessment frameworks – LCA, I-O approaches, impact pathway approaches.
- Quantifying the baseline – what to choose, no pristine state to reference.
- Lack of data; for example the lack of data at farm level on how much fertiliser is used.
- Need proper biodiversity indicators that are linked to ES flow.
- Uncertainty about metrics: Lack of metrics in International Finance Corporation (IFC) Performance Standards 6; risk of oversimplification of metrics; risk that metrics, especially global ones, are not ground-truthed with local data; too many metrics that appear to be competing.
- Lack of benchmarks or reference values for state and setting of boundaries.
- Difficult to assess cultural service impact.
- Economic valuation is difficult. Approaches to natural capital accounting can be resource and time expensive which rests mainly with the business who already have small margins.
- There are different valuation approaches, e.g. replacement cost, damage cost, market value. Need to know what the value obtained by each means.
- Lack of standardization - wide variability in application of biodiversity measurement and natural capital accounting across a sector.
- Data availability differs depending on geography so it can be difficult to achieve consistent levels of analysis across a business' global activities.
- The understanding of goals like 'net gain' is limited in the private sector.
- Measuring progress towards targets is challenging