



CAPITALS  
COALITION

# TEEB for agriculture and food: operational guidelines for business

Putting nature and people at the  
centre of food system transformation



Funded by  
the European Union



August 2023



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# Foreword



**Transforming our food system is one of the most urgent challenges we face in the 21st century. Providing food security for a growing population and restoring the natural systems that food production depends upon, while ensuring social equity, requires a systems-based approach.**

Developed to support businesses in implementing the TEEBAgriFood Evaluation Framework, these Guidelines provide a practical way for businesses to understand and act upon their impact and dependency on natural, human, social, and produced capital in the context of the agri-food sector.

The Guidelines reference and build on the internationally accepted harmonized business frameworks for identifying, measuring, and valuing organizational relationships with nature and people: the Natural and Social & Human Capital Protocols (hereafter the Protocols). The Protocols provide important additional support and context when applying these Guidelines.

Thanks to generous funding from the European Commission, the Guidelines have been piloted in seven countries with different agricultural approaches and traditions (Brazil, China, India, Indonesia, Malaysia, Mexico, and Thailand). Through strong in-country collaborations, businesses have applied, challenged, and built upon these Guidelines over the past three years. The feedback of those who engaged in the Steering Committee, roundtables, and training sessions has been invaluable and has greatly contributed to the development of this final version of the Guidelines. These Guidelines go beyond existing guidance for business by considering the interdependencies between nature and people in the food value chain. This is an important next step towards mainstreaming all of the capitals into decision making and will inform work in value chains in other sectors and geographies.

The efforts made by businesses to apply these Guidelines as part of the TEEBAgriFood for Business Work Package are being integrated through a broader systems-based project run by the United Nations Environment Program (UNEP) which aims to connect all relevant actors to strengthen efforts towards food system transformation.

I would like to thank everyone who has been involved in inspiring, evolving, and developing this work. This is a significant stepping stone and strong foundation towards a sustainable and just future where integration of all forms of capital is embedded into the way that we make decisions.

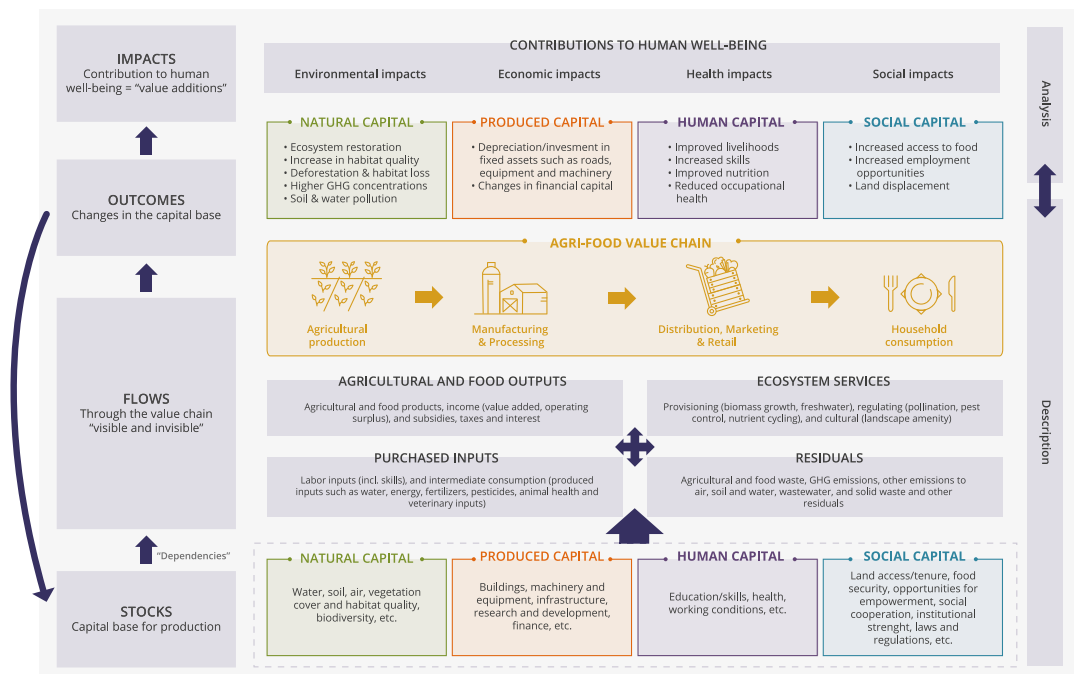
**Mark Gough, CEO, Capitals Coalition**

# Orientation

## Introducing the TEEBAgriFood Evaluation Framework and the Capitals Protocols and how they come together in these Operational Guidelines for Business

**The Economics of Ecosystems and Biodiversity (TEEB)** is a global initiative focused on “making nature’s values visible.” Its principal objective is to mainstream the values of biodiversity and ecosystem services into decision making at all levels. TEEB aims to achieve this goal by following a structured approach to valuation that helps decision makers recognize the wide range of benefits provided by ecosystems and biodiversity, demonstrate their values in economic terms and, where appropriate, capture those values in decision making.

In 2018, TEEB published a seminal document (TEEB for Agriculture and Food (TEEBAgriFood)) addressing the challenges within the food system and recognizing the importance of a systems approach through evaluating interactions within and changes to different “capitals”— natural, human, social, and produced (defined in action 1.2.1). The TEEBAgriFood Evaluation Framework is an overarching framework for policy, business, farming, and civil society. It provides key definitions, measurement concepts, and boundaries to describe and understand the complexity of the food system in its entirety. Figure 0.1 shows the progression and iteration of the TEEB AgriFood Evaluation Framework moving through stocks, to flows, to outcomes, to impacts upon human well-being.



**Figure 0.1** Elements of the TEEB AgriFood Evaluation Framework reprinted from The Economics of Ecosystems and Biodiversity for Agriculture and Food (2018)



## TEEBAgriFood for Business

Since early 2020, the Capitals Coalition has been leading the work program on business engagement within the larger TEEBAgriFood project that is being led by UNEP TEEB. As part of this work program, the Capitals Coalition developed the TEEBAgriFood Operational Guidelines for Business for use by private sector actors working in the agri-food sector, to provide details on carrying out a capitals assessment. The Guidelines also focus on including aspects of human and social capital\* alongside natural capital to contribute to developing a multi-capital lens.

### The Guidelines:

- ◆ Provide context on why capitals are relevant to any business in the food system and how businesses benefit from capitals.
- ◆ Develop the business case for considering multiple capitals in the food sector.
- ◆ Identify impacts and dependencies on different capitals relevant to businesses across the value chain of the food sector.
- ◆ Provide practical examples to demonstrate sector-specific business applications.
- ◆ Reveal information about the capitals a business relies upon and impacts upon. This information serves to supplement decision-making processes, rather than replace them.

### Intended Audience

The Guidelines are specifically written for businesses in the food sector but can also be used by businesses in other sectors. They follow a structured approach to application and are designed to be accessible and user-friendly.

The TEEBAgriFood Evaluation Framework and the TEEBAgriFood Operational Guidelines for Business can be considered as guidance to support True Cost Accounting (TCA).

### Structure

The Guidelines build upon and follow the structure of the Natural Capital\* and Social & Human Capital Protocols\* following the same four stages of a standard decision-making process, “Why,” “What,” “How,” and “What Next.” The Stages are broken down into nine Steps, which contain specific questions to be answered when carrying out a capitals assessment as shown in Figure 0.2.

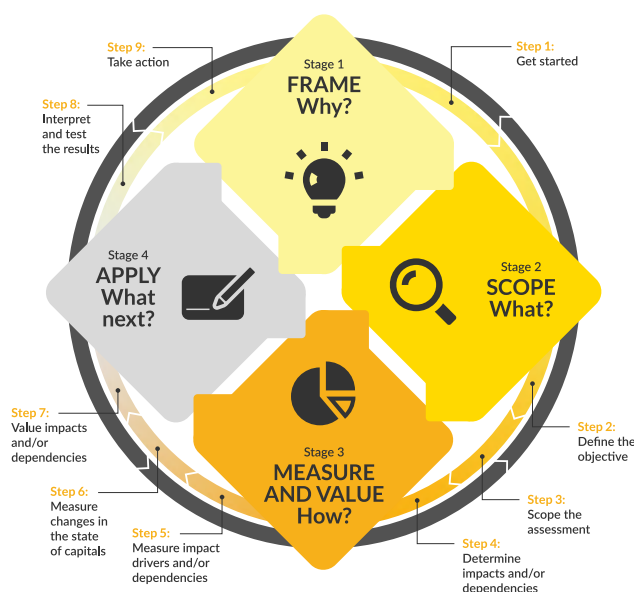


Figure 0.2 The framework of the TEEBAgriFood Operational Guidelines

\*To read the full glossary definition click on the word

[Social capital](#), [Natural Capital Protocol](#), [Social & Human Capital Protocol](#)

The Stages and Steps are iterative, and you should expect to revisit previous Steps as necessary for your decision-making processes. For example, after prioritizing your impacts and dependencies in Step 4, you may need to go back and change the objective or scope of your assessment in Steps 2 and 3. Similarly, once you have identified the value of your impacts and dependencies you may wish to rethink your prioritization\* process.

Each Step follows the same structure. Steps begin with an overarching question to be addressed and a brief introduction, followed by a detailed description of the actions required to complete the Step, together with guidance on how to proceed, and a template for outputs. Useful definitions of key terms are provided when they are first introduced.

You should complete all four Stages and nine Steps when carrying out an assessment.

To support you in applying a capitals approach, you can find a User Template on the Coalition's [webpage](#) that will help you to complete all Steps and actions of these Guidelines to conduct your own assessment.

### Principles

Principles of ethics protect, maintain, and where possible enhance people's rights, skills, experience, knowledge, and health as well as societies' shared values. Recognition of logical thresholds and limits should be included as a fundamental principle of any capitals assessment. In addition, these Guidelines are underpinned by four principles to make sure results are credible and fit for purpose.

**Relevance:** Ensure the consideration of the most relevant issues throughout your capitals assessment, including the impacts and/or dependencies that are most material for your business and stakeholders. This will help you identify the most important relationships between your business's activities and capital impacts and/or dependencies.

**Rigor\*:** Use fit-for-purpose, technically robust\* information, data, and methods. This will ensure the data your analysis produces is as reliable as possible for the context in which it was produced.

**Replicability:** Ensure that all your assumptions, data, caveats, and methods are transparent, traceable, fully documented, and repeatable. This facilitates the iterative development and application of your approach and implementation across your business and may allow for verification or audit if required.

**Consistency:** Ensure the data and methods you use for each assessment are compatible with each other and with the scope of the analysis. This will support you as you scale and integrate measurement and valuation across your business.

**Responsibility:** Integrated capitals assessments\* require decisions to be made that can influence who is impacted and who isn't impacted by an assessment. Throughout the assessment process you will be presented with complex information and required to make active decisions that require ethical judgements and trade-offs. The reality is that certain stakeholders, issues, or locations may benefit from your assessment, whereas others may not, and it is rarely feasible for organisations to consider and address absolutely everything. It is therefore essential that decisions are made from a position of strong ethical and moral judgement. Ethics should guide users to make decisions that they believe are morally correct and lead to positive outcomes. There are numerous ethical frameworks that can be explored and may help to inform our process, such as utilitarianism, consequentialism, the rights approach, or the common good approach. Guidance is provided in [Box 5.1](#) on how to tackle some of the most common ethical issues encountered during capital assessments.

Although it is recommended that the principle of **Consistency** be adhered to throughout your assessment, the Protocols do not propose that outputs be consistent and comparable between companies as outputs are context specific.

\*To read the full glossary definition click on the word

[Prioritization](#), [Rigor](#), [Robust](#), [Integrated capitals assessment](#)





## Definition of the food sector and its value chain

These Guidelines define the agri-food sector (hereafter the food sector) as the complete range of activities required to deliver a product through the different phases of production to end consumers (Figure 0.3).

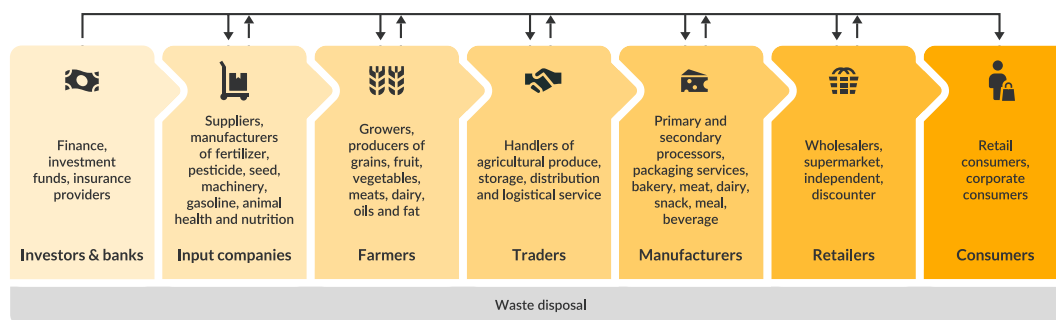


Figure 0.3 The food value chain

Farmers are very much at the heart of food system transformation. The traders stage of the value chain includes all intermediary stages not covered elsewhere, such as sourcing, logistics, and trading. Recycling, reuse, and other end-of-life options are considered within every stage of the value chain and can be a critical mechanism for reducing impacts and dependencies.

The hospitality/food service sector and non-food purpose sector (i.e., energy and beauty) are both beyond the scope of these Guidelines and not included here. Although fisheries were not included in TEEBAgriFood and are not the focus of these Guidelines, the Guidelines can be used to support fisheries-based assessments.

Finally, it is worth noting that supply chains vary in length and complexity, with long international and global supply chains existing beside short, local, or national ones. There is a high degree of variability in vertical integration for industry participants with some companies operating farms, processing facilities, and storage and distribution networks all the way through to the consumer.

## High-level Business Actions on Nature

The high-level business actions on nature were developed in a collaboration by leading organizations including Capitals Coalition, Business for Nature, WBCSD, TNFD, Science Based Targets Network, WEF and WWF. The actions guide businesses through the various tools, frameworks and initiatives available in the market to support them in assessing their relationships with nature, committing to action and target setting, transforming their practices and disclosing nature-related information.

Although initially developed for nature, the steps within the high-level actions are also relevant for businesses wanting to take meaningful action to assess and disclose impacts and dependencies on social and human capital\*. However, currently there are no specific tools or frameworks defined under each step for social and human capital.

The first step of the high-level business actions is to Assess. Companies should measure, value, and prioritize their impacts and dependencies on the capitals to ensure they are acting on the most material ones. Next, businesses should Commit through setting transparent, time-bound, specific, science-based targets. The third step is to Transform. Businesses can contribute to systems transformation through avoiding and reducing negative impacts, shifting business models, and advocating for policy ambition. Finally, companies should Disclose by tracking performance and publicly reporting throughout their journey. The actions Assess, Commit, Transform, and Disclose together comprise the steps of the high-level business actions on nature. These will be explained in more detail in Stage 4.

\*To read the full glossary definition click on the word

[Human capital](#)



### Capitals journey

Throughout the piloting of these Guidelines and Coalition Protocols, it became apparent that users have different knowledge levels and understanding of how to apply a capitals approach. There are five maturity stages (based on WBCSD Roadmaps to Nature Positive): knowledge seeking, starting, developing, advancing, and leading. Since all users will be at different stages, these Guidelines can support you at any stage of the journey, and through iteration you can continue to advance along the path.

### Ongoing refinement of the Guidelines

These Guidelines were first published in draft format in August 2020. Since then, they have been piloted and tested and have been under review by a Steering Committee. Throughout this period, work within the capitals space has continued to progress.

To achieve better insights and make risks and opportunities more visible, businesses must grow their understanding of their relationships across all capitals. The journey towards full integration of the capitals will need practical iteration and consultation before it can form the basis of a publication; to this end the Capitals Coalition is working on developing an integrated capitals approach. Any organization that applies these Guidelines with a mind to how natural, human, social, and produced capitals interact, is already achieving the early levels of integration and should be applauded for that.

### Business case studies

As part of the process of refining the Guidelines, they have been used to shape training sessions convened throughout the course of the project. These sessions supported private sector actors to develop case studies that follow the structure of the Guidelines. Several of these case studies are included in this document to showcase how the Guidelines can be applied in practice.

Summaries of these applications are featured in boxes found throughout the Steps to show how actual businesses have applied the Guidelines to their business context. The summaries of the cases in the Guidelines have been adapted to support the understanding of the theory explained in the related Steps. The full summaries of the case studies can be found [here](#).





# Stage 1: Frame

## Why?

### What is the Frame Stage?

The Frame Stage helps you to frame why you would undertake a capitals assessment

| Step                    | Question that this Step will answer           | Actions  |
|-------------------------|---|--|
| <b>1</b><br>Get started | Why should you conduct a capitals assessment? | 1.2.1 Familiarize yourself with the basic concepts of capitals |
|                         |   | 1.2.2 Apply the concept of capitals to your business context   |
|                         |   | 1.2.3 Prepare for your assessment                              |

### Additional notes

This Stage helps you to understand foundational concepts and terms and how to relate them to your particular business and circumstances.



# 1 Get started

## 1.1 Introduction

Completing Step 1 of the Guidelines will help you answer the following question:

Why should you conduct a capitals assessment?

Step 1 will help you identify which natural, human, social, and produced capital\* impacts and/or dependencies are relevant to your business. This Step also describes the risks and opportunities that a capitals assessment can help address, and some potential uses of assessment results. These are important inputs for more detailed scoping in Steps 2–4 and can help to build support for undertaking a capitals assessment in your company.

Note: Even if you already have a good understanding of how your business impacts and depends on capitals, we recommend that you read this Step as it introduces new terms and concepts related to how capitals can be integrated.

## 1.2 Actions

This Step will help you undertake the following actions:

1.2.1 Familiarize yourself with basic concepts of capitals

1.2.2 Apply the concept of capitals to your business context

1.2.3 Prepare for your capitals assessment

### 1.2.1 Familiarize yourself with the basic concepts of the capitals approach

This action introduces the basic concepts and definitions that you will need to advance through the Steps of these Guidelines.

#### a. The foundational concepts of natural, human, social, and produced capitals, capital stocks, and flows

A capital is the stock\* of an asset\* that combines to yield a flow of benefits or “services” to people, now and into the future (Figure 1.1). When invested in and managed responsibly, the asset creates value. If we “draw down” on the capital stock itself, we erode its ability to provide value to people and the economy, and if we degrade it too much, it can stop providing value all together.

One way to differentiate types of productive sources is to refer to them as natural, human, social, and produced capital (Box 1.1 and Figure 1.2). These four capitals represent the three pillars of sustainability – environmental (natural), social (human and social) and economic (produced).

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\*To read the full glossary definition click on the word

[Produced capital](#), [Asset](#), [Stock](#)





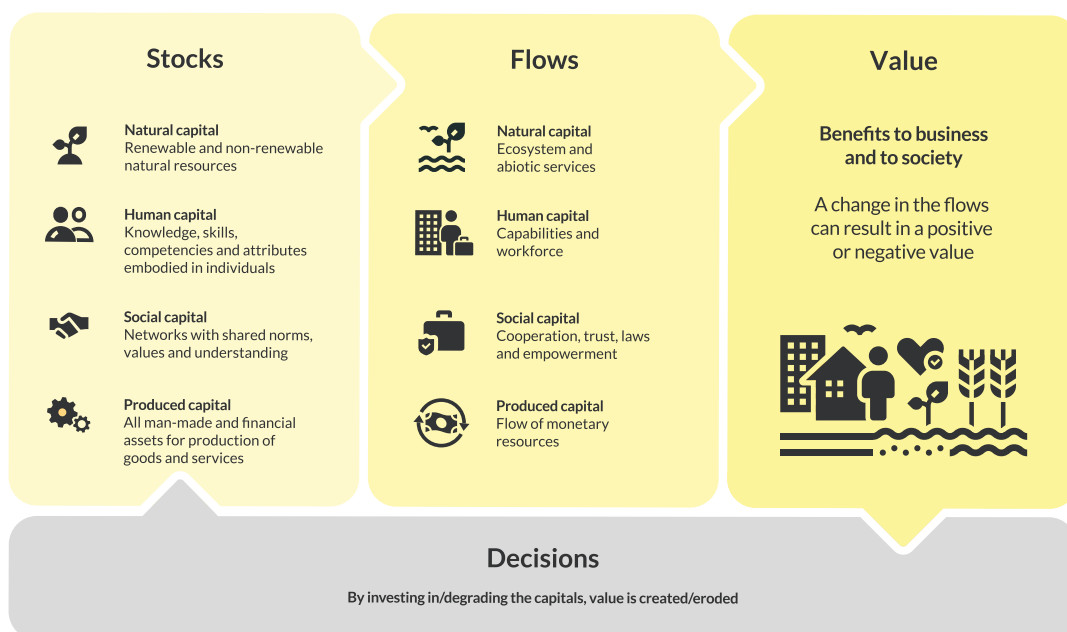


Figure 1.1 Capital stocks, flows, and values

#### Box 1.1: The four capitals

##### Natural Capital

The stock of renewable and non-renewable natural resources (e.g., plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people (adapted from Atkinson and Pearce 1995; Jansson et al. 1994)

##### Human Capital

An individual's knowledge, skills, competencies and attributes (Social & Human Capital Protocol 2019)

##### Social Capital

Networks and their shared norms, values, and understanding (Social & Human Capital Protocol 2019)

##### Produced Capital

Human-made goods as well as all financial assets that are used to produce goods and services consumed by society.

You may wish to subdivide produced capital into financial, manufactured, and intellectual. The capitals approach considers how produced capitals provide benefits to private owners or society more widely. Private assets might include company buildings, machinery, and software, whereas public assets might include roads, bridges, and docks that the company interacts with.

Private produced capital is included to some extent within conventional accounts, and public produced capital is included to some extent within national government accounts, although the interdependencies and interactions between them are often lost. Private value can be excluded by a business, typically providing a financial return. Public value cannot be excluded and provides value to the wider public. These values are therefore harder to capture as they cannot be traded in conventional markets.

Of particular relevance to agri-food are agricultural subsidies, a public subsidy for the production of food for food security purposes. To many businesses, subsidies are a key produced capital dependency to allow access to food in spite of the cost of production.

\*To read the full glossary definition click on the word

[Ecosystem](#)





Figure 1.2 Interconnection of capitals

### b. Impacts and dependencies

Every business depends on and impacts capitals.

Impacts are positive or negative contributions to one or more dimensions of well-being resulting from changes in the capitals. These could be capitals that your business depends directly upon or capitals that society more widely depends upon. Understanding the value of impacts, as well as where, to whom, and how these impacts are manifested, can help a business understand them better, change business decisions, mitigate the impacts, and/or where appropriate compensate for them as best as possible.

Dependencies are business reliance on or use of the capitals. You may or may not have influence over those capitals. All businesses depend to a lesser or greater extent upon natural, human, social, and produced capital to operate, directly or indirectly, through their value-chain or relationships. Businesses cannot succeed without natural capital such as land, raw materials, ecosystem services\*, energy; human capital such as workforce, knowledge, skills; social capital and structures; and produced capital such as equipment and financial resources.

### c. Interactions between business and the financial industry with the capitals

These impacts and/or dependencies create costs and benefits for business and society, generating risks but also creating opportunities through different transmission channels\*. Transmission channels are the complex interplay of nature-related dependencies and impacts over multiple time periods that can result in earning and cashflow vulnerability. This can transmit into a broader range of financial risks, including market, credit and liquidity risks (TNFD, 2023).

Capital impacts and dependencies can directly affect business performance; they may also generate positive or negative effects on particular stakeholders or on society as a whole. Stakeholder\* and societal responses to these effects can create additional risks and opportunities.

\*To read the full glossary definition click on the word

[Transmission channels](#), [Stakeholder](#), [Ecosystem services](#)



As all capitals are interconnected, any impact or dependency on one capital can cause changes in the other capitals. For example, deforestation by a business can reduce the quantity of natural capital, which can affect the human and social capital of indigenous peoples and local communities who rely on the forest for their livelihoods, and also cause further natural capital impacts like reduction in air quality, water filtration, and flood protection.

The capitals approach is about revealing these consequences and understanding the costs or benefits to both business and society. Business management and societal responses (which forms social capital) to these effects can create additional risks and opportunities for business through transmission channels, as well as for the financial sector as these are transferred through their services to business. To help set the context for your assessment, the interactions between natural, human, social, and produced capitals, business, and society are depicted in Figure 1.3. This also illustrates the approach used in these Guidelines to measure and value impacts and dependencies on the different capitals, in terms of risks and opportunities for the business and finance sectors.

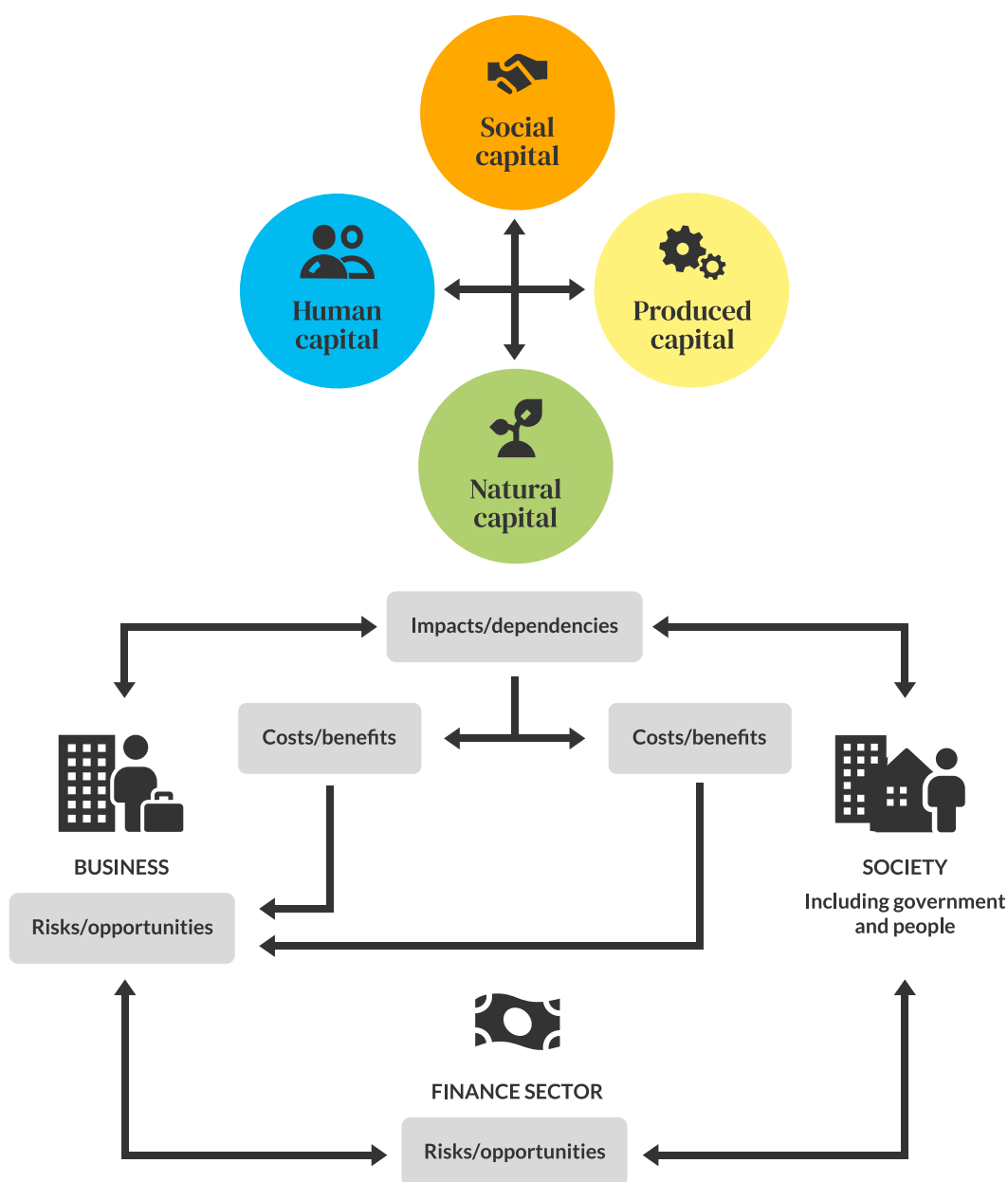


Figure 1.3 Capitals impacts and dependencies: conceptual model for business



#### d. Which capital(s) to assess

When planning a capitals assessment you will have to consider which capitals you will take into account. If this is your first assessment, you might start by considering your impact and dependencies on just one capital in relation to your business operations. This is called a “single capital assessment.” These Guidelines are written so you can easily navigate all Stages and Steps of the Guidelines with a single capital in mind. However, we recommend making a note of other capitals if and when they present potentially significant connections with the single-capital impacts you are assessing; this might help focus multi-capital assessments in the future.

If you are already at the point of wanting to consider multiple capitals simultaneously, these Guidelines have been written to allow that inclusion. You will find guidance on natural, social, and human capital throughout, with produced capital information where it is most relevant. These Guidelines support a partial level of integration, including basic systems-thinking concepts and techniques, while the upcoming “Capitals Protocol” will eventually offer deeper guidance on fully integrated assessments.

If you are struggling to decide which capital(s) to focus on, remember that in agricultural contexts the need for a suitable, sustainable natural environment is paramount. Trading off the long-term potential of natural capital will be detrimental to current and future generations and will inherently impact social, human, and produced capital into the future. For this reason, these Guidelines prioritize natural capital as the first capital to assess, but you are welcome to interpret this framework for whichever capital is highest priority for your business.





## Business Case 1.1

# Banorte, Mexico

## Agricultural risks and opportunities for the financial sector

### FRAME

Banorte, the second largest financial group in Mexico, offers a wide variety of products and services to the agricultural sector while focusing on increasing its financing of sustainable activities. Since 2012, the bank has managed the social and environmental risks of its financing portfolio. To strengthen their decision making, they are exploring methodologies that allow them to quantify the financial implications of risks and opportunities and costs and benefits in the value chains they provide services to.

### SCOPE

Banorte applied a capitals assessment to quantify risks derived from exposure to natural, human, social, and produced capital risks in their financial portfolio for avocado cultivation. By doing so, the bank aimed to identify and quantify the financial risks to which the sector is exposed, derived from the most relevant impacts it generates on the capitals. Therefore, Banorte assessed the impacts and dependencies significant for avocado cultivation.

### MEASURE & VALUE

Banorte measured and valued the impacts on soil quality, agrochemical usage, and land use (natural capital) as well as worker's health and safety (human capital).

### APPLY

Applying a capitals assessment\* made it possible for Banorte to observe the potential of the bank's agricultural portfolio to offer financial products and services that support best sustainability practices. Best agricultural practices informed by the assessment are being integrated into the bank's social and environmental risk management system for disbursing loans and credits, including counselling, annual reviews, and monitoring processes.

For more details and updates, please click [here](#).



### e. Systemic interactions between capitals

Whilst the four categories of capital help to explain value creation, the reality is that these types of capital do not exist in isolation. Changes to some asset capital types may ultimately lead to changes in other types of capital – for example, recreational opportunities may improve local produced assets such as housing stock or the human capital (health) of those that access it. This in turn may have further consequences for employment opportunities, etc.

Impacts created by one impact driver\* should be seen in a wider context of compounding impacts elsewhere. For example, a business that relies on local water supplies will have an impact on its own supply through abstraction. When this is combined with external pressures from other businesses, climate change affecting rainfall patterns, and increasing local populations, the entire system is significantly at risk.

Many public and private benefits that are enjoyed by businesses are formed as a result of multiple capitals working together. For example, safety is created by businesses having access to safe equipment (produced capital), having the knowledge of safe practice (human capital), societal norms around safe practice (social capital), all whilst operating in a habitable environment (natural capital).

Decision making has typically prioritized produced capital – and in particular financial capital - with little to no emphasis on the other capitals and the benefits they provide. When these interconnected components are misunderstood, overlooked, or addressed in isolation, the business can become exposed to risks and blind to opportunities over the short and long term. Many benefits are emergent only from the system level. Business, and society as a whole, is reliant not only on the capitals but on how they interact with each other. The obvious example is the phrase “there is no business on a dead planet,” but equally businesses cannot exist without the human resources that drive them or the socio-political space that social capital provides.

Understanding how all of the capitals, impacts, dependencies, and benefits provided interact as part of a wider system is essential for good business decision making.

#### 1.2.2 Apply these concepts to your business context

This action builds on the concepts of multiple capitals and shows how they relate to the way your business operates (i.e., your business model, supply chain, operations, etc.). This action aims to ensure that your capitals assessment considers all potential impacts and/or dependencies that may be significant to your business and its stakeholders (covered further in Step 4).

##### a. Describe your context

When framing your capitals journey, start by completing a preliminary identification of your main activities and describe your business model and context. This will help to frame how your business operates currently and will allow you to fundamentally assess how a capitals approach will help you achieve your expected outcomes. Describing the location, surroundings, stakeholders, and other factors affecting your activities will help you gain an overall picture of the context of the landscape, both literal and figurative, in which your assessment will be carried out.

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\*To read the full glossary definition click on the word

[Capitals assessment](#), [Impact driver](#)





## Business Case 1.2

# Astral ESG Investment, China

**Natural capital accounting to preserve bio- and cultural diversity and foster an ecological economy**

### FRAME

Astral ESG is an investment company active in agri-food systems. They work directly with local farmers and indigenous communities, buying food from them. The company is based in Yunnan, China's most biodiverse, and most ethnically diverse, province. Working in this unique landscape context motivated ASTRAL to identify where their activities create impacts or rely on specific dependencies, such as biodiversity preservation and cultural diversity.

### SCOPE

The objective of their assessment is to develop natural capital accounts to reflect the Chinese public system of "Gross Ecosystem Product" value in their industry. In other words, ASTRAL aims to show the value generated from what they call "the new ecological economy," an economy that accounts for natural capital.

### MEASURE & VALUE

The company is assessing water, carbon, germplasm, biogenetic resources and associated intellectual property rights, soil fertility, and remediation, among other areas.

### APPLY

The time horizon to complete the assessment is 2030. Mid-term, Astral is already committing to creating a positive cycle of low-carbon agriculture. Based on the assessment results, they aim to support the formulation of biodiversity standards in the agri-food sector. They wish to inspire other businesses to improve their relationship with nature and people.

For more details and updates, please click [here](#).



## b. Dependencies that are relevant to your business

All businesses depend on the capitals and the associated flows of benefits, directly and indirectly (see Figure 1.4). For example, businesses in the food sector depend on produced capital, such as machinery or fertilizers, and also on the supply of provisioning ecosystem services, such as food, water, and fiber. These provisioning services (or “goods”) are also important raw materials for many manufacturing and processing operations.

Regulating services such as natural pollination and pest control are critical in agriculture. Regulating services are often overlooked because their impacts are not direct, but the condition and functionality of these regulating services are vital for producing the final services we all depend upon. In particular, biodiversity does not always create direct results but is vital for the ongoing functionality of nature. Businesses in the food sector also depend on stocks of human capital within their workforce such as expertise and knowledge. Similarly, businesses depend on social capital through the existence of networks, trust, land access, and tenure security.

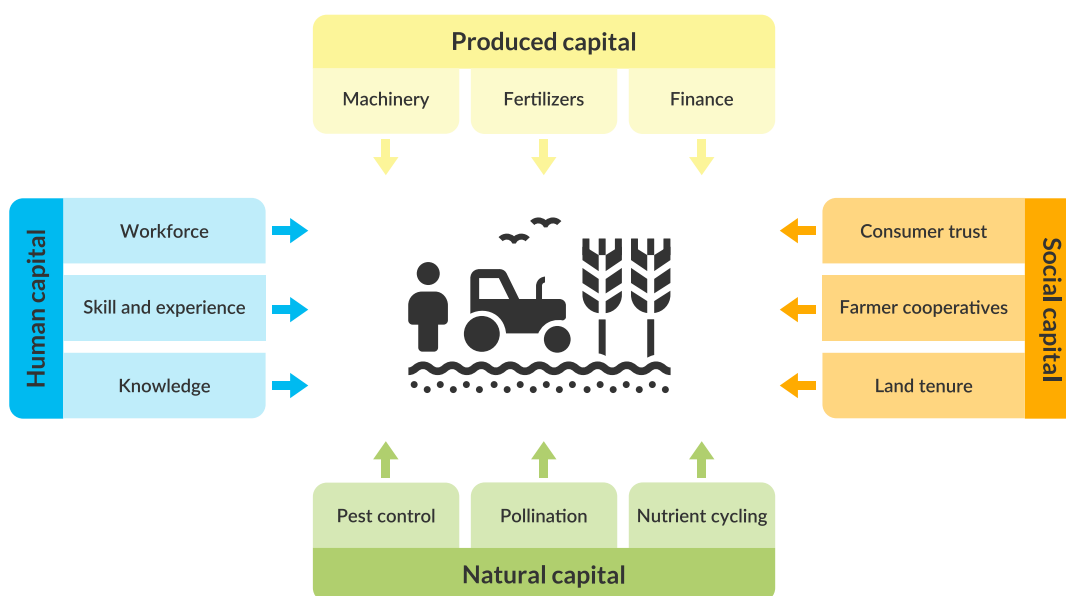


Figure 1.4 Examples of food business dependencies on capitals

Dependence on the capitals will vary according to the role of a business in the value chain, and the geographic location of its operations.

For instance, most actors in the food system recognize that water is an essential input to all primary production systems. However, the geographic location of a farm will determine if water is a limiting factor. In drier climates water can be a significant issue and the use of water in the dry season can be particularly problematic. If the business decision is to import water from other basins, this will subsequently cause financial consequences (e.g., high prices), social consequences (e.g., tensions between regions), or natural consequences (e.g., salinization and aridification of the donor region).

## c. Impacts that are relevant to your business

Impacts on capitals can arise directly from business operations or indirectly from the use of products and services. Impacts may occur at any point in the value chain and will vary depending on the stage of the supply chain and the geographic location of operations.

Impacts on capitals may be negative, for example land degradation or overexploitation of water resources, or forcing an employee to work long hours increasing stress and fatigue and thus the chances of injury or fatality when managing heavy machinery or dangerous equipment. Impacts can also be positive such as changing the planting regime resulting in higher soil water content, less soil erosion, and greater farm productivity, or introducing a living wage for employees, which leads to increased health for the employee and their family and increased productivity for the business.

Figure 1.5 provides examples of how business can impact different capitals.

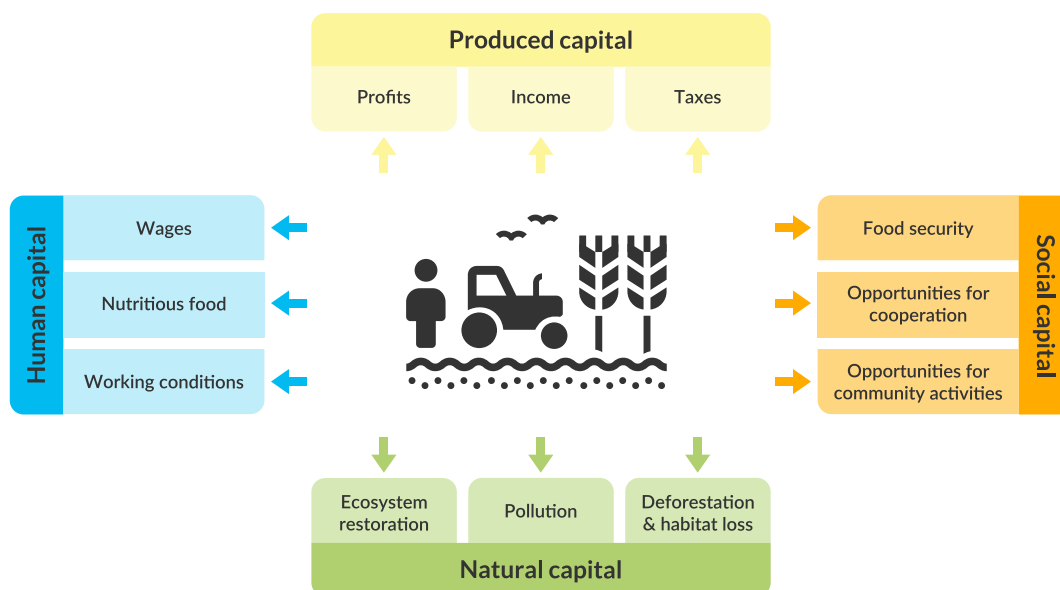


Figure 1.5 Examples of food business impacts on capitals

Impacts on one capital often result in indirect impacts on other capitals. For example, you can decide to restore an ecosystem with the aim of reducing flood risk and this may also result in the improvement of pollination services. This activity then leads to improvements in the health of people (e.g., due to additional air filtration), reduction of inputs (e.g., fertilizer), and improvement of social cohesion (e.g., through improved access to restored areas for recreational activities). The same is true for any capital; for example, providing a training program on sustainable agricultural practices may improve incomes and provide opportunity for professional advancement. It will also enhance the potential for social networking among local farmers and this can lead to a reduction of eutrophication of local rivers, through greater acknowledgement of shared assets.

Therefore, when conducting a capitals assessment, you should consider how your activities impact all other capitals, either directly or indirectly. If you have previously carried out a capitals assessment it is likely that you have identified, measured, and valued the impacts and dependencies of one capital. If this is your first capitals assessment, you need to identify: (i) your direct impacts and dependencies on the four capitals, and (ii) the indirect impacts and dependencies of your actions on the rest of the capitals.

Figures 1.6–1.8 provide practical examples of interactions between capitals.

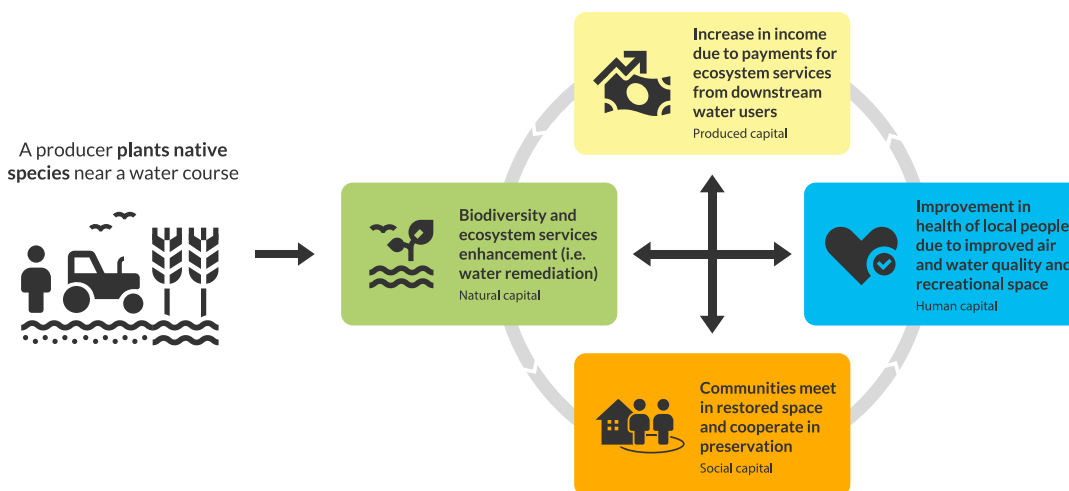


Figure 1.6 Example of interactions between capitals: ecosystem restoration activities





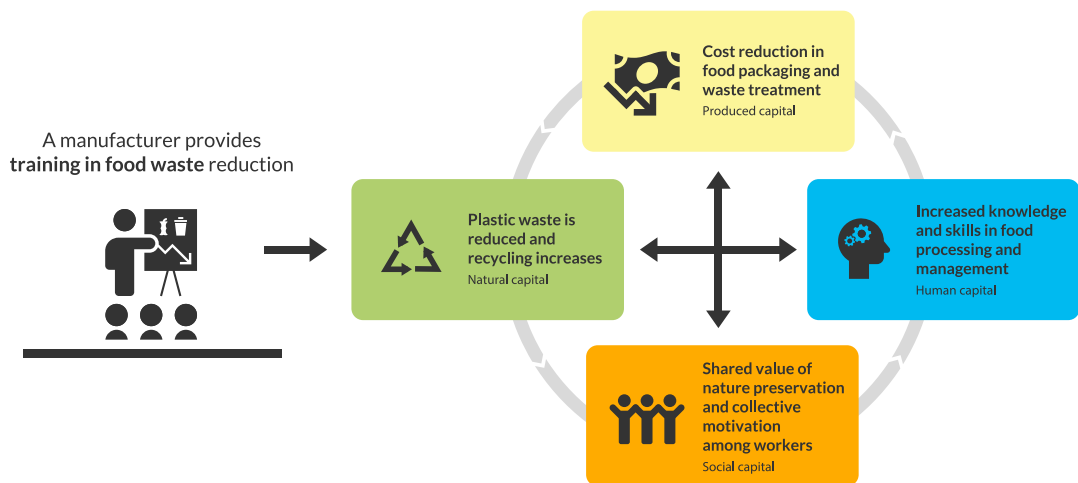


Figure 1.7 Example of interactions between capitals: training activities

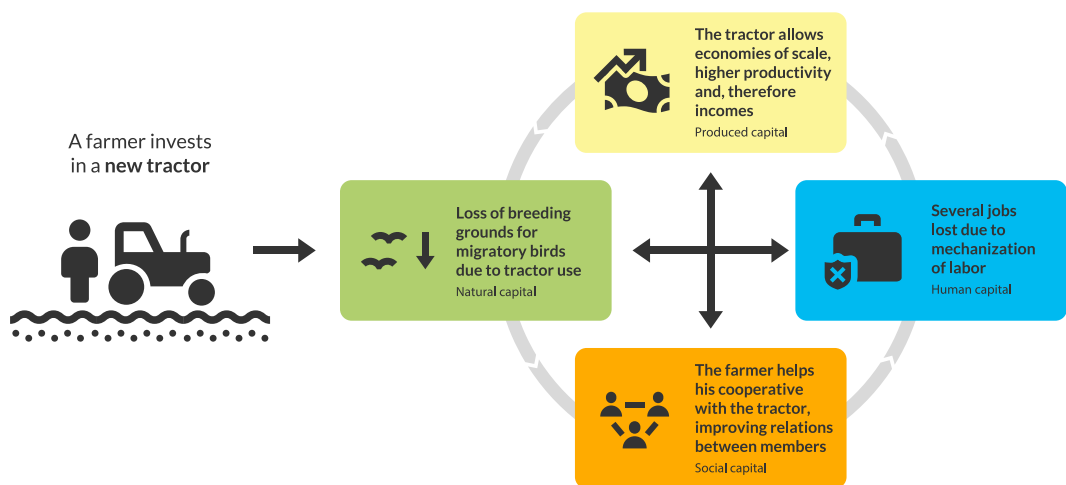


Figure 1.8 Example of interactions between capitals: investment in equipment

Business impacts and dependencies on capitals are interconnected. For example, a company that depends on water will also create impacts from their use of water. Similarly, a company that has a dependency on the knowledge of its workforce can also have an impact in increasing staff knowledge by conducting training sessions.

#### d. Risks and/or opportunities that are potentially relevant to your business

The business case for undertaking a capitals assessment is based on identifying the risks and opportunities that arise from impacts and/or dependencies on different capitals that might be invisible, overlooked, misunderstood, or undervalued. Once you have identified these and can start to measure and ultimately value them, you can consider how best to integrate them into your business decisions.

Risks and opportunities related to natural, human, social, and produced capitals can arise in many forms: operational, legal and regulatory, reputational and marketing, financial, and societal. Table 1.1 presents examples of capital-related risks and opportunities and will help you to consider which might be most relevant to your business. This information will help you to develop a business case for undertaking a capitals assessment.



Table 1.1 Examples of capital risks and opportunities

|   | Natural capital  | Human capital   | Social capital   | Produced capital  |
|---|--|---|--|---|
| <b>Operational: Regular business activities, expenditures, and processes</b>  |  |   |  |   |
| <b>Risk</b>   | Increased cost of raw material leads to deterioration of supply chain  | Increased illness and absence in workforce due to poor healthcare checks  | Loss of social license to operate due to poor relationship with local community  | Increased number of injuries resulting from irregular maintenance of machinery  |
| <b>Opportunity</b>  | Higher yields resulting from responsibly managed lands   | Increased efficiency of more competent and higher skilled workforce   | Strengthen value chain through networking and collaboration  | Lowered costs due to improved efficiency of equipment   |
| <b>Legal and regulatory: Laws, public policies, and regulations that affect business performance</b>  |  |   |  |   |
| <b>Risk</b>   | Increased compliance cost for achieving standards as regulation becomes more stringent   |   |  |   |
| <b>Opportunity</b>  | Reduced fines, penalties, compensation, or legal costs (e.g., by anticipating and avoiding negative impacts)<br>Competitive advantage as business preempts change in legislation |   |  |   |
| <b>Reputational and marketing: Company trust and relationships with direct business stakeholders, such as customers, suppliers, employees</b> |  |   |  |   |
| <b>Risk</b>   | Reduced market share due to reduced demand for product perceived to be linked to unsustainable farming/forestry  | Reduced productivity due to a lack of professional development opportunities leading employees to lose motivation at work | Loss of customer trust as business promotes organic produce but is found to use pesticides at a hidden point in the supply chain | Loss of brand value due to negative media coverage about lack of investment in safety equipment   |
| <b>Opportunity</b>  | Increased sales due to certification recognizing sustainable management practices  | Increased efficiency in processes as employees are given opportunity to rotate across different business units            | Increased quality of produce as producers feel respected, and well remunerated by traders  | Extended license to operate as business adopts advanced technology machinery reducing water consumption, leading to increased resource availability for local community |

Table 1.1 continues on the next page.



|  | Natural capital   | Human capital  | Social capital   | Produced capital  |
|--|---|--|--|---|
| <b>Financial: Costs of and access to capital including debt and equity</b>   |   |  |  |   |
| <b>Risk</b>  | Increased financial costs due to lack of transparency and environmental metrics   | Reduced options for financing due to high content of toxic substances in business's final consumer products    | Increased costs of financing a new production line due to previous cases of corruption in which business had been involved   | Higher interest rates of a loan for the purchase of new equipment due to lack of guarantee that the equipment is well adapted to the local conditions     |
| <b>Opportunity</b>   | Increased funding/ access to green funds, preferential rates based on public payments for public goods resulting from the zero-budget natural farming business strategy | Increased access to funding due to gender equality ratios in management positions                              | Lower interest rate offered by local financial cooperatives due to the business policy on benefit sharing with indigenous people   | Increased interest from investors as business displays full understanding and transparency of supply chain  |
| <b>Societal: Relationships with the wider society (e.g., local communities, NGOs, government agencies, and other stakeholders)</b> |   |  |  |   |
| <b>Risk</b>  | Delay in the supply of inputs due to cuts in roads made by local communities protesting business's pollution of local water resources                                   | Lack of workforce availability due to sharp rise in property prices forcing workers to move to other locations | Rejection of loan applications by local finance cooperatives after expansion of business operations results in restricted access to areas previously used for community gatherings | Increase in expenses to protect company's installations when the use of new equipment results in redundancy of workers, causing unrest of local community |
| <b>Opportunity</b>   | Partial exemption from council taxes as a result of business's restoration of local wetland   | Increased social license to operate as worker gets elected to local council                                    | Reduction in permitting delays through partnering with a local NGO to enhance dialogue with local groups   | Government tax cuts favoring clean and low-emission technology lead to accelerated progress towards emissions targets                                     |

#### e. Your impacts and dependencies exist within a system

Every business exists within a wider system and is reliant on all four capitals to function. Impacts on one capital will lead to outcomes that in turn may affect other capitals through their own impact drivers. For example, polluting waterways will have impacts that affect natural and human capital, however these effects won't stop here. The impact on human health (human capital) will in turn create unintended social and produced capital impacts. Different capitals are required to ensure that value is created. A field of barley requires skills, knowledge, machinery, and infrastructure to harvest, process, and deliver to the end consumer who ultimately will benefit from it.

#### f. Consider where and who you impact

"You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make."  
Jane Goodall



The capitals approach will highlight areas of value that are not normally factored into economic decision making. When these values are left out of decision-making processes, unintended or unrecognized impacts on other forms of capital, especially those that create common or public goods or services, are allowed. This creates a “free rider” effect and can ultimately lead to widespread issues, often referred to as the “tragedy of the commons.”

Impacts have previously been offset in the following ways:

- ◆ **Between capitals:** For example, by increasing produced (financial) capital you are impacting natural and human capitals.
- ◆ **Between stakeholder groups:** Generating positive impacts to larger groups while creating negative impacts to smaller groups, whilst it might maximize benefits available to the population as a whole, is unethical and should be avoided.
- ◆ **Between sites:** It may be that different sites have different impacts on different capitals (e.g., agricultural sites versus factories). Care should be taken to ensure these impacts are not aggregated as this would result in lost detail about the size of impacts in different locations. Offsets may form part of a mitigation process but should not be used to justify avoidable impacts and shouldn't be unclearly aggregated. Losses and gains in particular locations will also impact different stakeholders which should be considered as above.
- ◆ **Within the value chain:** Where a business only forms part of the value chain it may be that impacts are felt elsewhere. If goods are bought from a supplier, the impacts of those goods might be more significant at the production level. As a product is provided to end users, its use or improper disposal may also have an impact (e.g., low-nutrition foods or tobacco products, or single-use products that can lead to pollution if disposed of improperly).

The capitals approach provides an understanding of potential impacts, and of offsets used to mitigate these, for improved decision making.

### 1.2.3 Prepare for your capitals assessment

Preparing for your capitals assessment requires knowing how you will apply the results, securing internal support, and planning the process.

#### a. Identify potential applications of your assessment results

Building on your review of potential business risks and opportunities (described in action 1.2.2.d), next identify the business application—how you intend to use your capitals assessment—to help inform decision making.

Most capitals assessments are designed to inform business strategy, management, or operating decisions. This may involve one-off inputs to project design, or the integration of capitals into standard business processes, such as raw material procurement, option appraisal, or estimating “net positive impact.” Some applications may also be relevant to external audiences, such as revaluation of assets for company valuations, demonstrating net impact to regulators, stakeholder analysis for damage or compensation claims, or public reporting. Eventually, capitals assessments should form part of a business-as-usual approach with results being applied to everyday contexts and being overseen at every level of the company, including in the boardroom.

Table 1.2 presents a list of possible business applications. These are neither mutually exclusive nor exhaustive and may not match the terminology used in your company, but the examples provide an idea of the potential scope of applications. Although there may be more than one relevant business application, try to focus your assessment on the most appropriate one. The business application\* will represent how you intend to use the outcomes of the assessment and your specified objective\* should answer why, the outcome that you are hoping to achieve by applying the capitals approach.

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\*To read the full glossary definition click on the word

Business application, Objective.





Table 1.2 Business applications of a capitals assessment

| Type of business application   | This business application is relevant if you need  |
|--|--|
| Evaluate impacts and dependencies and assess risks and opportunities | To understand key impacts and dependencies, and associated risks and opportunities, to the business and to society, to prioritize management actions |
|  | To identify and evaluate potential investment opportunities  |
| Estimate total/net impact values and commit to targets               | To determine whether something is net zero or net positive (e.g., nature positive, or water positive)  |
|  | To inform the setting of net-zero or net-positive targets and actions  |
|  | To establish an appropriate amount of ecological restoration and compensation  |
| Compare options and transform outcomes                               | To determine the total value of an asset /land holding (e.g., corporate environmental balance sheet)   |
|  | To compare multiple options (e.g., investment options) to optimize between trade-offs* and decide on a preferred option                              |
|  | To evaluate something to help obtain a permit/license to operate   |
|  | To prioritize items from a long list (e.g., high-risk sites/products/activities)   |
| Internal and/or external communication and reporting                 | To facilitate transformation in the way companies and stakeholders operate   |
|  | To generate a range of outputs informing internal and/or external stakeholders of the approach and results of the above applications                 |
|  | To prioritize or contextualize information for non-financial (sustainability) reporting  |
|  | To prioritize, contextualize, and integrate non-financial reporting with financial reporting   |
| Assess impacts on stakeholders                                       | To help inform and/or educate staff internally to transform behaviors and inform strategy  |
|  | To ascertain which stakeholders are affected by changes in natural, human, or social capital due to your business activity, and to what extent       |

### b. Confirm level of integration

With a clear objective in mind, you can next confirm the number of capitals, or the level of integration, that you will need to fulfill it.

Integration refers to assessing the interconnections between and within capitals and is relevant to assessments of any shape or size. Even within a single capital assessment, integration will appear in a partial form; for example, an assessment looking solely at natural capital can still achieve integration by considering the complex, long-term relationships at play within ecosystems.

These Guidelines support both single capital assessments and multi-capital assessments that consider more than one capital. The Guidelines pave the way towards achieving fully integrated assessments, which will be explored further in subsequent Capitals Coalition work. The Natural Capital Protocol and the Social & Human Capital Protocol remain relevant and useful resources for more detailed support on these individual capitals.

\*To read the full glossary definition click on the word

[Trade-offs](#)



Table 1.3 Levels of integration of capital assessments

|                                  | Single capital assessment  | Multi-capital assessment  | Integrated assessment   |
|----------------------------------|--|---|---|
| <b>What is covered?</b>          | An assessment to measure and value impacts and dependencies on a single capital, either natural, social, or human. Even single capital assessments often factor some consideration of produced capital, such as finance, to aid decision making. | An assessment where more than one capital is considered, and findings are presented side by side in one package of information. As with single capitals assessment, some consideration of produced capital is to be expected to facilitate decision making. | An assessment to measure and value all relevant capitals, through applying systems thinking to assess interconnections within and between each capital.   |
| <b>Resourcing considerations</b> | You will need some knowledge about your chosen capital, and access to relevant information within the business.  | You may need more varied expertise and information across your chosen capitals to understand better how they interconnect. If resources are constrained, you may need to balance the number of capitals against the level of detail you can achieve.        | These Guidelines do not yet cover integrated capitals assessments but offer a valuable first step towards that goal. Integrated assessments will be explored further in subsequent Capitals Coalition work. |

### c. Building on previous assessments

If you have previously conducted a single capital assessment, you may have a clearer idea of where results can add most value to your business. You may choose to undertake the same type of application, or indeed the same assessment, but this time taking a multi-capital approach. Similarly, if this is your first assessment and you are only able to complete a single capital assessment\* then you will have built capacity and understanding for future multi- and integrated capitals assessments.

### d. Secure internal support

Engagement at all levels but especially at a senior level in the company is often necessary to build support for a capitals assessment. Involving senior management can provide valuable perspectives on core business concerns and ensure that these are reflected in the design of your assessment.

Input reflecting a range of operational and management functions can likewise help you develop a more rounded business case for conducting the assessment. This will help when interpreting and embedding assessment results into business decisions and processes, as discussed further in the Apply Stage. Internal engagement is critical when defining the business objective and application as it provides integrated thinking and strategy adding real value to your business decisions.

Support from key external stakeholders is also essential and is covered further in action 2.2.2.

### e. Plan your capitals assessment process

Before beginning a capitals assessment, it is important to have an idea of what will be involved at each Stage. Table 1.4. provides a rough indication of the resources that may be needed to carry out each Stage of an assessment.

\*To read the full glossary definition click on the word

[Single capital assessment](#)



**Table 1.4** Indicative resources needed throughout your assessment

Note: Throughout the process open dialogue between departments should be sought. Buy-in from colleagues is essential for positive outcomes from the project.

|                          | Skills   | Internal/external inputs  | Potential duration of work   |
|--------------------------|--|---|--|
| <b>Stage</b>             |  |   |  |
| <b>Frame</b>             | Knowledge of the business  | Mainly internal   | Weeks or months  |
| <b>Scope</b>             | Business strategy and leadership knowledge of the business and of the capitals approach<br>Project management<br>Expertise (e.g., ecologists, economists, health experts) may be needed, particularly for the prioritization in Step 4 | Significant internal input (which may be complex to organize in a large business)<br>Experience and results of similar exercises, particularly for the prioritization in Step 4<br>Knowledge of stakeholders' relationships | Weeks or more likely one or two months, depending on iteration                   |
| <b>Measure and Value</b> | Project management<br>Expertise (e.g., ecologists, anthropologists, economists, social scientists) for measurement, modeling, valuation, and analysis  | Internal knowledge of methods at least sufficient to specify and manage work<br>external work likely needed to conduct and review specialist inputs   | One or more months depending, for example, on extent of data collection          |
| <b>Apply</b>             | Interpretation, requiring expertise from economists and data analysts<br>Business strategy and leadership<br>Communications<br>Knowledge of the business and its current environmental and social management<br>Decision maker buy-in  | Significant internal input<br>Potential for external input from those with experience in similar decision making  | Weeks or more likely one or two months—longer if business processes are adjusted |

Other factors to bear in mind when identifying necessary resources include:

- ◆ A multi-capital assessment\* may involve more iteration than a single capital assessment. As you understand more about the impacts and dependencies on one capital, this could have significant implications for the other capitals and cause you to go back and review the scope and measurement and valuation in an iterative process.
- ◆ You will need to consider the trade-off between investing in skills and institutional knowledge within internal staff and hiring external specialists with significant technical expertise.
- ◆ A wide range of external resources are available for learning, understanding, and applying these concepts. They can be found [www.capitalscoalition.org/capitals-approach/training-resources/](http://www.capitalscoalition.org/capitals-approach/training-resources/)
- ◆ The range of potential resources required to apply economic valuation techniques will vary.



- ◆ Consider in advance how you will communicate results to decision makers and other stakeholders. Think about the implications for timing (e.g., an upcoming board meeting for which assessment results are required) and factor in the typical time necessary to agree on key messages and to finalize reports, articles, or newsletters, whether for an internal or external audience, or both (see action 9.2.2).

### 1.3 Outputs

The outputs of Step 1 are:

- ◆ An understanding of the concept of capitals and of stocks, flows, and values
- ◆ An understanding of the interactions between capitals
- ◆ Identification of your business applications
- ◆ Support for the assessment from key business stakeholders
- ◆ An initial understanding of the resources needed to carry out an integrated capitals assessment

These outputs will establish a solid foundation for later Steps in your assessment.

It is important to document the decisions you have made and the process you have followed for all Steps. This provides a record for validation or verification and supports consistency and improvement in future assessments.

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\*To read the full glossary definition click on the word

[Multi-capital assessment](#)





## Business Case 1.3

# Biovert Protein, Thailand

## Sustainable aquaculture in the Lower Mekong River Basin – A multi-capital assessment

### FRAME

Biovert Protein Co. Ltd. is a Thailand-based startup with the mission to transform linear organic waste into circular economy bio-materials. Focusing on technological innovation in the aquaculture sector, the business uses nature-based solutions to unlock access to nutrients from farm wastewater for upcycling into protein meal. Air bubbles remove organic waste in wastewater and provide clean water for reuse. The nutrients in the removed organic waste are then used to grow black soldier fly larvae to be used as fish feed.

The context in which Biovert Protein is conducting their pilot is in the Mekong Basin region in Thailand, an area that accounts for 25% of global freshwater fish catch. With dam construction in the Upper Mekong Basin to meet growing energy demand in the region, capture fisheries are in decline. The dams have created unseasonal flooding and droughts, lowered water levels, hindered migration of fish, and reduced the amount of sediment carried by the river. This affects 60 to 70 million people in local riparian communities who rely on the river for their income.

The start-up aims to unlock value using a nature-based system to scale up aquaculture, replace inland capture fisheries, maintain the percentage of fish eaten in diets, increase household incomes, and create employment for local women.

The business model furthermore focuses on providing alternative measures to conventional aquaculture production by mitigating several capital-related risks:

- ◆ Protecting biodiversity and minimizing greenhouse gas emissions by implementing more sustainable farming practices and wastewater treatment (natural capital)
- ◆ Decreasing exposure to waterborne disease and improving workers' health (human capital)



- ◆ Providing food security for local communities who traditionally have relied on capture fish and kai from the Mekong River (social capital)
- ◆ Lowering production costs and risks, preventing fish disease through cleaning farm water, and implementing efficient energy use (produced capital)

The business is applying a multi-capitals approach to assess and build evidence on the risks and opportunities that the business model provides and its impact on nature and people when compared to existing aquaculture practices. So the most relevant business applications are to evaluate potential impacts, assess risk and opportunities, and compare options. Biovert Protein furthermore aims to communicate their assessment results externally to target impact investors and build partnerships.

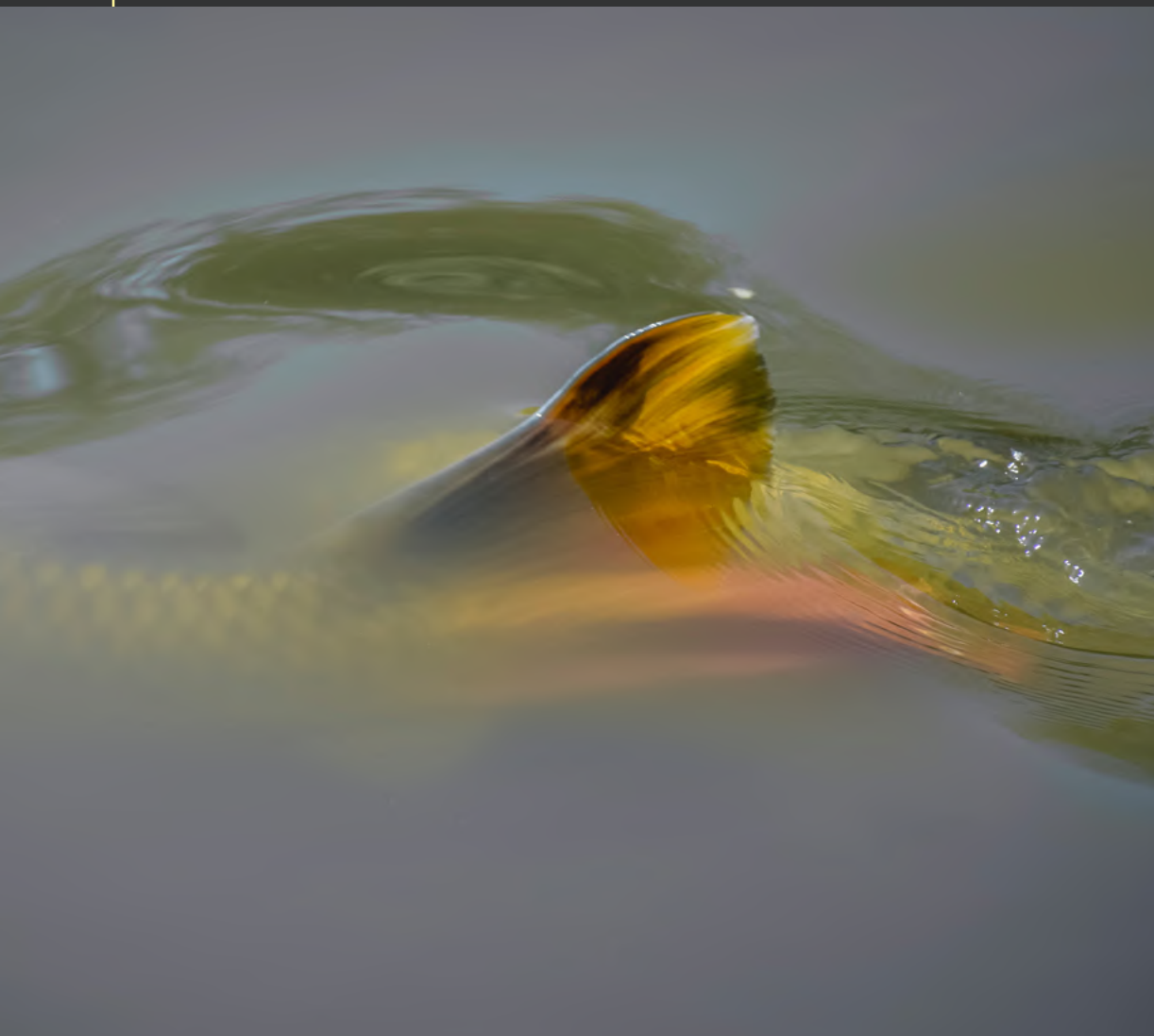
### SCOPE

The anticipated objective of the assessment is to quantify the difference in production costs, waste production, health and safety, and food security for two different scenarios for aquaculture aeration and black soldier fly production.

### MEASURE & VALUE and APPLY

Results on these Stages haven't been reported at the time of publication of these Guidelines.

For more details and updates, please click [here](#).





# Stage 2: Scope

## What?

### What is the Scope Stage?

The Scope Stage details considerations for setting the specific objective of your capitals assessment. The Scope Stage involves three linked Steps:

| Step  | Question that this Step will answer                 | Actions   |
|---|---|---|
| <b>2</b><br>Define the objective                  | What is the objective of your assessment?           | 2.2.1 Identify the target audience<br>2.2.2 Identify stakeholders and the appropriate level of engagement<br>2.2.3 Articulate the objective of your assessment  |
| <b>3</b><br>Scope the assessment                  | What is an appropriate scope to meet the objective? | 3.2.1 Determine the organizational focus<br>3.2.2 Determine the value-chain boundary<br>3.2.3 Specify whose value perspective<br>3.2.4 Decide on assessing impacts and/or dependencies<br>3.2.5 Decide which type of values you will consider<br>3.2.6 Consider other technical issues<br>3.2.7 Address key planning issues |
| <b>4</b><br>Determine impacts and/or dependencies | Which impacts and/or dependencies will you value?   | 4.2.1 List potential impacts and/or dependencies<br>4.2.2 Identify the criteria for prioritization<br>4.2.3 Gather relevant information<br>4.2.4 Complete prioritization  |

### Additional notes

Businesses operating in the food sector should address all of the actions associated with each Step in the Scope Stage. The Guidelines provide further insights to the Protocols for some of the actions where most appropriate.





# 2 Define the objective

## 2.1 Introduction

Step 2 of the Guidelines provides additional guidance for answering the following question:  
What is the objective of your assessment?

## 2.2 Actions

In particular, the Guidelines will help you undertake the following actions:

2.2.1 Identify the target audience\*

2.2.2 Identify stakeholders and the appropriate level of engagement

2.2.3 Articulate the objective of your assessment

### 2.2.1 Identify the target audience

Identifying the target audience and understanding what drives them is key in defining your objective as it will influence the way the assessment is conducted, the type of outputs to be delivered, and the desired outcomes. The target audience is defined here as the main users of the assessment output (i.e., the people who will read and use the output to make decisions). The target audience is likely to be an internal stakeholder or decision maker, although it may be an external audience such as shareholders if the objective is to provide output for a company report.

Linked to this target audience are those stakeholders who may need to authorize or fund the assessment at the outset. Quite often these will be the same as the target audience. It will be important to develop a strong case to justify the need to carry out the assessment.

The following list of potential internal and external target audiences acts as a potential stakeholder checklist. The more specific you can be about the target audience the better. Think carefully about whether the assessment is for an internal or external audience, or both, as this may influence whether validation and/or verification are necessary and how you communicate your results (see actions 8.2.4 and 9.2.2).

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\*To read the full glossary definition click on the word

[Target audience](#)



Table 2.1 Potential target audiences

| Internal target audiences may include:   | External target audiences may include:  |
|--|---|
| <ul style="list-style-type: none"> <li>◆ Shareholders (if applicable)</li> <li>◆ Senior executives and directors (i.e., board members or “C-suite” managers)</li> <li>◆ Heads of sustainability, corporate social responsibility, environment, health and safety, and due diligence departments, site managers, and operations managers</li> <li>◆ Departments such as finance, strategy, procurement, marketing and communications, reporting, public or government affairs, investor relations, safety, human resources, auditing and compliance, and enterprise risk management</li> <li>◆ Employees and contractors</li> </ul> | <ul style="list-style-type: none"> <li>◆ Shareholders (if applicable)</li> <li>◆ Investors</li> <li>◆ Suppliers</li> <li>◆ Civil society (NGOs, labor unions, etc.)</li> <li>◆ Community/other affected stakeholders (e.g., local residents, schools, other businesses, special interest groups, farmers, fishermen, tourists)</li> <li>◆ Institutional partners</li> <li>◆ Governments</li> <li>◆ Regulators</li> <li>◆ Customers</li> <li>◆ Indigenous people</li> <li>◆ Professional bodies</li> <li>◆ Insurers</li> </ul> |

Source: Natural Capital Coalition 2016, Social and Human Capital Coalition 2019

### 2.2.2 Identify stakeholders and the appropriate level of engagement

Your assessment is likely to be more relevant, reliable, and useful (e.g., for embedding capitals assessments into your business strategy) if you are able to consult and involve the right internal and external stakeholders from the outset. A stakeholder is any individual, organization, sector, or community with an interest or “stake” in the outcome of a decision or process. Your list of relevant stakeholders will almost certainly be longer than the target audience.

In addition to your target audience, this may include identifying and engaging with other stakeholders who may be affected by the results, including people who can:

- i. Provide information to help undertake the assessment
- ii. Influence the assessment, in terms of their viewpoints and behaviors
- iii. Help verify, validate, and interpret the assessment (e.g., experts)

Stakeholders can be categorized into four major groups:

- ◆ The workforce (direct employees and contingent workers)
- ◆ Workers in the value chain (upstream and downstream)
- ◆ Communities affected, or potentially affected, by business activities and decisions (across the value chain, including indigenous peoples and local communities (IPLCs))
- ◆ People impacted, or potentially impacted, by products and services (consumers, end-users, and others)



Figure 2.1 Major stakeholder groups



Stakeholders internal and external to the company can contribute significant insights into the assessment and its results. Internal stakeholders may be able to provide considerable insight, for example procurement staff will have detailed knowledge of the value chain.

External stakeholder input can also provide greater robustness and credibility to results and is certainly to be encouraged. However, bear in mind that you may have to provide some background on the basic concepts of a capitals assessment before stakeholders are able to contribute.

The scope of the assessment will also influence the appropriateness and feasibility of engaging with particular stakeholders. For example, if your assessment is project based and concerns direct operations in a specific location, then local stakeholder engagement is highly recommended. However, if you are a company closer to the end stages of the value chain (e.g., processing) and your assessment is looking at upstream impacts or dependencies, you may be several steps removed from the raw material production site (or you may not know the exact location of the production site). In these cases, local stakeholder engagement may be unfeasible and less appropriate. Even so it is important to understand any issues associated with land tenure or ownership that could result in more significant impacts or dependencies (see the significance assessment criteria in action 4.2.2).

As well as local stakeholders, there may be communities living on agricultural concession land. In these cases, meaningful consultation with local communities and indigenous people should be properly undertaken and the rights of indigenous peoples must be affirmed (Equator Principles 2020). Indigenous peoples and local communities steward much of the world's natural resources and play a vital role in safeguarding nature. Their communities are also highly dependent on nature for their livelihoods and indigenous-led enterprises are often pioneers in sustainable business models.

There may also be key stakeholders who are not geographically close to the company or operations. For example, environmental or social NGOs may not be local but may be interested in specific issues in products or areas where a food company is operating.

To help complete this action you should undertake a stakeholder analysis. This involves identifying potential stakeholders, analyzing their characteristics, and then mapping them in order to prioritize the preferred nature and level of engagement. If your business or your industry peers have already mapped out the most important stakeholders, you could use this as a starting point but make it specific to your assessment. You should include the relative importance of stakeholders and their relative influence such as whether they are primary stakeholders (i.e., they depend on the resources affected) or secondary stakeholders (i.e., they are not directly affected but interested), and their legitimacy, willingness, and ability to engage and contribute.







## Business Case 2.1

# Aires de Campo, Mexico

## Sustainability beyond organic certification - Stakeholder engagement to assess social and human capital

### FRAME

Aires de Campo engages in the commercialization of organic products, including poultry, coffee, dairy, eggs, honey, oil, vegetables, and seeds. By producing organic, the business has had a strong focus on natural capital. However, with the business improving their strategic efforts regarding economic, environmental, and social sustainability, Aires de Campo sought to gain a deeper understanding of their social capital impacts and dependencies. The envisioned business application of their capitals assessment was to assess impacts on stakeholders and communicate internally and externally.

### SCOPE

The capitals assessment objective was to identify social and human capital impacts and dependencies to better monitor and report business sustainability efforts. The data were collected through an annual survey which they conducted among their suppliers. While usually focusing on natural capital, the survey was updated to collect social and human capital information.

Both internal (management, employees, investors) and external stakeholders (beneficiaries, clients, consumers) were identified to provide their insights and inform Aires de Campo's sustainability strategy. The target audience of the results was clients as well as a consultancy company.

## MEASURE & VALUE

They conducted a qualitative analysis of the data provided by their stakeholders through the survey. The business focused on the measurement and valuation of their impacts on small suppliers and creation of new jobs as well as improved health and increased security for workers.

## APPLY

Through the consultation of internal and external stakeholders, Aires de Campo has been able to collect relevant and useful information to inform their capitals assessment. As a result, the business will implement new structures and programs informed by those directly involved and/or affected. Aires de Campo introduced a sustainability training program to sensitize staff and customers, improved working conditions in their production centers, and restructured internal departments to create multidisciplinary teams. Furthermore, the business used the outcomes of the assessment to successfully support their application to become B Corp certified.

For more details and updates, please click [here](#).



### 2.2.3 Articulate the objective of your assessment

In Step 1, you started to think about how you intend to use the results of your capitals assessment—your potential business application. In Step 2, you develop and articulate the objective, or why you are doing it. This objective should be linked to your business context and the potential business application you decided on earlier, so that the “why you are conducting this assessment” (your objective) and the “how you intend to use the assessment results” (your business application) are aligned. Sometimes, you might find yourself setting an objective that doesn’t match the business application you decided on earlier. If this happens, reconsider the business application you set earlier, as this process is iterative. You might end up having to revisit your application and objective several times as you move along on your capitals journey, depending on your resources, data availability, etc.

Ideally the objective should be SMART (specific, measurable, attainable, relevant, and time-bound). Using SMART criteria will support you in setting an objective that is obtainable within the time, budget, staff, and knowledge that are available. Generally we recommend starting with an objective that is quite narrow in scope, so that you can obtain useful results and learn the approach at the same time. Once you have gone through the Stages and find that you have a good understanding of the methodology, you can expand the scope of your assessment to, for instance, other sites, the entire value chain, or multiple capitals.

It is important to articulate the anticipated benefits that your business stands to gain from undertaking an assessment. There should be a clear link between why you are conducting the assessment, how you intend to use the results, and your business context, so that the results are relevant to your business. The assessment should focus on information pertinent to decision making.

Table 2.2 lists business applications, objectives, and benefits for the food sector of completing a capitals assessment. The list is not exhaustive and you may use different terms within your company.

**Table 2.2** Examples of business applications, objectives, and benefits of a capitals assessment in the food sector

| Business application                  | Example objectives   | Example benefits  |
|---------------------------------------|--|---|
| <b>Assess risks and opportunities</b> | Understand the implications of your company’s impacts and dependencies on natural, human, social, and produced capitals. It helps you to inform decisions regarding strategy development and risk mitigation. For example, a food and beverage company that has never previously valued natural or social and human capitals may choose to assess its entire value chain to identify elements of potential risk to determine where targeted improvements can be made and better managed.   | Improved decision making; improved risk management  |
| <b>Compare options</b>                | Help compare the trade-offs of alternative options in natural, human, social, and produced capital terms when presented with various scenarios. This can be used to inform business decisions relating to the use of innovative practices or new technologies, or for prioritization. For example, a landowner may choose to compare the consequences of different cropping systems to determine which land use is the best considering soil fertility (natural capital) and health of workers (human capital). In addition, option appraisals can be used to inform investment decisions by identifying potential solutions which increase the total return from natural, human, social, and produced capitals. | Improved decision making; increased competitive advantage; enhanced reporting and communication |

Table 2.2 continues on the next page.



| Business application                            | Example objectives  | Example benefits  |
|---|---|---|
| <b>Assess impacts on stakeholders</b>           | Ascertain which stakeholders are affected by a change in capitals due to your business activity. For example, chemical discharge from sugarcane farming pollutes soil and groundwater used by local communities (which also affects workers of the business who are part of these communities).   | Improved decision making; improved risk management  |
| <b>Estimate total value and/or net impact</b>   | Assess the total value and net impact of natural, human, and social capitals generated by a system. For example, a food company assessed the total net impact on natural, human, social, and produced capitals at company level. An alternative business strategy offers improved economic performance and positive impacts on customers, society, and the environment. This kind of analysis informs strategic planning and decisions on capital investment and management. Capitals valuation could be integrated within traditional financial accounting for an in-depth understanding of context-based business activities. | Improved decision making; increased competitive advantage; enhanced reporting and communication |
| <b>Communicate internally and/or externally</b> | Help inform decision making, communication strategies, and target setting across the food sector. Besides the support to inform business decisions on communications strategies, it also enhances engagement with stakeholders, such as investors.  | Increased competitive advantage; enhanced reporting and communication                           |

Step 2 of these Guidelines provided additional guidance to help you develop and articulate the objective of your assessment.

### 2.3 Outputs

The output of Step 2 is your objective for the assessment which you will have defined by taking into account:

- ◆ Your audience
- ◆ A stakeholder list and appropriate level of engagement
- ◆ The specific benefits you anticipate from the assessment





# 3 Scope the assessment

## 3.1 Introduction

This section of the Guidelines provides additional guidance for answering the following question:

What is an appropriate scope to meet the objective?

The scope of your assessment will be driven by your objective, your resources, and your expected outcomes. It is likely that trade-offs within your assessment in relation to what to include or exclude may be required to ensure that it remains feasible and useful. It will be driven by the level of integration you are seeking, where you draw the boundaries of your assessment, and the technical depth to which you are able to conduct the assessment.

The scope of your assessment will define the level of maturity of your assessment. As you progress through your assessment this should be kept under review as you understand more about it and any challenges that arise.

## 3.2 Actions

In particular, these Guidelines will help you undertake the following actions:

- 3.2.1 Determine the organizational focus
- 3.2.2 Determine the value-chain boundary
- 3.2.3 Specify whose value perspective
- 3.2.4 Decide on assessing impacts and/or dependencies
- 3.2.5 Decide which types of value you will consider
- 3.2.6 Consider other technical issues
- 3.2.7 Address key planning issues

### 3.2.1 Determine the organizational focus\*

Organizational focus refers to the part or parts of a business to be included in a capitals assessment.

There are three general levels of organizational focus, namely:

- ◆ Corporate: assessment of a corporation or group, including all subsidiaries, business units, divisions, different geographies, markets, etc.
- ◆ Project or site: assessment of a planned undertaking or initiative for a specific purpose, and including all related sites, activities, processes, and incidents.
- ◆ Product: assessment of particular goods and/or services, including the materials and services used in their production.

There are important similarities and differences between these three levels in terms of how an assessment is undertaken.

Determining an appropriate organizational focus will likely depend on the business application you have chosen. Table 3.1 provides some additional considerations for choosing an appropriate organizational focus.

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\*To read the full glossary definition click on the word

[Organizational focus](#)



**Table 3.1** Considerations when determining the organizational focus of your assessment

| Corporate   | Project or site   | Product   |
|---|---|---|
| <ul style="list-style-type: none"> <li>◆ Likely to require more effort and consolidation of information across the business.</li> <li>◆ May need to define which subsidiaries to include.</li> <li>◆ May highlight significant issues that were not anticipated.</li> <li>◆ May be bounded geographically to a country, or even a single location.</li> <li>◆ May imply a broad but shallow assessment of impacts and/or dependencies.</li> </ul> | <ul style="list-style-type: none"> <li>◆ Good for comparing alternative options.</li> <li>◆ Need to decide which projects/sites to assess.</li> <li>◆ May involve assessing an extension of an existing facility or a new build.</li> <li>◆ New builds are likely to require significant data collection, especially on the baseline situation.</li> <li>◆ May need to define specific aspects or alternative options (i.e., scenarios) to assess.</li> <li>◆ Narrow scope may allow for detailed assessment of impacts and/or dependencies.</li> </ul> | <ul style="list-style-type: none"> <li>◆ Good for comparing alternative options.</li> <li>◆ Need to decide which product(s), material(s), and/or related services to assess.</li> <li>◆ High volume, fast growing, or most profitable products may not have the most significant issues.</li> <li>◆ Narrow scope may allow for detailed assessment of impacts and/or dependencies.</li> </ul> |

### 3.2.2 Determine the value-chain boundary\*

As well as choosing your organizational focus, you need to identify which part(s) of the value chain will be assessed. The Guidelines consider three major parts of the value chain:

- ◆ Upstream (cradle-to-gate): covers the activities of suppliers, including purchased energy or contracted labor.
- ◆ Direct operations (gate-to-gate): covers activities over which the business has direct operational control, including majority-owned subsidiaries.
- ◆ Downstream (gate-to-grave): covers activities linked to the purchase, use, re-use, recovery, recycling, and final disposal of the business's products and services.

While the obvious choice is to start with the direct operations of your business where you have control, the higher priority issues may be found upstream or downstream (see Step 4). Alternatively, your assessment could conduct a full value-chain assessment which considers all three parts.

Table 3.2 shows how the nature of your impacts and dependencies may vary depending on the chosen value-chain boundary. More guidance on the key considerations when determining a value-chain boundary can be found in Table 3.2 of the Natural Capital Protocol.

**Table 3.2** Examples of capitals issues occurring at different parts of the value chain

| Example impacts and dependencies | Upstream  | Direct operations  | Downstream  |
|----------------------------------|---|--|---|
| <b>Health and safety impact</b>  | Your supplier struggled to provide enough safety equipment for its employees this year, resulting in a number of workplace injuries associated with your order. | Some of your safety equipment is old, overused, and no longer fully effective. You risk a possible long-term impact on your workforce's health due to agrochemical inhalation. | Packaging for your products is revealed as potentially unsuitable for the humidity levels in some of your target markets, causing health risk. This might cause health-related issues and legal claims in the future. |



| Example impacts and dependencies     | Upstream   | Direct operations   | Downstream  |
|--------------------------------------|--|---|---|
| <b>GHG emissions impact</b>          | You source from a cooperative that uses wind power. This reduces strain on local energy supplies (harvested fuel wood). Upstream emissions are lower than expected.  | You have invested in new, more efficient lighting and heating for your storage warehouses (produced capital). This reduces the GHG emissions of your direct operations, as well as your energy bill.                                      | You have chosen to switch your logistics provider to one that has more distribution hubs in your target market. This makes road travel to retailers more efficient, therefore reducing downstream GHG emissions.                          |
| <b>Water availability dependency</b> | You are sourcing sugarcane from a region that has experienced rainfall shortages in recent years, threatening the reliability of your contract. Your upstream dependency on water availability becomes a strategic priority. | Your direct operations have anticipated the effects of climate change and have been investing in technology to monitor water use smartly, such that you can predict and manage your dependency on water better than other industry peers. | Your processed sugarcane is sold exclusively to a confectionery manufacturer in a nearby city, who relies on groundwater for production processes. Groundwater is depleting fast, putting your biggest customer and your revenue at risk. |

### 3.2.3 Specify whose value perspective\*

A key action in your assessment is deciding whose value perspective to consider. You may focus your assessment on the value to business (i.e., business value) or on the value to society (i.e., societal value). The value perspective chosen determines which costs or benefits are included in an assessment.

If you are focusing, for example, on the financial implications to your business of water shortages, you would start from the business value perspective. For a multi-capital assessment you might want to consider potential implications on social capital beyond the border of the business. For example, while your business may have enough water, shortages could result in nearby stakeholders having insufficient water, which might lead to indirect impacts to your business (e.g., reputational costs from stakeholder protests resulting in loss of your license to operate). Your impacts on society may result in changes in business values. This more complete understanding would consider how impacts to society may affect your business, both now and in the future.

Understanding the nature and magnitude of societal values can shed light on potential risks (and opportunities) to your business. For example, societal values may affect your social license to operate, or raise the risk that some natural capital impacts may be “internalized” through new regulations or environmental markets.

You may wish to frame your value perspective through the affected stakeholder groups that you identified previously in action 2.2.2.

\*To read the full glossary definition click on the word

[Value-chain boundary](#), [Value perspective](#)



### 3.2.4 Decide on assessing impacts and/or dependencies

Your assessment may cover your impacts, your dependencies, or both. This will in part depend on the business application and your objective. A complete assessment considers both impacts and dependencies to gain a full understanding of your company's risk and opportunity related to natural, human, and social capitals.

It is important to note that impacts and dependencies may be interrelated. Business dependencies typically result in impacts such as when water use by a company (the dependency) results in less water, or lower quality water, available for other stakeholders (causing an impact). For example, vineyards depend on water for their production of grapes and wine. However, this might impact drinking water availability and recreation options in the area, as the water is being used for agricultural production. Recent summer droughts in Europe have shown how these dependencies and impacts interrelate.

Impacts and dependencies are explained further in Step 4 where the concepts of impact pathways\* and dependency pathways\* are introduced. In that Step, you will be guided in how to select which specific impacts and dependencies your assessment will cover.

Both impacts and dependencies can be relevant to any organizational focus and value-chain boundary. They can be considered in the three Components\* of a complete capitals assessment:

- a. **Impacts on your business** (as a result of your impacts on natural, human, and social capital)
- b. **Your impacts on society** (as a result of your impacts on natural, human, and social capital)
- c. **Your business dependencies** (benefits that your business receives from natural, human, and social capital)

It is recommended that all three Components be included within an assessment as all three are generally relevant to all potential business applications.

A multi-capital approach will help to highlight where impacts to the local environment may have indirect impacts on capitals that you, in turn, rely upon. For example, where environmental impacts affect human health this may reduce working hours due to illness of workers and their immediate families. For this reason multiple capitals should be investigated, even if at a high level initially, to ensure that unintended consequences are not occurring.

Note: It is important to recognize the limitations in cases where all three Components are not assessed.

#### a. Impacts on your business

“Impacts on your business” as a result of your impacts on natural, human, and social capitals are those that affect your financial bottom line—either now or in the future. They may result from your direct operations or be passed through to you as a result of capital impacts elsewhere in your value chain. The following are examples of potential impacts on your business:

- ◆ Current financial costs or benefits (e.g., environmental taxes, fines, or compensation costs, effluent or waste treatment costs, increased input prices due to regulation of your suppliers, reduced sales due to negative publicity about your product's impacts on natural, human, or social capital). It should be noted that this should also include impacts that you would normally include as part of financial accounting.
- ◆ Potential future financial costs or benefits (e.g., where you anticipate that new regulations or taxes may lead to increased future costs or create new liabilities).

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\*To read the full glossary definition click on the word

[Impact pathways](#), [dependency pathways](#), [Components](#)





**Limitations:**

- ◆ Assessing impacts on your business will not reflect your dependence on natural, human, or social capital.
- ◆ The estimates of value obtained will not reflect the external costs and/or benefits to society associated with the impacts of your business on natural, human, or social capital. In many cases, the direct financial consequences for a business that arise from its impacts will be lower than the costs borne or benefits secured by society.

**Resources and stakeholder engagement considerations:**

- ◆ Typically, fewer external resources and less specialist expertise are needed than for assessing the other two components since relevant data and expertise may well be available within the company.
- ◆ Stakeholder engagement may be less important as assessments will tend to relate to financial costs and benefits and be largely for internal use.

**b. Your impacts on society**

“Your impacts on society” refers to impacts on stakeholders or people’s well-being. These impacts can result from changes to natural, human, social, or produced capital. They can come from your direct operations or indirectly from somewhere else in your value chain, including suppliers and consumers (see action 3.2.2 on value-chain boundary). Note that you may want to understand the magnitude of these impacts, even if you are not directly responsible for them. Analyses that consider your impacts on society include:

- ◆ Wider changes felt by the community, the sector, the economy, etc. as a result of your business impacts on natural, human, social, or produced capital.
- ◆ Societal costs and/or benefits associated with the company’s activities.
- ◆ Costs or benefits associated with both direct and indirect (e.g., supply chain) impacts and/or dependencies.

**Limitations:**

- ◆ Assessing your impacts on society will not reflect your dependence on natural, human, or social capital.
- ◆ Impacts felt by stakeholders rarely translate directly into financial costs and benefits to the business, even when they are expressed in monetary terms. This is because these societal costs and benefits can rarely be imposed on or captured by companies precisely. For example, the financial costs (e.g., mitigating expenditures) imposed by environmental legislation are typically lower than the societal costs of the impacts avoided. Equally, the financial costs of reputational damage associated with impacts on social capital may be greater than the societal costs of the impacts themselves.

**Resources and stakeholder engagement considerations:**

- ◆ Typically, more resources are required to assess impact on society and you may need to consult external sources including specialist expertise from environmental, ecological, and welfare economists.
- ◆ Access to available data on impacts to people and the environment may be hard to come by. Trade-offs in this regard will need to be assessed.
- ◆ Stakeholder engagement is likely to be important when considering local issues and decisions that may significantly alter local sites/resources or access to them. Stakeholder engagement is less relevant for broad assessments covering many geographies and diffuse impacts (e.g., a whole supply chain assessment).



### c. Your business dependencies

“Your business dependencies” refers to how much you depend on natural, human, or social capital for your direct operations or indirectly in your value chain, including suppliers and consumers. Note that you may want to understand the scale of these dependencies even if you cannot directly influence them, as this will help with future risk management. Analyses that consider your business dependencies include:

- ◆ The benefits (i.e., value) to your company from using natural, human, and social capitals.
- ◆ Current financial costs (e.g., amounts paid for water, agricultural inputs, labor, and care of the workforce).
- ◆ Potential future financial costs (e.g., if you expect the prices\* of natural capital inputs to rise or become more volatile, or if minimum living wage is predicted to increase).
- ◆ Costs associated with both direct and indirect dependencies (e.g., dependencies in the supply chain).

#### Limitations:

- ◆ If you have particularly significant capital dependencies (e.g., you are a major user of fresh water), these may also create major impacts on external stakeholders which you will not capture without looking at the impacts felt by external stakeholders (Component b). If these impacts on external stakeholders are sufficiently severe, they may in turn result in impacts on your business (e.g., reputational damage or loss of social license to operate), which you will miss if you choose only to look at your business dependencies.

#### Resources and stakeholder engagement considerations:

- ◆ May require specialist environmental/natural resource modeling expertise to assess external drivers of change in natural capital on which your business depends.
- ◆ May require social scientists and macroeconomists to assess external drivers of change in social, produced, and human capital on which your business depends.
- ◆ The importance of stakeholder engagement will vary depending on the objective of the assessment, but as other stakeholders may also depend on the same natural, human, and social capitals, engagement is often important.

You can now review the Components of impacts and dependency related to your business application (from Step 1) to identify which are most relevant for your assessment. More guidance on how to do this can be found in Table 3.4 of the Natural Capital Protocol.

### 3.2.5 Decide which types of value you will consider

The value of impacts and dependencies can be provided in three ways: qualitative, quantitative, and monetary.

- ◆ Qualitative valuation\*: Valuation\* that describes natural, human, and social capital impacts or dependencies and may rank them into categories such as high, medium, or low.
- ◆ Quantitative valuation\*: Valuation that uses non-monetary units such as numbers (e.g., in a composite index), area, mass, or volume to assess the magnitude of natural, social, and human capital impacts or dependencies.
- ◆ Monetary valuation\*: Valuation that uses money (e.g., \$, €, ¥) as the common unit to assess the values of natural, social, and human capital impacts and/or dependencies.

Assessments typically start with a qualitative review, then proceed to quantitative measurement, and finally to estimation of monetary values as required, each potentially contributing to the next. The important thing is to choose based on the decision you are attempting to inform.

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\*To read the full glossary definition click on the word

[Valuation](#), [Qualitative valuation](#), [Quantitative valuation](#), [Monetary valuation](#), [Price](#)



In some cases, a qualitative or quantitative valuation may be sufficient to meet your needs. In other cases, you may need a mix of all three types of valuation, for example where certain impacts are not easily monetized, or when reliable data are unavailable for some variables. More information on the types of valuation can be found in the Protocols and their application explored through case studies.

All forms of value are important and should be included where relevant. The ultimate aim of valuation is to reveal value and include it in decision making where it was previously missing. Businesses who are able to incorporate different types of values into their decision-making processes will have the deepest insights into potential outcomes for themselves and society.

### 3.2.6 Consider other technical issues: baseline scenarios, spatial boundaries, and time horizon

#### a. Baseline\*

The baseline is a point or state against which the change in capital can be compared. When undertaking an assessment which covers a determined period of time you will need to consider how the baseline and capital stock would have changed over the same period with and without your business intervention.

Capitals are dynamic and may change due to pressures (other businesses, climate change, population increase, etc.) generated by external actors. Considering these trends allows you to compare your business activities in a meaningful way.

Baseline examples:

- ◆ **Prevailing conditions or historical situation:** where impacts this year are compared to the average over previous years.
- ◆ **Pristine baseline:** for natural capital, impacts are measured relative to what the land would be in its natural state if the business were not operating at that place. A pristine baseline can be hard to establish due to different historical reference states.
- ◆ **A sector-wide or economy-wide average level:** where business impacts are compared with impacts from relevant peers and comparable food businesses.
- ◆ **An optimal landscape management scenario:** where changes are measured relative to an estimated optimal landscape management scenario.

You should also consider whether you are assessing changes in “stocks” of capital (e.g., water, land, knowledge, skills, shared values, machinery assets) and/or “flows” of goods and services (e.g., ecosystem services or training sessions).

#### b. Scenario\*

The concept of valuation change is based on being able to compare impacts and dependencies across at least two scenarios: the baseline and a chosen scenario that is being valued.

Types of scenario that you may consider (adapted from McKenzie et al. 2012):

- ◆ Intervention scenarios or real alternatives being considered (e.g., for comparing alternative development projects or project locations, or comparing alternative materials used within particular products).
- ◆ A counterfactual\* is a form of scenario that describes a plausible alternative state of the site and its conditions that would result if the company did not operate. More than one counterfactual can be considered, to account for different perspectives (e.g., from stakeholders or experts).

Note: These provide a starting point but are not exhaustive and other scenarios may be appropriate for your objective.

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\*To read the full glossary definition click on the word

[Baseline](#), [Scenario](#), [Counterfactual](#)



### c. Spatial boundary\*

Establishing the spatial boundary means deciding what geographic area the assessment will consider. The answer depends on various factors, including the organizational focus, value-chain boundary, and chosen value perspective, which you will have decided earlier in Step 3.

For project-level assessments, for example, you need to include the “potential area of influence” for each type of impact (i.e., the total area over which each impact may occur). This may involve the following considerations, especially in the case of natural capital impacts:

- ◆ Impacts to biodiversity and ecosystem services may extend well beyond the immediate vicinity of a project, due to ecological linkages, wildlife migration, and other landscape-level factors.
- ◆ Water pollution and related issues should be assessed at catchment level, taking into account relevant upriver, downriver, and water scarcity issues as appropriate.
- ◆ Assessment of air-quality issues should bear in mind the specific area and features likely to be affected as a result of wind and dispersion. In the case of GHG emissions, the relevant spatial boundary is the entire planet.

### d. Temporal boundary\*

Identifying a temporal boundary means determining an appropriate time frame for the assessment (i.e., over how many days, months, or years should impacts and/or dependencies be assessed and compared?). The assessment period should relate to your objective and correspond to the organizational focus and significant impacts and/or dependencies under consideration. Some relevant questions include:

- ◆ Should the assessment cover past, present, and/or future impacts and dependencies?
- ◆ What and when is the most appropriate temporal baseline? Should the company consider changes in capitals relative to conditions when the company took effective control?
- ◆ What period should the assessment cover? For example, an assessment may be limited to a snapshot of the situation at a particular point in time. Alternatively, it may cover a particular financial year, or the entire expected project lifespan. You could also consider meaningful milestones in the business’s history, such as a large merger, acquisition, or divestment, which could help to identify significant time periods. Your objective and other scoping questions will influence the extent to which historical (sunk) costs and/or future decommissioning costs need to be included.

Note: You should be prepared to revisit these boundaries, baselines, and scenarios after you have identified your relevant, higher priority issues in Step 4, as this may influence your desired scope.

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\*To read the full glossary definition click on the word

[Spatial boundary](#), [Temporal boundary](#)







## Business Case 3.1

# Binatani, Indonesia

## Human and social capital enhancement to support farmers' prosperity

### FRAME

Binatani is the corporate social responsibility foundation of East-West Seed in Indonesia, committed to farmers' well-being, the creation of shared prosperity, and environmental stewardship.

Existing risks such as water scarcity, pests, and extreme climate events have led to declines in agricultural production, enhancing farmers' vulnerability.

To remediate this, the Agriculture Livelihood Project established an integrated approach to train farmers to create successful small businesses and ensure a stable supply chain. Through training, the project enhances stakeholders' knowledge and skills in production, organic fertilization, crop diversification, access to finance, safety, and nutrition, among others.

### SCOPE

The objective of the assessment is to show the project's positive contribution to social and human capital, with the hope of extending available funding.

For its scope, Binatani selected 48 groups of 350 farmers and their families within the spatial boundary of the East Nusa Tenggara region.

Their baseline was the prevailing condition at the project's beginning in October 2021. The temporal boundary is two years, corresponding to the project timeline.

As the scenario, Binatani chose to look at the midterm situation in September 2022 and the ending situation in September 2023. In this way, project results can be compared against the baseline, showing the visible contribution to well-being over time.



**Baseline**  
Prevailing situation

**Intervention scenario**  
Mid-term situation

**Intervention scenario**  
Ending situation

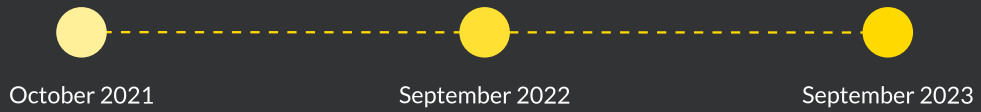


Figure 3.1 Binatani project timeline

### MEASURE & VALUE

In September 2022, preliminary qualitative, quantitative, and monetary data were collected. In this midterm evaluation, Binatani was able to show that farmers were satisfied with the project's outcomes. Testimony and data showed higher crop diversity, better production of highly demanded products, more stable incomes for farmers, and improved nutrition for children.

### APPLY

Through focus group discussion and surveys, they produced a 58-page baseline study report and a theory of change. Based on this report, they will progress their assessment until the ending situation.

For more details and updates, please click [here](#).



### 3.2.7 Address key planning issues

Your answers to the scoping questions outlined above may need to be adjusted in light of planning and resource constraints (see action 1.2.3) which will determine what scope is achievable. These constraints may also be considered as “critical success factors” and include:

- ◆ **Timescale:** How quickly does the assessment need to be completed? Have you factored enough time for the expected duration of work?
- ◆ **Funding/resources:** What budget and human resources are available? Are there other sources of funding available from within the business or externally that could help finance the assessment?
- ◆ **Capacity:** What skills are available within the business to undertake an assessment? What additional skills, if any, are needed? Depending on the business decision you are seeking to influence, you may need a range of skills and expertise including environmental economics, welfare economics, research, data analysis, mathematical or statistical modeling (from calculating averages and estimations on a spreadsheet, to using complex statistical and econometric packages), stakeholder mapping and engagement, and communications. This list of skills is not meant to be exhaustive but a starting point.
- ◆ **Data availability and accessibility:** What constraints on data are anticipated, and/or what requirements are necessary for translation into other languages?
- ◆ **Stakeholder relationships:** To what extent do you need to identify and establish relationships with stakeholders to conduct the study, and potentially implement solutions? You considered your desired stakeholder engagement in action 2.2.2.

Note: You should be prepared to revisit the previous actions in this Step if the key planning issues identified here are likely to affect what is achievable.

### 3.3 Outputs

The output for Step 3 is a well-defined scope that is appropriate for your assessment and objective.



# 4 Determine the impacts and/or dependencies

## 4.1 Introduction

This section of the Guidelines provides additional guidance for answering the following question:

Which impacts and/or dependencies are a priority for valuation?

## 4.2 Actions

In particular, these Guidelines will help you undertake the following actions:

4.2.1 List potential impacts and/or dependencies

4.2.2 Identify the criteria for prioritization\*

4.2.3 Gather relevant information

4.2.4 Complete prioritization

### 4.2.1 List potential impacts and/or dependencies

There are many different approaches to assessing the priority of issues affecting a business. Most companies have experience with at least one approach often through their risk, governance, finance, or strategy functions.

These Guidelines do not specify one particular method for identifying the priority issue, but instead set out the importance of carrying out an assessment through a generic, systematic, and transparent process. The Guidelines do introduce the concept of impact and dependency pathways which should be used to identify what is significant to your business. Understanding these terms is fundamental to conducting a capitals assessment.

An **impact pathway**\* describes how, as a result of a specific business activity, a particular **impact driver** results in changes in the capitals, which in turn will affect the benefits that they can provide now and into the future, and then how these changes affect different stakeholders. Figure 4.1 shows a generic impact pathway and figure 4.2 provides an example for terrestrial ecosystem use.

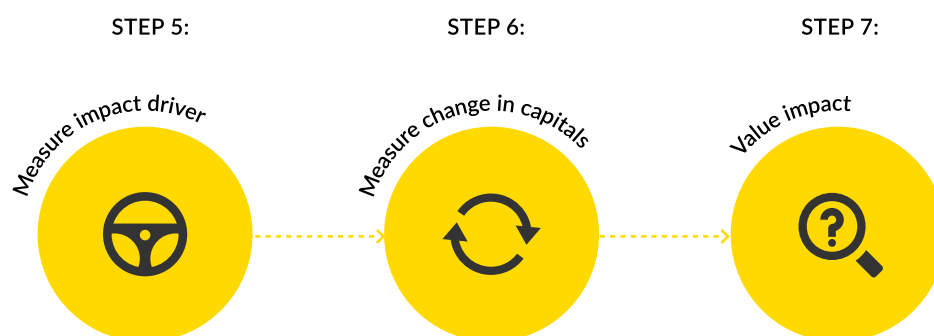


Figure 4.1 Generic impact pathway



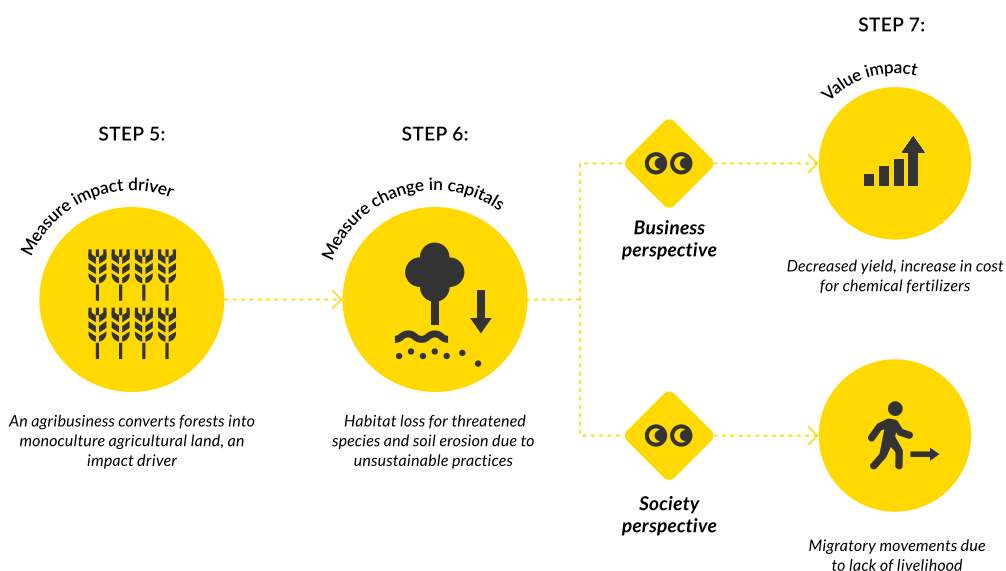


Figure 4.2 Example impact pathway for terrestrial ecosystem use

A **dependency pathway**\* shows how a particular business activity depends upon capitals through identifying changes in capitals that could affect the business. Understanding these dependency pathways is useful for determining what external risks exist to the business that could result from drivers of change. Drivers of change could include climate change, consumer sentiment, political landscape, or health and safety regulations. Figure 4.3 provides an example dependency pathway.

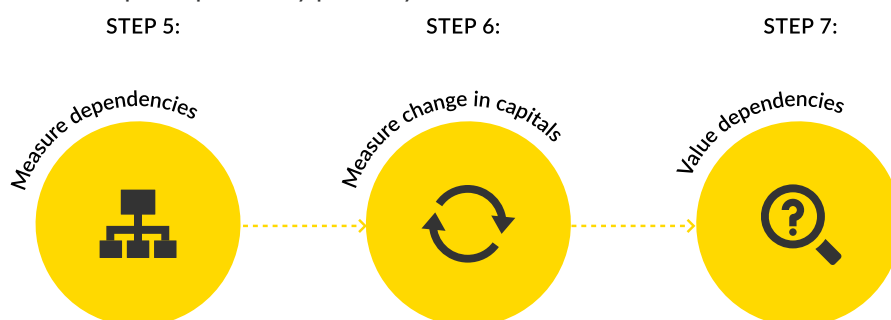


Figure 4.3 Generic dependency pathway

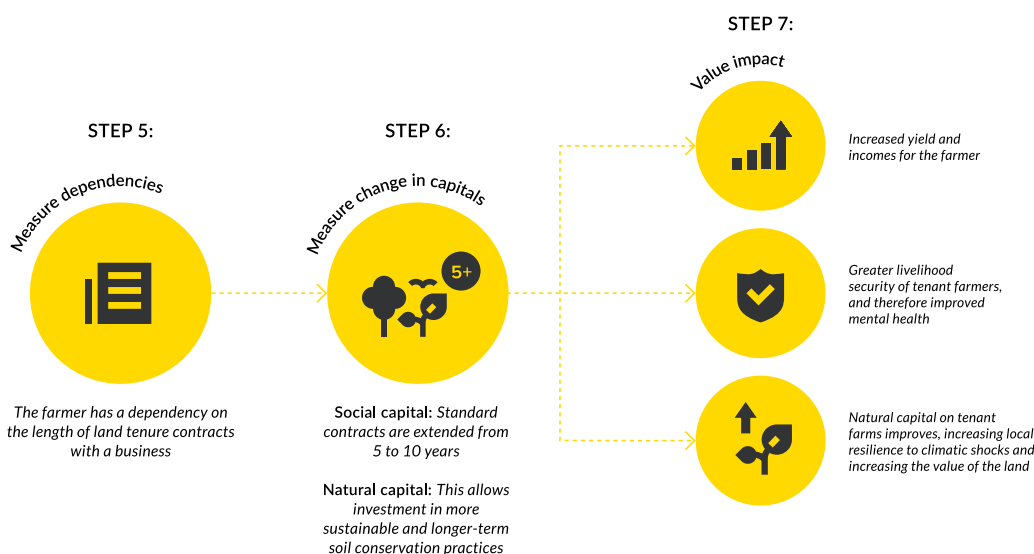


Figure 4.4 Example dependency pathway for length of land tenure contracts

\*To read the full glossary definition click on the word

[Dependency pathway](#), [Impact pathway](#), [Prioritization](#)



Definitions for each impact driver and dependency category can be found in Table 4.1 and Table 4.2.

**Table 4.1** Definition of indicative impact drivers for the food sector

| Capital                 | Potential impact drivers                               | Definition  |
|-------------------------|--|---|
| Natural                 | Water use  | Amount of water used by business  |
|                         | Terrestrial ecosystem use                              | Land and habitat used by business   |
|                         | GHG emissions  | Greenhouse gas emissions of business activities   |
|                         | Pesticide and herbicide use                            | Pesticides and herbicides used by business  |
|                         | Fertilizer use   | Fertilizer used by business   |
|                         | Soil use   | Use of soil structure, function, and quality  |
|                         | Waste generation                                       | Solid waste generated by business such as plastic, glass, manure, and recyclable materials  |
|                         | Animal welfare conditions                              | Conditions of farmed animals  |
|                         | Genetic modified organisms                             | Organism containing DNA that has been altered using genetic engineering   |
| Human                   | Nutritional content of food                            | Quantity of components in food (e.g., saturated fats, refined sugar) that potentially drive diet-related diseases in consumers (e.g., diabetes, obesity)                            |
|                         | Use of substances harmful to consumers                 | Content of substances in food (e.g., antibiotics, pesticides) that potentially drive food-related diseases in consumers (e.g., antibiotic resistance, neurodevelopmental disorders) |
|                         | Food safety practices                                  | Use of practices (e.g., irradiation, unsafe handling) that can result in food-related diseases in consumers (e.g., cancer, foodborne infections)                                    |
|                         | Employee health and safety conditions                  | Capacity to create a healthy and safe workplace, free of injuries, fatalities, and illness  |
|                         | Salaries and benefits                                  | Remuneration of workforce   |
|                         | Workers' living conditions                             | Access to affordable, safe, and secure housing for workforce  |
|                         | Labor rights   | Rights of worker in relation to the workplace   |
|                         | Child and slave labor laws                             | Rights that prohibit child and slave labor  |
|                         | Priority rights  | Rights pertaining to the first to apply for an invention, industrial design, or trademark   |
|                         | Gender rights  | Rights to ensure equal treatment of men and women in the workforce  |
| Workers' representation | Integration of workforce into business decision making |   |

Table 4.1 continues on the next page.



| Capital | Potential impact drivers                    | Definition  |
|---------|---|---|
| Social  | Food security                               | Economic and physical availability and access to healthy and safe food for workforce and surrounding population   |
|         | Food loss                                   | Food that has become unfit for consumption before reaching the consumer   |
|         | Food waste                                  | Food discarded that is fit for consumption, either before or after it spoils  |
|         | Integration of workforce into communities   | Acceptance and integration of workforce by surrounding communities and vice versa   |
|         | Benefit sharing with indigenous communities | Sharing a portion of the benefits derived from the access and use of genetic resources with indigenous communities that provide traditional knowledge associated with the genetic resources |

Table 4.2 Definition of indicative dependencies for the food sector

| Capital | Potential dependencies | Definition   |
|---------|------------------------|--|
| Natural | Water supply           | Combined ecosystem contributions of water flow regulation, water purification, and other ecosystem services to the supply of water of appropriate quality to users for various uses including household consumption  |
|         | Water purification     | The ecosystem contributions to the restoration and maintenance of the chemical condition of surface water and groundwater bodies through the breakdown or removal of nutrients and other pollutants by ecosystem components that mitigate the harmful effects of the pollutants on human use or health |
|         | Soil quality           | Ecosystem contributions to the decomposition of organic and inorganic materials and to the fertility and characteristics of soils (e.g., for input to biomass production)  |
|         | Pollination            | Ecosystem contributions by wild pollinators to the fertilization of crops that maintains or increases the abundance and/or diversity of other species that economic units use or enjoy   |
|         | Pest control           | Ecosystem contributions to the incidence of species that may prevent or reduce the effects of pests on biomass production processes or other economic and human activity   |

Table 4.2 continues on the next page.



| Capital  | Potential dependencies                               | Definition  |
|----------|--|---|
| Capital  | Genetic material                                     | Ecosystem contributions from all biota (including seed, spore, or gamete production) that are used by economic units, for example (i) to develop new animal and plant breeds; (ii) in gene synthesis; or (iii) in product development directly using genetic material   |
|          | Rainfall pattern regulation                          | Ecosystem contributions of vegetation, in particular forests, in maintaining rainfall patterns through evapotranspiration at the sub-continental scale. Forests and other vegetation recycle moisture back to the atmosphere where it is available for the generation of rainfall. Rainfall in interior parts of continents fully depends upon this recycling |
|          | Land   | The part of the Earth's surface that is not covered by water  |
|          | Energy   | The power or heat that is created when something moves, is burned, or is exerted  |
| Human    | Experience   | Amount of time spent by workers in similar occupation   |
|          | Skills and knowledge                                 | Capabilities and understanding of workforce   |
|          | Workforce availability                               | Number of workers available in the market   |
|          | Health of workers                                    | Mental and physical health condition of workers   |
|          | Agricultural practices                               | A collection of techniques to apply in farm production processes to get improved agricultural products  |
|          | Nutritional security                                 | The ability of individuals to access nutrition required for short- and long-term health outcomes  |
| Social   | Social networks and cooperation                      | Presence of collective networks, trust, and reciprocity, such as in cooperatives  |
|          | Property rights                                      | Rights of people and companies to own and use land or other resources, such as genetic material found in nature   |
|          | Social acceptance and trust                          | Recognition and belief in the contribution of a business to stakeholder interests   |
|          | Law and regulation (e.g., labor and property rights) | Respect and adherence to the rules of a society   |
|          | Food security  | The ability to access essential goods and services, including food  |
| Produced | Access to infrastructure and technology              | Capacity to use the infrastructure and technology needed for an effective provision of goods and services   |





A note on human health

Food companies can impact on, and depend on, human health in many ways both directly and indirectly.

For instance, a direct impact could be an agricultural business applying high volumes of chemical fertilizers to crops, affecting the health of the workforce through exposure to endocrine-disrupting chemicals. Similarly, poor working conditions can lead to stress and mental health issues, which in turn will affect workforce productivity.

It is also possible to impact the health of people indirectly through the contamination of the environment (e.g., via pollution of water sources), resulting in disease in the wider community (such as through waterborne infections). There are many examples of how a business's reputation has been affected following such occurrences.

Further down the supply chain, food companies can also impact the health of their consumers, for instance through:

- ◆ The delivery of contaminated, unsafe, and altered food that results in food-related diseases. For example, the use of antibiotics and growth promoters can lead to antibiotic resistance in consumers.
- ◆ The nutritional and caloric content of final products (e.g., content of salt, sugar). These could increase the incidence of diet-related diseases (e.g., obesity, cardiovascular disease, diabetes) in consumers. While the impact on consumers depends on their dietary habits, business decisions and actions (e.g., labeling, reducing salt and sugar content) can help to reduce impacts.

Food companies can also impact food security, especially in relation to hunger and undernourishment. Some business decisions, such as pricing or geographic distribution of products, can impact people's access to food. Other decisions, such as biofortification of products and diversification of crops, can significantly contribute to reducing undernourishment levels.

#### 4.2.2 Identify the criteria for prioritization

Once you have compiled a short list of potential impacts and/or dependencies, you should identify for whom the impacts and dependencies are most significant. This will be affected by your choice of value perspective (business impacts, societal impacts, or dependencies) and by the stakeholder mapping. Other criteria to decide which impacts and dependencies are most significant may relate to the risk and opportunity categories in Table 1.1:

- ◆ **Operational:** the extent to which the natural, human, produced, or social capital impact or dependency may significantly affect business operations, project implementation, or the value of existing or new products.
- ◆ **Legal and regulatory:** the extent to which the natural, human, or social capital impact or dependency may trigger a legal process or liability (e.g., emission fees or extraction quotas, costs of health and safety requirements, compensation for discrimination claims).
- ◆ **Financing:** the extent to which the natural, human, or social capital impact or dependency may influence "cost of capital" or your access to capital, investor interest, or insurance conditions. This may be indirect as part of an extended impact pathway that affects your social capital asset of reputation.
- ◆ **Reputational and marketing:** the extent to which the natural, human, or social capital impact or dependency may affect the product portfolio, company image, or relationship with customers and other stakeholders (e.g., changing customer preferences).
- ◆ **Societal:** the extent to which the natural, human, or social capital impact or dependency may generate significant impacts to society (i.e., external stakeholders). For example, interaction with indigenous communities might automatically increase the scale of some impacts, positive or negative.



### 4.2.3 Gather relevant information

Based on the criteria you have selected, you should gather the necessary information to assess the potential priority of each impact and/or dependency.

The type of information you collect might include:

- ◆ Type of impact and/or dependency
- ◆ Scale of impact and/or dependency
- ◆ Consequence of impact and/or dependency (on business, society, or both)
- ◆ Time scale (short, medium, or long term)
- ◆ Collecting this information may involve:
  - ◆ Seeking expert opinion and/or analysis, or leveraging existing information (e.g., results of an environmental or social impact assessment) and local knowledge of key issues
  - ◆ Consulting stakeholders (internal and/or external) (e.g., interviews, workshops, questionnaire surveys)
  - ◆ Compiling publicly available information on specific issues (e.g., case studies from relevant locations, civil society reports, land-use maps, species threat assessments, census data)
  - ◆ Conducting a rapid assessment of value (e.g., what proportion of total sales revenue depends upon a specific ecosystem service? What is the financial value of the production asset involved?)

External consultation can be helpful but is not always required, as long as an appropriate method and/or expert judgment is used along with adequate qualitative and/or quantitative research (see action 2.2.2 for more guidance on identifying stakeholders and appropriate levels of engagement).

Note: When identifying information to collect it is important to also identify who will provide the information, who will collate it, when it will be collated, and where it will be held.

### 4.2.4 Complete the prioritization

Based on the information you have gathered it should now be possible to assess the relative priority of each impact and/or dependency based on the criteria in action 4.2.2 and identify those that are of higher priority to move forward into measurement and valuation.

It is recommended that you establish a panel of relevant people with a broad range of skills to complete the prioritization. When ranking, it is good practice to set a threshold above which issues are considered significant and to consider your ability to influence your impact and/or dependency.

Prioritization can be done through a step-by-step approach that supports you to select priority impacts and dependencies and rank these accordingly. Figure 4.5 shows the steps and matrix to use for this prioritization. The [User Template](#) contains an interactive figure 4.5 matrix template that will support you to plot the impacts and/or dependencies to support you in your own prioritization. Business case 4.1 for Arvind, figure 4.6, includes an example of how the template matrix could be used.



|  |   |                    |                          |           |          |   |       |
|--|---|--------------------|--------------------------|-----------|----------|---|-------|
| 1. Write the objective of your assessment here   |   |                    |                          |           |          | 5. Based on ranking in step 4, indicate which impact drivers to include in your assessment (This can be shown with a YES or a NO) |       |
| 2. List potentially relevant impact drivers & dependencies related to objective below (derive from Table 4.1/4.2)                              | 3. Criteria for selection to base your ranking on: categories of risks and opportunities (these can but don't have to differ from the ones listed here) |                    |                          |           |          |   |       |
|  | Operational   | Legal & regulatory | Reputational & marketing | Financial | Societal |   | Other |
|  |   |                    |                          |           |          |   |       |
|  |   |                    |                          |           |          |   |       |
|  |   |                    |                          |           |          |   |       |
|  |   |                    |                          |           |          |   |       |
| 4. Rank impacts drivers & dependencies in the cells based on the criteria to prioritize (section 3): Use HIGH, MEDIUM, LOW and/or color coding |   |                    | High                     | Medium    | Low      |   |       |
| 6. Create priority list of impact drivers & dependencies based on step 5 here (maximum 3)  | 1.  |                    |                          |           |          |   |       |
|  | 2.  |                    |                          |           |          |   |       |
|  | 3.  |                    |                          |           |          |   |       |

Figure 4.5 Matrix template to prioritize impacts and dependencies

Once you have assessed and ranked the priority level of potential impacts and/or dependencies across all capitals within your scope, you should be clearer on which should be taken forward into the Measure and Value Stage.

It may be possible that your initial impact may not be significant but the impacts created can have further impacts on other types of capital. Where possible these additional impacts should be considered and assessed in turn for their own potentially significant impacts. The scope of this should be carefully considered by the assessor, utilizing expert opinions in these circumstances will help to quickly assess potentially significant impacts as “unintended consequences” of the impact initially assessed.

Where uncertainties remain, further information-gathering or consultation may be necessary to judge the level of priority.

### 4.3 Outputs

The output for Step 4 is a list of prioritized impact drivers and dependencies to inform Steps 5 to 7. This list may be ranked according to your chosen criteria.





## Business Case 4.1

# Arvind Limited, India

**A comparative business case on the human and ecological cost of sustainable and conventional cotton production: Part 1, SCOPE**

### **FRAME**

The Indian textile-to-retail conglomerate Arvind Limited is involved in the process of making fabrics and garments with cotton as the key raw material, accounting for 80% of all their products. With altered climatic conditions such as delayed monsoons and an increase in droughts, securing an uninterrupted supply of cotton has become a concern. This dependency has led Arvind to focus on the sustainability of their cotton supply and the reduction of negative environmental impacts caused during its cultivation.

### **SCOPE**

To improve responsible sourcing and compare sourcing options, Arvind carried out an assessment with the objective to evaluate the human and ecological costs of water use per kg of seed cotton produced under Better Cotton (BC) principles and compare this to conventional practices.

For the objective to be specific, measurable, and achievable (SMART criteria), Arvind decided to focus on water use and to carry out valuations for other priority impact drivers at a later date.

From a long list, Arvind selected priority impact drivers and dependencies relevant to their business (See Table 4.1 and Table 4.2). Using the criteria of risks and opportunities visible to Arvind (operational, legal and regulatory, financial, reputational, marketing, and social), the prioritization resulted in the selection of three key impact drivers related to their objective:



|   |  |                    |                          |           |          |       |   |    |
|---|--|--------------------|--------------------------|-----------|----------|-------|---|----|
| 1. Objective: To evaluate the human and ecological costs of water use per kg of seed cotton produced under Better Cotton Initiative (BCI) principles and compare this to conventional practices |  |                    |                          |           |          |       | 5. Based on ranking in step 4, indicate which impact drivers to include in your assessment (This can be shown with a YES or a NO) |    |
| 2. List potentially relevant impact drivers & dependencies related to objective below (derive from Table 4.1/4.2)   | 3. Criteria for selection to base you ranking on: categories of risks and opportunities (these can but don't have to differ from the ones listed here) |                    |                          |           |          |       |   |    |
|   | Operational  | Legal & regulatory | Reputational & marketing | Financial | Societal | Other |   |    |
|   | Water availability   | High               | Low                      | High      | Low      | High  |   | XX |
|   | Water use  | High               | High                     | High      | High     | High  |   | XX |
|   | Pesticide, herbicide and fertilizer use  | High               | High                     | High      | High     | High  |   | XX |
|   | Skills and knowledge   | Medium             | Low                      | High      | High     | Low   |   | XX |
| Accessibility to infrastructure   | Low  | Medium             | High                     | High      | Medium   | XX    |   |    |
| Salaries and benefits   | High   | High               | High                     | High      | High     | XX    |   |    |
| 4. Rank impacts drivers & dependencies in the cells based on the criteria to prioritize (section 3): Use HIGH, MEDIUM, LOW and/or color coding  |  | High               | Medium                   | Low       |          |       |   |    |
| 6. Create priority list of impact drivers & dependencies based on step 5 here (maximum 3)   | 1. Water use   |                    |                          |           |          |       |   |    |
|   | 2. Pesticide, herbicide and fertilizer use   |                    |                          |           |          |       |   |    |
|   | 3. Salaries and benefits   |                    |                          |           |          |       |   |    |

Figure 4.6 Prioritization of impact drivers and dependencies by Arvind

To prepare for Stage 3, Arvind prepared for measurement and valuation by drawing an impact pathway showing the impact of their water use on the capitals and the consequence on business and society.

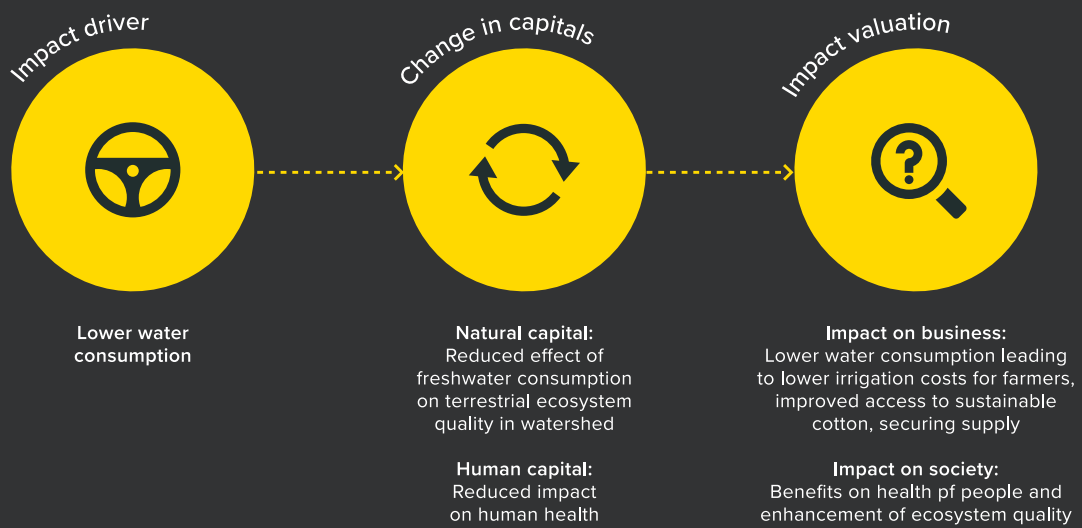


Figure 4.7 Impact pathway for the prioritized impact driver water use

### MEASURE & VALUE and APPLY

The pathway Arvind created guided the measurement and valuation of water use, by first measuring the consequence of that impact driver and then valuing it. Arvind's case will be further highlighted in Step 7.

For more details and updates, please click [here](#).





# Stage 3: Measure and Value

## How?

### What is the Measure and Value Stage?

The Measure and Value Stage introduces how impacts and/or dependencies can be measured and valued.

The Measure and Value Stage involves three linked Steps:

| Step   | Question that this Step will answer  | Actions   |
|--|--|---|
| <b>5</b><br>Measure impact drivers and/or dependencies | How can your impact drivers and/or dependencies be measured?   | 5.2.1 Map your activities against impact drivers and/or dependencies<br>5.2.2 Define which impact drivers and/or dependencies indicators you will use<br>5.2.3 Identify how you will measure impact drivers and/or dependencies<br>5.2.4 Collect data   |
| <b>6</b><br>Measure changes in the state of capitals   | What are the changes in the state and trends of capitals related to your business impacts and/or dependencies? | 6.2.1 Identify changes in capitals associated with your business activities and impact drivers<br>6.2.2 Identify changes in capitals associated with external factors<br>6.2.3 Assess trends affecting the state of capitals<br>6.2.4 Select methods for measuring changes<br>6.2.5 Undertake or commission measurement |
| <b>7</b><br>Value impacts and/or dependencies          | What is the value of your capitals impacts and/or dependencies?  | 7.2.1 Define the consequences of impacts and/or dependencies<br>7.2.2 Determine the relative significance of associated costs and/or benefits<br>7.2.3 Select appropriate valuation technique(s)<br>7.2.4 Undertake or commission valuation   |





### Additional notes

You should address all of the actions associated with each Step in the Measure and Value Stage.

Before you start this Stage you should familiarize yourself with Step 8 in the Apply Stage which covers interpreting and using assessment results as there may be implications for Steps 5–7 depending upon your objective.

This Stage includes guidance on a diverse set of methods ranging from simple environmental, human, and social data collection through to sophisticated modeling (ecological, toxicological, nutritional) and advanced econometric analysis. The information generated with these methods will complement information you probably already collect about the financial, built, and intellectual capital that forms part of your produced capital holdings.

This Stage is intended to provide sufficient information for you to understand the key features of the various techniques discussed. To complete the Steps you may need the support of people with the following skills: Life Cycle Analysis\* (LCA) and Life Cycle Impact Analysis (LCIA) experts; biodiversity, nutrition, safety specialists; economic, health and safety, or ecological modelers; or environmental and health economists. If you do not have these skills internally, you may need to find external support.

This Stage is required to understand the impacts of your business activities on the value creation or depletion of capitals that affect your business and society as a whole. Understanding the impacts in qualitative, quantitative, and, where appropriate, monetary terms can help with decision making processes in the subsequent stages.

These Guidelines do not attempt to provide detailed instructions on how to apply specific measurement\* or valuation methods. It refers instead to the extensive academic, practitioner, and policy literature on these methods.

**Table MV.1** Relationship between business applications and the Measure and Value Steps

| Business application                     | Relationship to specific Measure and Value Steps and actions  |
|--|---|
| Assess risks and opportunities           | All Steps and actions are potentially relevant. Step 6 may be of particular importance here because risks will be greater in proximity to significant ecological and health thresholds or where there is potential for irreversible changes.  |
| Compare options                          | In Step 7, qualitative valuation may be sufficient for initial high-level screening and prioritization of options. Monetary valuation will help you to compare different impacts (or dependencies) associated with each option in more detail and to assess the aggregate impacts using a common currency.  |
| Assess impacts on different stakeholders | To allow for effective distributional analysis, the affected populations will need to be segmented by stakeholder group in Step 7.  |
| Estimate total value and/or net impact   | In Step 7, monetary valuation enables the aggregation of varied impacts using the same currency. In this way you can determine whether the outcome of your assessment is net positive, either from a business value or societal value perspective. Quantitative approaches may be preferable if net impact in a single impact area is the focus, as long as the context is adequately taken into account. |
| Communicate internally and/or externally | Communication of qualitative and quantitative information of capitals of the kind described in Step 5 has a long history and is relatively commonplace in sustainability reporting. Communication of capitals valuation results (business or societal) (Step 7) is a more recent trend but is becoming increasingly common.   |

\*To read the full glossary definition click on the word

[Life Cycle Assessment](#), [Measurement](#)



Although the actions in this Stage can apply to all three Components introduced in Step 3 (impacts on your business, your impacts on society, and your business dependencies), there are differences in their relative importance and the applicability of certain methods.

### How should you plan for this Stage?

Throughout the Measure and Value Stage of your capitals assessment, keep the following questions in mind:

What is the availability and quality of data? Where time or budget do not allow for the collection of primary data, you will need to consider the implications of relying on secondary, potentially proprietary data. Alternatively, you may need approval to start collecting new internal data.

- ◆ Do you have people with appropriate expertise and capacity within your business to undertake the assessment? If not, what skills are needed and who could provide them?
- ◆ Are there budget or time constraints that may affect what is achievable? Although there are many free-to-use statistics and other resources, you may need to use databases or models that are proprietary, costly, or require a long time to deploy, particularly for assessments upstream or downstream in the value chain.
- ◆ Are there dynamic aspects of your business (such as seasonal changes in product range, output volumes, or ongoing efficiency drives) that may affect the consistency of data over time?
- ◆ How stable are the relevant regulations of impacts and/or conditions of access to capital resources on which your business is dependent, and how will you track changes over time?

What kind of data do you find useful for your decision-making processes – qualitative, quantitative, or monetary?

Whose value perspective do you find useful? This could be stakeholders or shareholders, and could even include non-human actors in the form of intrinsic valuation. This will determine how you carry out your valuation and also how you understand your impacts and the trade-offs at stake.

What forms of value are you interested in? You may wish to consider non-human and relational values as part of your assessment.

### Before you get started with the Measure and Value Stage

Before you get started with this Stage, it is important to consider planning requirements, including your internal capacity to complete the assessment and the availability of data. There are also a wide range of sector-specific frameworks, initiatives, and datasets that can be leveraged to provide context and to support your assessment.

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Annex A sets out a non-exhaustive list of some of the main published resources available, explains how they could be used in a capitals assessment, and highlights which capitals and which Steps of these Guidelines they are relevant to.





# 5 Measure impact drivers and/or dependencies

## 5.1 Introduction

This section of the Guidelines provides additional guidance for answering the following question:

How can your impact drivers and/or dependencies be measured?

Step 5 sets out how to select appropriate measures for your impact drivers and/or dependencies and provides examples of a range of potential indicators and methods for analysis. By the end of this Step you should have measured (in qualitative and/or quantitative terms) each priority impact driver and/or dependency.

In some cases, it may not be practical to measure your impact drivers and/or dependencies directly and you will need to make informed estimations instead.

Note: Unless specified in the text, all actions are relevant to all three Components: business impacts, societal impacts, and dependencies.



Figure 5.1 Focus of Step 5

## 5.2 Actions

In particular, these Guidelines will help you undertake the following actions:

- 5.2.1 Map your activities against impact drivers and/or dependencies
- 5.2.2 Define which impact driver and/or dependency indicators you will measure
- 5.2.3 Identify how you will measure impact drivers and/or dependencies
- 5.2.4 Collect data

### 5.2.1 Map your activities against impact drivers and/or dependencies

In order to complete this action, you will need to identify all of the relevant activities associated with your priority impact drivers and/or dependencies. The template presented in Step 4 can assist you with this process.

Table 5.1 provides some simplified examples of how you might start to map business activities to priority impacts and dependencies in your assessment. Figure 5.2 (see business case 5.1) provides an example of mapping of priority activities created during the capitals assessment of the business ASYX.

Table 5.1 Examples of activity mapping

| Company undertaking assessment | Organizational focus | Value-chain element   | Priority capitals impacts and dependencies   |
|--------------------------------|----------------------|---|--|
| Mango juice producer           | Corporate            | Upstream (raw materials)  | <p><b>Impact drivers:</b> water use, pesticide use, fertilizer use, labor rights, workers' living conditions, food loss</p> <p><b>Dependencies:</b> water supply, land access, access to infrastructure and technology, health of workers, pest control, skills and knowledge</p>  |
|                                |                      | Operations  | <p><b>Impact drivers:</b> water use, GHG emissions, waste generation, nutritional content of product, labor rights, food waste</p> <p><b>Dependencies:</b> water supply and purification, laws and regulation, health of workers, skills and knowledge of workers, energy</p>  |
|                                |                      | Downstream (distribution, retail, and consumption)  | <p><b>Impact drivers:</b> GHG emissions, waste generation, nutritional content of food, use of substances harmful for consumers, food safety practices, employee health and safety conditions, salaries and benefits, labor rights, workers' representation, food security, food waste</p> <p><b>Dependencies:</b> Energy, health of workers, social acceptance and trust, laws and regulation, accessibility to infrastructure and technology</p> |
| Chicken producer               | Product              | Operational (chicken farming including chicken feeding, egg collection, and distribution) | <p><b>Impact drivers:</b> water use, GHG emissions, fertilizer use, soil use, animal welfare conditions, safety practices, labor rights, food loss and waste</p> <p><b>Dependencies:</b> water supply and purification, pest control, health of workers, social acceptance and trust, access to infrastructure and technology</p>  |





## Business Case 5.1

# ASYX, Candra Naya Lestari - Indonesia

**Farm to fashion – reindustrialization of agriculture waste to biodegradable apparel**

### FRAME

ASYX is a supply-chain integration firm specialized in agroindustry, working across producers, marketers, and retailers in Indonesia, Singapore, Kenya, and Hong Kong.

Through integrated and digitized supply-chain processes, the company shapes best practices such as circular economy and sustainable business procurement strategies.

In 2020, ASYX started to incubate natural fibers production through its sister company PT Candra Naya Lestari, working closely with communities in Java as well as peatland communities in Sumatra and Kalimantan. The initiative reuses otherwise wasted pineapple leaves and turns them into biodegradable fibers for yarns and household items. ASYX mapped the pineapple value chain and observed the opportunity to create new markets for pineapple leaf fibers to supply the apparel industry.

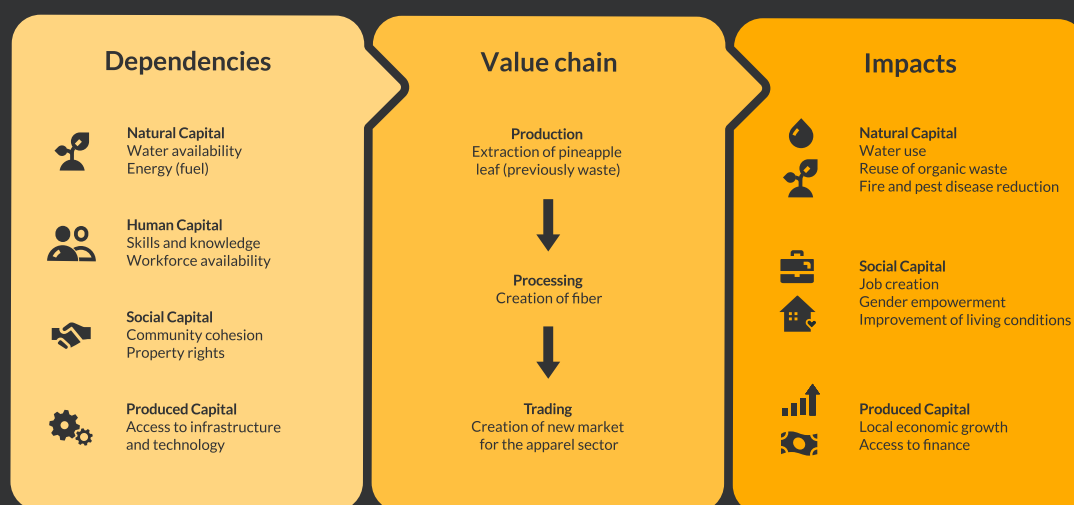
The business application is to communicate the multiple benefits of the project and to expand this community-based business.

### SCOPE

The assessment objective was to gain clarity on the pineapple leaf fiber value chain to better know where positive impacts happen for nature, people, and the economy.

## MEASURE & VALUE

ASYX clarified where the dependencies and impacts of their activities lie, classifying it per capital as shown in Figure 5.2. By comparing the situation before and after the collaboration, they were able to recognize diverse contributions.



**Figure 5.2** Example of a process diagram showing dependencies and impacts linked to the capitals associated with the production, processing, and trading of pineapple leaf fiber from the ASYX business case

Contributions include the expansion and creation of secure jobs, growing from 3 to 15 staff positions for each production center, which resulted in gender empowerment through more women being employed (human capital), more efficient water use (natural capital), the use of otherwise wasted pineapple leaves, the development of fiber production from 10kg to 600kg per month, and the economic contribution to regional growth (produced capital) over 8 months having started from scratch.

## APPLY

ASYX used the results to communicate better to buyers and investors from the fashion industry, so they can further the expansion of a more sustainable natural material supply chain. From a byproduct, ASYX Candra Naya Lestari is able to generate shared value, prosperity, and well-being for different stakeholders.

For more details and updates, please click [here](#).



### 5.2.2 Define which impact drivers and/or dependencies indicators you will use

This action involves determining what you will be measuring (the indicator) and the type of data needed. An indicator is the form of measurement used to gauge the state or level of the impact driver and/or dependency. Indicators are used to track the performance of a business over time, or for comparison across business units and with other companies.

Measurement of the priority impact drivers and/or dependencies can be either qualitative, quantitative, or monetary.

- ◆ Qualitative indicators may be based on professional judgment but can also be informed by the opinions of stakeholders, such as public opinion. Qualitative measures may be quantified, for example by including a subjective assessment of high, medium, or low, or other defined criteria.
- ◆ Quantitative indicators are typically in physical units, such as amount of different pollutants emitted (e.g., tons), the amount of resources consumed (m<sup>3</sup> water, hectares of habitat), or the number of hours of training provided to workers (h/year). In some cases, estimates derived using modeling techniques are needed to obtain these indicators.
- ◆ Monetary valuations may follow a quantitative assessment where reliable value factors or valuation techniques exist.

You may find that the data required to measure impact drivers and dependencies are frequently the same. For example, data on the use of water can be used to identify the extent of a dependency on water and/or to identify the scale of water consumption, an impact driver. Or the number of employees who received training can be used to identify a workforce dependency on training and/or the scale of businesses investment in that training (the impact driver). For simplicity we discuss the data for impact drivers and dependencies separately in this Step.

It is equally important that the indicators chosen are suitable for measuring changes in capitals (Step 6) and for valuation (Step 7). For this reason, the selection of indicators should be coordinated with the selection of measurement and valuation methods in other Steps.

In an ideal situation, an impact driver or dependency can be measured or estimated directly (e.g., the volume of water consumed or number of hours of health and safety training). In other cases, intermediate or proxy indicators are required. These provide a useful shortcut which must then be combined with other information to measure or estimate the impact driver or dependency. For example, fuel use data combined with publicly available conversion factors can help infer the volume of GHG and other emissions to air. Various published guides are available which provide emission factors (or conversion factors) to translate the liters of fuel used into grams of emissions.

Table 5.2 presents examples of quantitative indicators for different impact drivers. This is relevant for impacts on your business and your impacts on society and follows the relevant impact categories identified in the matrix template (see Step 4). The indicators should be expressed for a given location and for a given period of time. This table, and the following impact (driver) tables, focus on natural, social, and human capital as the creation, acquisition, and erosion of produced capital is more likely to be covered in financial accounts.



Table 5.2 Examples of quantitative indicators for impact drivers

| Capital  | Potential impact drivers               | Definition  |
|--|--|---|
| Natural  | Water use                              | Cubic meters of water consumption, <sup>1</sup> by watershed and month  |
|  | Terrestrial ecosystem use              | Hectares of land occupied, by land-use type and ecoregion   |
|  |  | Hectares of land transformed, by land-use type and ecoregion  |
|  | GHG emissions                          | Tons of CO <sub>2</sub> e   |
|  | Pesticide and herbicide use            | Kilograms of toxic compounds <sup>2</sup> in pesticides/herbicides applied  |
|  | Fertilizer use                         | Kilograms of phosphorus in fertilizers applied  |
|  |  | Kilograms of nitrogen in fertilizers applied  |
|  | Soil use                               | Hectares of land occupied   |
|  | Waste generation                       | Kilograms of plastic reaching the ocean   |
|  |  | Kilograms of waste by type (i.e., non-hazardous, hazardous, and radioactive), by material (e.g., lead, plastic, organic matter), or by disposal methods (landfill, sludge sewage, incineration, recycling, specialist processing) |
| Animal welfare conditions                                | Number of cattle heads per hectare     |   |
|  | Square meters of individual cubicles   |   |
| Human  | Nutritional content of food            | Grams of saturated fat/sugar/refined carbohydrate per 100 grams of final product  |
|  | Use of substances harmful to consumers | Micrograms of antibiotic by cattle head   |
|  | Food safety practices                  | Liters of polluted water used for irrigation  |
|  |  | Kilograms of non-composted organic fertilizer in direct contact with edible parts of plants   |
|  | Employee health and safety conditions  | Number of hours of overtime per week  |
|  |  | Number of hours in difficult working postures per day   |
|  |  | Number of days of workers' exposure to severe weather episodes per year   |
|  |  | Average distance of workers from potentially harmful animals/plants   |
|  |  | Number of hours of health and safety training   |
|  |  | Number of workers with safety training and measures on hazardous tools and heavy machinery use  |
| Kilograms of pesticides used/managed by workers per year |  |   |

Table 5.2 continues on the next page.



| Capital | Potential impact drivers                    | Definition   |
|---------|---|--|
| Capital | Salaries and benefits                       | Gross salary per employee or contractor  |
|         |   | Gross value of pension or monetary benefits per employee   |
|         |   | Gross value of in-kind benefits such as housing, transport, or meals                             |
|         | Workers living conditions                   | Average size (m <sup>2</sup> ) of temporary/seasonal accommodations of worker                    |
|         | Labor rights                                | Number of workers subject of modern slavery/debt bondage   |
|         | Gender rights                               | Difference in pay between men and women in same levels   |
| Social  | Worker representation                       | Proportion of workers involved in union groups   |
|         |   | Proportion of board meetings with worker representation  |
|         | Food security                               | Ratio of change in price of a basic food basket per change in cost of a product                  |
|         | Food waste                                  | Kilograms of food waste per kilogram of final food product sold                                  |
|         | Integration of workforce into communities   | Number of employees in a position of leadership in community or involved in community activities |
|         | Benefit sharing with indigenous communities | Annual contribution of the business to the community fund per year                               |

<sup>1</sup>Water consumption is different to water withdrawal. Water withdrawal does not take into account that significant amounts of water may be withdrawn but released into the same watershed (e.g., turbined or cooling water), sometimes within a very short time period. Water consumption only considers the portion of water which is no longer available in the same watershed because it has been evaporated, integrated into a product, or released into a different watershed or the sea (Life Cycle Initiative 2016).

<sup>2</sup>Some of these compounds include: 2,4-Dichlorophenoxyacetic acid, Bentazone, Butaclor, Cipermetrin, Clomazone, Propionic acid (proxy for Cyhalofop-butyl), Dalapon, Dazomet, Dimetoate, Fenoxaprop, Furadan, Glyphosate, 2-Thiohydantoin (proxy for Imazapic), Imidacloprid, Bensulfuron methy, Ordram (molinate), Oxadiazon, Oxifluorfen, Pendimethalin, Sulfadimethoxine (proxy for Penoxsulam), Pretilachlor, Propanil, Safaner, Triazofos

Table 5.3 provides example indicators for different dependency categories. The indicators for dependencies that are business inputs (e.g., water, knowledge) will often be the same as indicators for impact driver inputs. This is relevant if your business dependencies are part of your analysis. In the case of natural capital, selecting appropriate indicators to assess dependence on regulating services is more challenging. Relevant indicators may relate to the area and quality of habitats that provide the service (e.g., 10 hectares of mature forest providing water filtration service), or they may be more specific to the service itself (e.g., 8 million liters of water filtered per year).

Table 5.3 Example indicators for several dependencies

| Capital           | Dependency category                             | Example quantitative indicator  |
|-------------------|---|---|
| Natural           | Water supply                                    | Cubic meters of water extracted by company  |
|                   |   | Average rainfall per growing season   |
|                   | Water purification                              | Quality parameters measured at company extraction points: salinity (i.e., electrical conductivity, dS/m or total dissolved solids, mg/l), ionic concentration per liter (sodium, chloride, boron, trace elements), infiltration (sodium adsorption ratio), steroidal estrogens and others affecting susceptible crops (nitrogen, pH or bicarbonate) |
|                   |   | Hectares of habitats providing water filtration   |
|                   |   | Hectares of vegetation cover  |
|                   | Soil quality                                    | Soil pH and organic matter  |
|                   | Pollination                                     | Pollinator population density   |
|                   | Pest control                                    | Pest population density, such as mealybugs on cassava crops   |
|                   | Genetic material                                | Sub-species genetic variation of seeds used by business   |
|                   | Energy  | Liters of fuel consumed by type of fuel and year  |
| Human             | Experience                                      | Number of skilled workers from the local area experienced in local weather patterns and harvest rhythms   |
|                   |   | Number of workers knowledgeable of the time required for ecosystem restoration  |
|                   | Skills and Knowledge                            | Number of workers with knowledge of the role of native species that improve crop resilience   |
|                   |   | Number of critical skill gaps within the workforce  |
|                   | Workforce availability                          | Number of workers needed to maintain business activity levels   |
| Health of workers | Rate of undernourishment in workforce           |   |
|                   | Rates of depression and stress within workforce |   |
| Social            | Social networks and cooperation                 | Number of finance cooperatives present in the region  |
|                   | Property rights                                 | Average length of land tenure contracts with tenant farmers   |
|                   |   | Percentage of local genetically valuable organisms used by business   |

Table 5.3 continues on the next page.





| Capital  | Dependency category                     | Example quantitative indicator  |
|----------|---|---|
|          | Social acceptance and trust             | Number of recorded conflicts in-house resulting from misinformation                     |
|          |   | Number and diversity of representatives at stakeholder meetings                         |
|          | Law and regulation                      | Corruption Perceptions Index (CPI) published annually by NGO Transparency International |
| Produced | Access to infrastructure and technology | Number of businesses adopting similar technologies                                      |

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

Through this action, you will determine how to obtain the data needed to measure your impact drivers and/or dependencies. There are many sources of available data. You will need to distinguish which data are available internally, publicly, or commercially and consider the level of confidence you have in the data, which will change depending upon the source.

Potential sources of available data include:

#### Primary data\*:

- ◆ Internal business data collected for the assessment being undertaken
- ◆ Data collected from suppliers or customers for the assessment being undertaken

#### Secondary data\*:

- ◆ Published, peer-reviewed, and grey literature (e.g., life cycle impact assessment databases; industry, government, or internal reports; interviews with third parties/proxies)
- ◆ Past assessments
- ◆ Estimates derived using modeling techniques (e.g., EEIO, productivity models, mass balance)

Although primary data will deliver more precise results and match your business activities most closely, collecting data involves significant effort and specialist skills and primary data are only correct at the time and place of capture. Therefore, most businesses use a combination of primary and secondary data as this is more practical and is sufficient to inform their decisions.

Issues that make primary data more complex to collect include the need to define a representative sample, develop a survey method that is free of bias, determine the minimum sample size, and allocate resources for data collection, verification, and other tests. Training or specialist assistance may be necessary to ensure that relevant data are collected correctly, and to determine the statistical significance of results. Also, impact drivers vary over time, for example due to seasonal variation in production or where there are significant spatial variations.

In cases where direct measurement of impact drivers and/or dependencies is not practical, you will have to make informed estimates instead. Techniques that rely on secondary data include the direct application of results from other situations, as well as adjusted estimates based on modeling. Use of secondary data requires careful consideration of underlying assumptions, conversion factors, and other procedures to ensure the data used are appropriate for your situation.

For an exploration of primary and secondary data sources and their availability, see WBCSD FReSH (2018).

\*To read the full glossary definition click on the word

[Primary data](#), [Secondary data](#)



Having reviewed available primary data and options for using secondary data, identify which impact drivers and/or dependencies associated with each activity are to be measured or estimated.

Note: Unless you have in-house specialists, you may need to seek external support when dealing with secondary data. This is discussed in more detail in Step 7.

Table 5.4 shows the data requirements and methods used to estimate intermediate indicators (i.e., indicators that can help you to reach your final indicator) and impact drivers for coffee production. Several different activities are considered, with examples of specific impact drivers for each. In this case, the best available method was selected for each indicator; some are based on measured data and some on surveys. Table 5.4 also shows the methods used to translate the intermediate indicator into the impact driver indicator, including emission factors, risk models, and life cycle impact assessment (LCIA) databases.

**Table 5.4** Examples of identifying intermediate indicators for natural capital

| Value chain/site identifier | Activity/process               | Impact driver category    | Intermediate indicator             | Method for intermediate indicator   | Calculation of indicator of impact driver | Indicator of impact driver   |
|-----------------------------|--------------------------------|---------------------------|------------------------------------|-------------------------------------|---|--|
| Coffee manufacturer         | Industrial roasting            | GHG emissions             | Electricity use (kWh)              | Collected using survey              | Emission factor for grid                  | CO <sub>2</sub> e (kg)   |
| Coffee manufacturer         | Industrial roasting            | Water use                 | Water withdrawal (m <sup>3</sup> ) | Measured on site                    | Measured on site                          | Water consumption (m <sup>3</sup> )  |
| Coffee logistics            | Transport to roasting facility | Non-GHG air pollutants    | Diesel fuel use (l)                | Calculated from fuel invoices       | Emission factor for truck                 | PM <sub>2.5</sub> , PM <sub>10</sub> , NO <sub>x</sub> , SO <sub>x</sub> , VOCs (kg) |
| Coffee bean producer        | Farming                        | Fertilizer use            | Fertilizer application (kg/ha)     | Calculated from fertilizer invoices | Hydrological model                        | N and P emissions to surface water (kg)  |
| Supplier of food to workers | Beef production                | Terrestrial ecosystem use | Beef consumed (kg)                 | Measured on site                    | Productivity model                        | Land use (ha)  |
| Supplier of tractors        | Tractor manufacturer           | Waste generation          | Number of trucks bought            | Measured on site                    | Life cycle impact assessment database     | Hazardous waste incinerated (kg)   |

### 5.2.4 Collect data

The data collection process will depend on the scope and purpose of your assessment. Key points to consider include:

- ◆ Collect relevant primary data where practical and appropriate. Note that the collection of primary data often takes longer than anticipated, so plan carefully for this. To make sure that information is gathered correctly, it may be necessary to train data collectors in advance.
- ◆ Check the quality of the data and consider validating the data-collection process (Step 8).
- ◆ Conduct or commission secondary data collection and/or modeling as needed, based on the methods discussed above. Review and validate the data estimation process and resulting data as this may have implications for testing assumptions and how results from your assessment are being applied, communicated, and/or reported.
- ◆ For ongoing data collection, consider using metered data sources.

You can use both primary and secondary data-gathering techniques to collect data beyond a business's own operations—for instance, upstream with suppliers or downstream with consumers in the value chain. This provides an opportunity to engage with stakeholders and can strengthen business relationships. Always try and provide feedback to the data provider so they can see the benefit of providing the data.



Always document calculation methodologies and assumptions:

- ◆ Document calculation methodologies: Keep a record of (and whenever appropriate disclose) information about the methods employed to calculate an indicator. This can help you in achieving increased convergence and comparability. Not only does this help you to increase accountability and transparency, it also supports your potential to increase awareness about best practices, be recognized as a leader, and inspire other peers.
- ◆ Document assumptions: Carefully document (and whenever appropriate disclose) the assumptions that you use throughout your analysis and any limitations in the application of your results. This increases credibility with your stakeholders and facilitates learning and collaboration.

It is worth noting that the better the data you are able to collect, the more accurate the information with which you are able to inform decisions. However, data collection can be a long, expensive, and resource-intensive task. You may wish to carry out the assessment using qualitative data to inform and understand impact pathways. In doing so you can gather an understanding of the types and magnitudes of impacts at a high level, before potentially diving deeper.

#### Box 5.1: Ethical considerations in data collection

Following important ethical requirements and principles for data collection respects the rights of participants and strengthens the accuracy of results.

##### Informed consent

This is the process of obtaining approval from participants for the sharing and use of their data. To ensure that consent is informed, it must be freely given, with sufficient information provided on all aspects of participation and data use. With regards to indigenous peoples, businesses should abide by specific principles relating to free, prior, and informed consent as specified by the UN (OHCHR 2013).

##### Cultural norms

Businesses should be sensitive, aware, and respectful of cultural norms when determining appropriate data collection techniques. This could include, for example, being conscious of gender dynamics and whether women will speak freely in front of peers who are men.

##### Legal requirements:

Businesses should review data laws and regulations in the country and locations where they are collecting data to ensure they comply.

##### Personal data

Many organizations collect and store large volumes of personal data. Businesses should give utmost consideration to how these data are stored and used, particularly in relation to the European Union's General Data Protection Regulation (European Union Publications 2016).

Other factors to be aware of include education and literacy levels, privacy and anonymity, and bias, as well as safety in some contexts.

### 5.3 Outputs

The output of Step 5 is a list of indicators (qualitative and/or quantitative) for each priority impact driver and/or dependency associated with the chosen business activities in accordance with the chosen organizational focus and value-chain segment. The data source needs to be indicated for each indicator (primary or secondary data) and available data and data gaps should be identified.

An optional output is the map of the value chain showing priority impacts and dependencies.





## Business Case 5.2

# Liv Up, Brazil

## Evaluating the benefits of Liv Up's short supply chain with smallholder organic farmers

### FRAME

Liv Up is a food-tech company based in São Paulo that identified that the newest generation want to eat healthy without sacrificing taste but lack time to cook. This inspired the company to create a new way of living and eating that could be practical, healthy, and tasty, so they use fresh and raw ingredients to cook meals that are then frozen. The small business has grown quickly over the past years, moving from a start-up to a scale-up phase.

### SCOPE

The objective of the assessment was to better understand the value chain, strengthen business strategy, improve communication with stakeholders, and map risks and opportunities to generate shared value. The scope focuses on measuring social and human capitals and increasing well-being from “dedicated planting,” a direct and long-term partnership with farmers producing organic fresh food.

To gather data, Liv Up hired a third party who carried out interviews.

### MEASURE & VALUE

Liv Up was able to gather qualitative, quantitative, and monetary indicators on the impacts and benefits generated through dedicated planting in 2021.

For their organic ingredients supply, they identified in monetary terms the financial gains (in Brazilian Real, R\$) a farmer can realize through participating in dedicated planting along with the company's living wage guarantee. They also valued indirect income generation for the community.

They gathered quantitative data for the following indicators: the organic supply guarantee for Liv Up (in kgs and %), the farm productivity rate, the farm production diversification rate, and the farmer's quality of life improvement.



Liv Up also conducted qualitative valuation gathering indicators related to the social return of this economic activity. They identified the farmer's quality of life improvement, the benefits from the direct partnership, and the farmer's stability due to the purchase warranty.

To have a holistic assessment, they gathered demographic information such as the proportion of female workers, family members, and other farm contractors. Finally, Liv Up also compared the efficiency of their short supply chain to a distributor's longer chain.

Among others, the results showed that over 50 tons per month were securely sourced from dedicated planting, generating an average of 10 000 R\$ (approx. 1800€) monthly income per family.

### APPLY

Through their assessment, Liv Up was able to consolidate their sustainable sourcing design. They found evidence to prioritize direct partnerships and organic food, and sustainability and ESG strategies. Their assessment also supported them to communicate better with investors and consumers about the business impacts.

For more details and updates, please click [here](#).



# 6 Measure changes in the state of capital

## 6.1 Introduction

This section of the Guidelines provides additional guidance for answering the following question:

What are the changes in the capitals related to your impacts and/or dependencies?

To assess the changes in value due to changes from impacts and dependencies it is usually necessary to measure changes in the capitals. Doing so will help you to evaluate the ability of these capitals to provide benefits now and into the future. In addition, you should consider how trends in capitals may alter the costs and benefits of your impacts and dependencies over time.

This Step provides an overview of the relevant considerations when:

- i. Selecting and applying methods, or commissioning work, to measure changes in capitals resulting from your impact drivers.
- ii. Evaluating how external factors are affecting the state and trends of capitals. These factors will influence not only the extent of your impacts, but also the capitals on which your business depends.

There may be situations when it is not practical to measure changes in capitals explicitly, and you will have to use informed estimations instead.

This Step presents various methods for measuring and estimating changes in capitals and methods to assess the likelihood of these changes, along with examples and guidance for selecting appropriate methods or commissioning specialist work.

Note: All actions and their descriptions are relevant to all three Components of a capitals assessment.

When completing this Step, note that:

- ◆ Even if directly measuring changes in capitals is not necessary (e.g., if you decide to use value transfer methods in Step 7), conducting Step 6 at a high level helps to ensure that the changes in capitals implied or assumed by your simplified approach are appropriate and fully understood.
- ◆ You can use the impact pathways and dependency pathways identified in Step 4 to structure your work, considering the various changes in capitals resulting from each impact driver, or affecting each dependency, in turn.
- ◆ Where multiple methods are used in a single assessment, check that they are consistent and compatible. Different methods may involve different geographic or temporal scopes or use different indicators and metrics; they may treat extreme observations (outliers), or attribute changes in capitals to business activity, in different ways. While a range of capital measurements can and often must be used to assess business impacts and dependencies, you will need to consider and allow for methodological differences that could affect your results.
- ◆ Where there are multiple actors who together contribute to changes in capitals, it will be necessary to identify the portion of the change resulting from the impact drivers associated with your business activities. Similarly, the context in which your impacts will take place should be considered, if your impacts are part of a larger set of drivers being driven by other companies then this larger context needs to be considered.



- ◆ Compounding factors should also be considered, including changes in demographics, climatic conditions, and shifting sentiments, for example. An activity leading to increased water extraction may cause larger issues where populations are also rising and rainfall levels are decreasing.
- ◆ The extent of change in capitals resulting from different impact drivers will depend partly on the status of that capital, which varies in different locations. Local or regional variations in the condition of capitals must be considered explicitly, particularly if your assessment focuses on local activity and decisions.
- ◆ For more sophisticated assessments it is likely that you will require input from external specialists in different capitals (e.g., hydrologists, ecologists, nutritionists, anthropologists) unless you have these skills in-house.

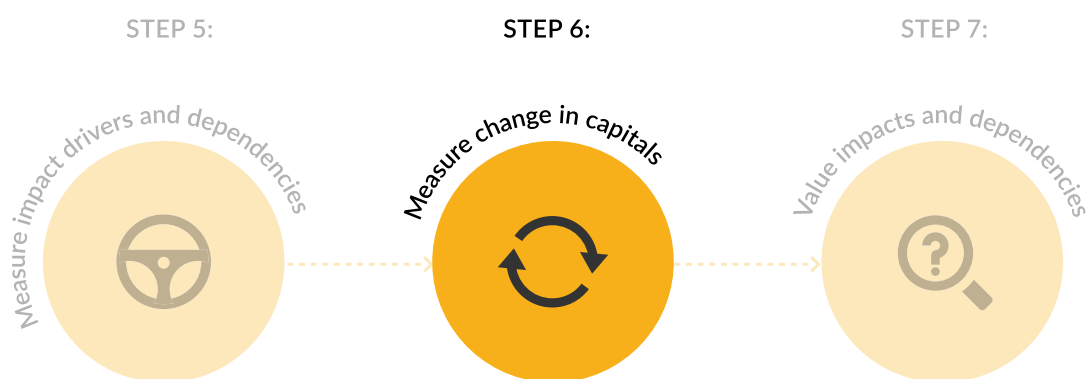


Figure 6.1 Focus of Step 6

## 6.2 Actions

In particular, these Guidelines will help you undertake the following actions:

- 6.2.1 Identify changes in capitals associated with your business activities and impact drivers
- 6.2.2 Identify changes in capitals associated with external factors
- 6.2.3 Assess trends affecting the state of capitals
- 6.2.4 Select methods for measuring change
- 6.2.5 Undertake or commission measurement

### 6.2.1 Identify changes in capitals associated with your business activities and impact drivers

This action considers the changes in capitals that are likely to result from the impact drivers measured or estimated in Step 5. The Protocols present some generic examples of changes in different capitals for a range of impact drivers.

Note: You can skip this action and move on to 6.2.2 directly if:

- ◆ The impacts on your business are independent of the magnitude of your impacts on society (e.g., many regulations and taxes are not set based on the societal value of your impacts), OR
- ◆ You are using other studies, including value transfer\*, that have already estimated the link between the impact driver and the change in capitals (e.g., many published LCIA data have the change in natural capital implicitly included).

\*To read the full glossary definition click on the word

[Value transfer](#)

Where value transfer or published impact factors are used to assess changes in capitals resulting from your business activities, it may be possible to adjust for differences between your business/site of interest and the location or context of the original source study. In such cases, completing this Step can help you make those adjustments. Even if no adjustments are needed, you should consider changes in capitals at a high level. This will enable you to check that the type and extent of capital changes described in the source study is comparable to what occurs at your site(s). The selection of specific changes in capitals to include in your assessment will also depend on the scope of the assessment and on available data, the cost of sourcing or modeling additional data, suitable methods, and the time and other resources available for your assessment.

Table 6.1 presents some sector-specific examples for the impact drivers that were introduced in Step 5 of the Guidelines. As described in the Frame Stage, one impact driver can result in changes in several capitals. All capitals that experience a change should be identified when developing the impact and dependency pathways in Step 4. Table 6.1 shows one-to-one capital relationships with the aim of illustrating the logic of the pathway in a simple manner, but it is important to measure all capital changes resulting from each impact driver or dependency.

**Table 6.1** Sector-specific examples of relevant changes in capitals for several impact drivers

| Capital                                      | Impact driver category      | Example quantitative indicator   | Example of changes in capitals resulting from the impact driver  |
|--|-----------------------------|--|--|
| Natural                                      | Water use                   | Cubic meters of water consumption, by watershed and month                                    | Change in water availability in same watershed (m <sup>3</sup> )   |
|  | Terrestrial ecosystem use   | Hectares of land occupied, by land-use type and ecoregion                                    | Change in global/regional species abundance (potentially disappeared fraction, PDF – see Box 6.1)  |
|  |                             | Hectares of land transformed, by land-use type and ecoregion                                 |  |
|  | GHG emissions               | Tons of CO <sub>2</sub> e  | Change in global mean temperature and change in number of terrestrial and marine species   |
|  | Pesticide and herbicide use | Kilograms of pesticides applied  | Change in human intake of potentially harmful chemical substances in pesticides/herbicides (i.e., endocrine disrupting chemicals or 2,4-Dichlorophenoxyacetic acid, Bentazone, Cipermetrin, Dimetoate) |
|  |                             |  | Change in number of species (i.e., pollinators)  |
|  | Fertilizer use              | Kilograms of phosphorus in fertilizers applied   | Change in number of species in water ecosystems due to changes in nutrient level in water (eutrophication)   |
| Kilograms of nitrogen in fertilizers applied |                             | Change in number of marine species due to changes in nitrogen concentration in coastal water |  |
| Soil use                                     | Hectares of land occupied   | Change in soil organic carbon  |  |

Table 6.1 continues on the next page.





| Capital                                       | Impact driver category                 | Example quantitative indicator   | Example of changes in capitals resulting from the impact driver                          |
|---|--|--|--|
|   | Animal welfare conditions              | Number of cattle head per hectare<br>Square meters of individual cubicles        | Change in frequency of cattle infections   |
| Human   | Nutritional content of food            | Grams of saturated fat/sugar/refined carbohydrate per 100 grams of final product | Change in daily human intake of saturated fat/sugar/refined carbohydrate                 |
|   | Use of substances harmful to consumers | Micrograms of antibiotic by cattle head  | Change in daily intake of antibiotics by people  |
|   | Food safety practices                  | Micrograms of pathogens per 100 grams of final product                           | Change in daily intake of pathogens by people  |
|   | Employee health and safety conditions  | Number of hours of overtime per week   | Change in risk of occupational illness and injuries/fatalities due to fatigue and stress |
|   |  | Number of hours in difficult working postures per day                            |  |
|   |  | Number of days with exposure to severe weather episodes by workers/year          |  |
|   |  | Average distance of workers from potentially harmful animals/plants              |  |
|   |  | Number of hours of health and safety training                                    |  |
|   | Salaries and benefits                  | Living wage salary for workers in lowest pay band                                | Change in workers' family caloric intake   |
|   | Workers living conditions              | Average size (m <sup>2</sup> ) of temporary/seasonal accommodations by worker    | Change in risk of occupational illness and injury due to fatigue                         |
|   | Child and slave laws                   | Number of workers subject to modern slavery/debt bondage                         | Change in number of incidents of forced labor reported                                   |
|   | Gender rights                          | Difference in pay between men and women in same levels                           | Change in female employees' motivation at work   |
|   | Worker representation                  | Proportion of workers involved in union groups                                   | Change in the sense of ownership of the workforce  |
| Representation of employees at board meetings |  | Change in number of decisions taken with employee input                          |  |

Table 6.1 continues on the next page.



| Capital | Impact driver category                      | Example quantitative indicator   | Example of changes in capitals resulting from the impact driver |
|---------|---|--|---|
| Social  | Food security                               | Ratio of change in price of a basic food basket per change in price of a product                 | Change in individuals' caloric intake                           |
|         | Food waste                                  | Kilograms of food waste per kilogram of food product   | Change in global food security levels                           |
|         | Integration of workforce into communities   | Number of employees in a position of leadership in community or involved in community activities | Change in number of migrant workers with feeling of exclusion   |
|         | Benefit sharing with indigenous communities | Annual contribution of the business to the community fund per year                               | Change in number of people reached through community engagement |

#### Box 6.1 Potentially Disappeared Fraction of Species

The Potentially Disappeared Fraction (PDF) is one of the existing metrics used to measure impacts on biodiversity\* or changes in an ecosystem's quality. The Potentially Disappeared Fraction measures the fraction of species that potentially disappear when a substance is introduced into a given environment (e.g., the atmosphere or the marine environment). This provides an indication of the loss of species richness resulting from different activities.

### 6.2.2 Identify changes in capitals associated with external factors

You should also identify external factors that could result in major changes in the state of the capitals, as these may directly or indirectly affect the significance of impacts on your business, your impacts on society, and/or your business dependencies.

- ◆ **Impacts** (to business or society) – identify external forces already affecting, or that could result in changes to, your business impacts. For example, a small food processing business may have relatively minor impacts on fresh water today, due to moderate water consumption, but development of irrigated farming in the region could mean the company's water use becomes much more significant in a local context, due to changing supply and demand conditions. Identifying external factors is especially important when you are conducting a multi-capital assessment. If several organizations have the same impact drivers, the magnitude of your shared impacts, especially your impacts on society, can be significantly high, even triggering systemic social conflicts. There are many examples of this, such as climate change, deforestation, or soil degradation, which are already forcing people to migrate or move to find ways to improve their livelihoods, particularly in some areas of the world. The lack of integration, and sometimes rejection, of migrants often results in social conflict. Without a transformational change across the entire economy and society, the situation will only worsen. You will find recommendations in these Guidelines about how to assess and inform decisions at an actionable level (your business), but it is important to also understand your impacts in the larger context in which your business operates.
- ◆ **Business dependencies** – identify external factors already affecting, or that could result in changes to, your business dependencies. For example, if a nearby forest is degraded, this could reduce the protection from fire and flooding that your business benefits from. Table 6.2 presents some sector-specific examples of changes in capitals influencing the dependencies that were introduced in Step 4. The table also presents some examples of how the change in capitals may vary according to location-specific external factors.

Note: It is helpful to map the relevant indicators chosen in Step 5 to their dependencies and identify the likely subsequent changes in capitals (as shown in Table 6.2).

\*To read the full glossary definition click on the word

[Biodiversity](#)



External factors potentially leading to changes in natural capital include both natural forces and human activities. This is particularly important when considering your business dependencies. The factors can be described as follows:

1. **Natural change:** All environments, habitats, species, cultures, and economic systems are in a dynamic state. For example, rivers change their routes due to fluvial erosion and deposition processes, while populations of certain species can vary dramatically based on predator-prey cycles or on mortality due to harsh weather conditions.
2. **Human-induced change:** Capitals are changing as a result of human activities (e.g., land-use change, increased water use, pollution, sociopolitical changes, educational policies). Impact drivers resulting from the activities of other businesses, government agencies, and individuals can all affect capitals, with potentially significant consequences for your business.

In the case of natural capital, one of the most significant changes that many of us are now aware of is climate change and the more frequent occurrence of extreme weather events such as major storms, flooding, and droughts. This is likely to have consequences for business, particularly regarding its dependency on natural resources, accessible and affordable energy, and compliance with climate regulations. An understanding of the magnitude of such changes will increase the ability of a business to assess risks and opportunities, as well as to adapt and increase resilience to climate change.

When many different actors contribute to a change in capitals (for example, a training program funded by multiple parties), you should acknowledge that you cannot directly attribute the whole of the impact to your business. In some instances, acknowledgment that you have enabled the change, or played an indirect role in this, without claiming attribution, may be enough.

Some of the approaches you might consider using to measure changes due to external factors include:

- ◆ Business-as-usual projections based on historic baseline data. Such projections use what has happened previously to project forward what might happen without a new intervention;
- ◆ Randomized controlled trials. This is where you apply your intervention to a specific set of employees or location and not to another similar group or location and monitor each over time to assess differences in behaviors and outcomes;
- ◆ Stakeholder surveys (including e-surveys, face-to-face surveys, focus groups, and one-to-one interviews). This explores the situation before and after outcomes and questions what alternative outcomes might have come about without your intervention;
- ◆ Delphi expert elicitation (in relation to causality). A Delphi expert elicitation is used to solicit the opinions of experts via an iterative questioning process. After each round of questions, you summarize and circulate responses for discussion in the next round. This enables the development of a consensus on the issue while taking into account common trends and outliers;
- ◆ Case studies with a cohort of individuals or locations affected by your business's actions that explore the changes resulting from your activities in their lives or the environment.



Table 6.2 Sector-specific examples of relevant changes in capitals for several dependencies

| Capital | Dependency category                              | Example quantitative indicator  | Example of relevant changes to capitals  |
|---------|--|---|--|
| Natural | Water supply                                     | Cubic meters of water extracted by company  | Local aquifers fall due to company's increased extraction  |
|         |  | Average rainfall per growing season   | Global climate change makes rainfall less predictable<br>Higher temperatures and heavier rainfall cause more frequent and severe locust wars |
|         | Water purification                               | Quality parameters measured at company extraction points: salinity, ionic concentration per liter, infiltration | Upstream intensive agriculture results in worsening water turbidity  |
|         |  | Hectares of habitats providing water filtration   | Change in water level in aquifers  |
|         | Soil quality                                     | Hectares of vegetation cover  | Deforestation to make space for farmland results in greater soil run-off and eutrophication of rivers  |
|         |  | Soil pH and organic matter  | Removal of harvested material decreases organic matter in soil   |
|         | Pollination                                      | Pollinators' population density   | Neighboring farms use of pesticide, or climate change, causes a loss of natural pollination  |
|         | Pest control                                     | Pest population density, such as mealybugs on cassava crops   | Global trade increases the prevalence of mealybugs on Asian cassava crops  |
|         | Genetic material                                 | Number of native plant species suitable for farming   | Decrease of genetic diversity due to extensive hybridization of seeds  |
| Energy  | Liters of fuel consumed by type of fuel and year | Scarcity of fossil fuels increases due to higher global consumption than discovery in new reservoirs            |  |
| Human   | Experience                                       | Number of skilled workers from the local area, experienced in local weather patterns and harvest rhythms        | Migration of youth to nearby cities means locally experienced farmers are less available for employment                                      |
|         |  | Number of workers knowledgeable of the time required for ecosystem restoration                                  | Local farmer networks and seminars increase experience sharing, growing the total stock of experience in the region                          |

Table 6.2 continues on the next page.





| Capital   | Dependency category   | Example quantitative indicator  | Example of relevant changes to capitals   |
|---|---|---|---|
|   | Skills and Knowledge  | Number of workers with knowledge of the role of native species that improve crop resilience   | Loss of biodiversity (natural capital) over generations means the knowledge of ecosystem functioning is lost  |
|   |   | Number of critical skill gaps within the workforce  | New skills in the workforce increase workers' cohesion and motivation   |
|   | Workforce availability  | Number of workers needed to maintain business activity levels   | The availability of local workers declines due to migration of people from rural to urban areas   |
|   | Health of workers   | Rate of undernourishment in workforce   | Undernourishment trends decline   |
| Rates of depression and stress within workforce |   | Depression and stress cause higher turnover of staff  |   |
| Social  | Social networks and cooperation   | Number of finance cooperatives present in the region  | The presence of financial cooperatives provides sustainable finance locally, increasing access to credit for farmers to renew machinery and equipment |
|   | Property rights   | Average length of land tenure contracts with tenant farmers   | Longer tenure contracts (5+ years) enhance long-term soil conservation practices, resulting in improved soil quality                                  |
|   |   | Percentage of local genetically valuable organisms used by business   | Increase in protest by local communities due to overuse of genetically valuable organisms results in insufficient resources for local community       |
|   | Social acceptance and trust   | Number of recorded conflicts in-house resulting from misinformation   | Lack of transparency leads to failure to reach out to all relevant parties and results in a minor problem escalating into a large conflict            |
|   |   |   | Reduced opposition to and protest against business activities and improved trust among stakeholders   |
| Law and regulation                              | Corruption Perceptions Index (CPI) published annually by NGO Transparency International | Agricultural input company stops selling their products to government agencies at a higher price, decreasing the share of profit public officials receive |   |
| Produced  | Accessibility to infrastructure and technology  | Number of businesses adopting similar technologies  | Business innovation in line with country culture facilitates ease of scaling technological and methodological innovations in surrounding community    |



### 6.2.3 Assess trends affecting the state of capitals

Having identified any external factors that may influence the state of natural, human, and social capital, you should now identify trends associated with these factors.

Understanding trends in external factors is especially important where changes in capitals are non-linear, cumulative, or approaching critical thresholds. The effect of your impact drivers may be accentuated (or moderated) by external factors. This information may also be required for valuation (see Step 7).

It is not strictly necessary to distinguish natural from human-induced environmental change. Nevertheless, the distinction can be helpful as it may influence your choice of assessment methods, as well as the actions you take based on your assessment.

For changes in natural capital resulting from natural processes, the methods used will focus on ecological patterns and processes, while for human-induced changes the methods used will consider changes arising from emissions, resource use, and waste production (i.e., impact drivers). For changes in human and social capital occurring directly from human-induced pressures, methods are likely to be focused on demographics, salaries, health condition, etc.

In some cases, it may be necessary to quantify the state and trends of capitals through direct measurement; in other cases, this can be done through estimation. For example, site-level analysis of ecosystem and/or abiotic services\* may require that you model current conditions in order to understand pre-existing pressures on the system. The additional impacts of your business are then introduced to the model, in order to determine the portion of change in the system that can be attributed to your business activities.

In other cases, it may be sufficient to consider the state and trends of capitals in qualitative terms in order to validate the assumptions implied by your choice of assessment method. For example, some air pollution models assume that the ambient level of pollution is already above the threshold where health impacts occur and use a linear relationship to assess the impacts of additional pollution. In this example, you need only confirm your belief that the assumption is reasonable, rather than attempting to quantify the level of external pressures. Taking into account both natural and human-induced trends relevant to the capitals is essential for assessing scenarios, including “business as usual” and any other alternative options being considered.

### 6.2.4 Select methods for measuring change

Select the most appropriate method(s) for measuring or estimating relevant changes in the capitals for different impact and dependency pathways. In addition, where relevant, you may need to determine the likelihood of external factors affecting different changes in the capitals, particularly when assessing dependencies.

Measuring can be challenging and costly. Measuring impacts in the technical sense is difficult due to (among other factors) the length of time it can take for impacts to materialize, influences beyond business activities that affect the impacts measured, and the need for data outside of the scope of business operations. Businesses often focus on measurement at an earlier stage along the impact pathway as a proxy for impact and use data-modeling techniques to understand what their longer-term impacts might be (WBCSD 2013). Businesses must be careful in their use of proxy indicators as these provide no guarantee that the impact will be generated as anticipated.

#### a. Methods to assess changes in the capitals

There are different methods available for measuring and estimating changes in the capitals. The methods for measuring change can be classified in three main categories:

- a. Direct measurement
- b. Standardized modeling methods, which are applicable to any context and therefore less detailed and low resolution
- c. Bespoke modeling methods, which are developed for a specific context and therefore more detailed and high resolution



The appropriate choice will depend on the level of detail required, practicability within the available time and resources, and/or the geographic scope under consideration. Table 6.3 provides an overview of the standardized modeling methods that you could use. These are widely available and based upon well-established approaches such as life cycle impact assessment (LCIA) (Box 6.2) and can provide you with a first estimate and help you understand the limitations and convenience of using direct measurement approaches or more bespoke modeling methods.

Specific bespoke modeling methods can also be used on a case-by-case basis to supplement standardized modeling methods. For example, when measuring the change in water availability, a hydrological model could offer a simplified view of a system adapted to a location. Predictive models may be used in scenario analysis, such as displaying pollinator abundance in response to location-specific conditions. Where limited data exist, databases can be used to model response to certain impact drivers—for instance denitrification-decomposition models can indicate the soil organic carbon storage and distribution over a large land area with limited data. Changes in human populations are more challenging to model and rely on publicly available longitudinal data sets. For instance, it is possible to forecast future obesity rates using a multi-state life table model which outlines the probability of moving from one body mass index (BMI) to another over time, based on past data.

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\*To read the full glossary definition click on the word

[Abiotic services](#)



Table 6.3 Examples of standardized modeling methods for measuring changes in the capitals

| Capital  | Impact driver category   | Changes in capitals                                | Example of direct measurement  | Example of standardized modeling methods   |
|----------|--|--|--|--|
| Natural  | Water use  | Change in water availability                       | Direct measurement of water-level change   | Life cycle impact assessment models and characterization factors (for more detail see Box 6.2) |
|          | Terrestrial ecosystem use  | Change in species abundance                        | Measure change in richness and evenness of species between different land uses   | Life cycle impact assessment models and characterization factors (for more detail see Box 6.2) |
|          | GHG emissions  | Change in global mean temperature                  | Measure instances of extreme weather conditions over time  | Life cycle impact assessment models and characterization factors (for more detail see Box 6.2) |
|          |  | Change in number of terrestrial and marine species | Change in extreme weather conditions   |  |
|          |  | Pesticide and herbicide use                        | Change in human intake of chemical substances  |  |
|          | Pesticide and herbicide use  | Change in number of species (i.e., pollinators)    | Population survey of pollinators   | Life cycle impact assessment models and characterization factors (for more detail see Box 6.2) |
|          |  | Fertilizer use                                     | Change in number of species in water ecosystems due to changes in nutrient level (from phosphorus concentration) in water (eutrophication) | Measure oxygen concentration in surrounding bodies of water                                    |
|          | Change in number of marine species due to changes in nitrogen concentration in coastal water |  | Measure oxygen concentration in surrounding bodies of marine water   | Life cycle impact assessment models and characterization factors (for more detail see Box 6.2) |
| Soil use | Change in soil organic carbon  |  | Measure carbon content of a sample of soil in a laboratory   | Life cycle impact assessment models and characterization factors (for more detail see Box 6.2) |

Table 6.3 continues on the next page.





| Capital | Impact driver category                 | Changes in capitals   | Example of direct measurement  | Example of standardized modeling methods  |
|---------|--|---|--|---|
|         | Waste generation                       | Change in number of species due to plastic littered to marine environment   | Use published data on whale beaching to determine proportion of mortality caused by ingestion of plastic waste | <p><b>For physical impacts:</b> Models do not yet exist but some studies provide global estimates (i.e., the Secretariat of the Convention on Biological Diversity (2012) publishes the number of species with entanglement and ingestion records: 45% and 26% for marine mammals, 0.39% and 0.24% for fish, and 21% and 28% for seabirds)</p> <p><b>For chemical impacts:</b> Life cycle impact assessment models and characterization factors (for more detail see Box 6.2)</p> |
|         | Animal welfare conditions              | Change in frequency of cattle infections                                    | Direct count of cattle head affected by infections in one year   | Livestock epidemiological studies   |
| Human   | Nutritional content of food            | Change in daily intake of saturated fat/sugar/refined carbohydrate          | Dietary study with a cohort of population  | Diet/nutritional models   |
|         | Use of substances harmful to consumers | Change in daily intake of antibiotic by people                              | Comparative study of antibiotic-resistant humans with meat- versus plant-based diet                            | Diet/nutritional models   |
|         | Food safety practices                  | Change in daily intake of pathogens by people                               | Number of individuals with bacteria-induced diarrhea and vomiting  | Diet/nutritional models   |
|         | Employee health and safety conditions  | Change in risk of occupational illness and injury due to fatigue and stress | Number of workers unable to work due to illness relating to pesticide use                                      | Health and safety models/studies  |
|         | Salaries and benefits                  | Change in caloric intake by workers' families                               | Household survey   | Income models (elasticity of demand for food to changes in income)  |

Table 6.3 continues on the next page.



| Capital       | Impact driver category                      | Changes in capitals   | Example of direct measurement                               | Example of standardized modeling methods                         |
|---------------|---|---|---|--|
|               | Workers' living conditions                  | Change in risk of occupational illness and injury due to fatigue  | Household survey  | Health and safety modeling tools/studies                         |
|               | Labor rights                                | Change in number of incidents of forced labor reported  | Direct count  | Not available  |
|               | Gender rights                               | Change in female employees' motivation at work  | Survey to employees   | Sectoral studies   |
|               | Worker representation                       | Change in sense of ownership of the workforce<br>Change in number of decisions taken with employee input in consideration | Number of decisions made that include employee consultation | Increase in productivity due to satisfaction of employees        |
| <b>Social</b> | Food security                               | Change in individuals' caloric intake   | Household survey  | Income models (elasticity of demand to prices of basic products) |
|               | Food waste                                  | Change in global food security levels   | Use of Global Food Security Index                           | Integrated assessment food system models                         |
|               | Integration of workforce into communities   | Change in number of migrant workers with feeling of exclusion   | Surveys   | Sector studies   |
|               | Benefit sharing with indigenous communities | Change in annual contribution of the business to the community fund per year  | Annual reports of the company                               | Not available  |



### Box 6.2 Life cycle impact assessment to measure changes in natural capital

The life cycle impact assessment (LCIA) approach allows measuring changes in the stock of natural capital resulting from different impact drivers. Table B1 provides a description of the types of life cycle characterization factors. It also provides examples of sources of life cycle impact assessment databases and models that you could use to measure changes in natural capital resulting from different impact drivers.

**Table B1:** Types of life cycle characterization factors and examples of data sources

| Impact driver category      | Changes in capitals  | Example of direct measurement  | Example of standardized modeling methods   |
|-----------------------------|--|--|--|
| Water use                   | Change in water availability   | Water scarcity characterization factors describe the change in relative available water remaining as a result of water consumption in an area (m <sup>3</sup> world eq./m <sup>3</sup> ). These factors range from 0.1 to 100. | Life Cycle Initiative (2016) publishes factors by: (i) watershed or country and (ii) month or year. They are published for agricultural and non-agricultural activities.   |
| Terrestrial ecosystem use   | Change in species abundance  | Global and regional characterization factors describe the change in species abundance resulting from land occupation and land-use transformation (PDF/m <sup>2</sup> ).  | Life Cycle Initiative (2016) publishes factors for: (i) global and (ii) regional species abundance. They are published for land use and change by ecoregion or by country. |
| GHG emissions               | Change in global mean temperature  | Global characterization factors describe the change in global temperature potential in the short term (20 years) and long term (100 years) resulting from GHG emissions.   | Life Cycle Initiative (2016) publishes factors for all greenhouse gases (GHGs).  |
| Pesticide and herbicide use | Change in human intake of chemical substances<br>Change in number of species (i.e., pollinators) | Global characterization factors describe changes in (i) human intake and (ii) species abundance resulting from release of chemical substances.   | The USEtox model developed by Life Cycle Initiative provides these factors.  |

Box 6.2 and Table B1 continue on the next page.



**Box 6.2 Life cycle impact assessment to measure changes in natural capital**

|                |   |   |   |
|----------------|---|---|---|
| Fertilizer use | Change in number of species in water ecosystems due to changes in nutrient level (from phosphorus concentration) in water (eutrophication)  | Two types of factors are needed: <ul style="list-style-type: none"> <li>• Freshwater eutrophication potential factors that describe the amount of phosphorus with potential to reach freshwater bodies.</li> <li>• Global and/or country-specific characterization factors which describe the change in species abundance from phosphorus discharge.</li> </ul> | Global indicators for this impact category are published by the Life Cycle Initiative. Different life cycle impact assessment models publish at country level for agricultural activities (i.e., IMPACT World+ (Bulle et al. 2019), LC-Impact (Verones et al. 2017), and ReCiPe 2016 (Huijbregts et al. 2016)). |
|                | Change in number of marine species due to changes in nitrogen concentration in coastal water  | Characterization factors describe the change in species abundance from nitrogen discharge.  |   |
| Soil use       | Change in soil organic carbon   | Characterization factors describe the soil organic carbon deficit resulting from land occupation and transformation to different land uses.   | Global indicators for this impact category are published by the Life Cycle Initiative. A comprehensive description of methods and models available is given by Legaz et al. (2017).   |
| Solid waste    | Change in number of species due to plastic littered to marine environment   | <b>For chemical impacts:</b> Characterization factors describe marine toxicity resulting from harmful substances in plastics released.  | Some life cycle impact assessment models such as Recipe and EUSES-LCA provide these factors.  |
|                | Change in capitals due to GHG emissions, land use, water consumption, and air, land and water pollution emissions associated with disposal of waste (by waste type) via landfill, incineration or recycling | Most of the previous characterization factors describe changes in natural capital from pollution resulting from waste management. Besides these, characterization factors for other air pollutants (such as fine particulate matter) describe the intake of pollutants by the population resulting from pollutant emissions.                                    | Life Cycle Initiative (2016) publishes factors for fine particulate matter.   |



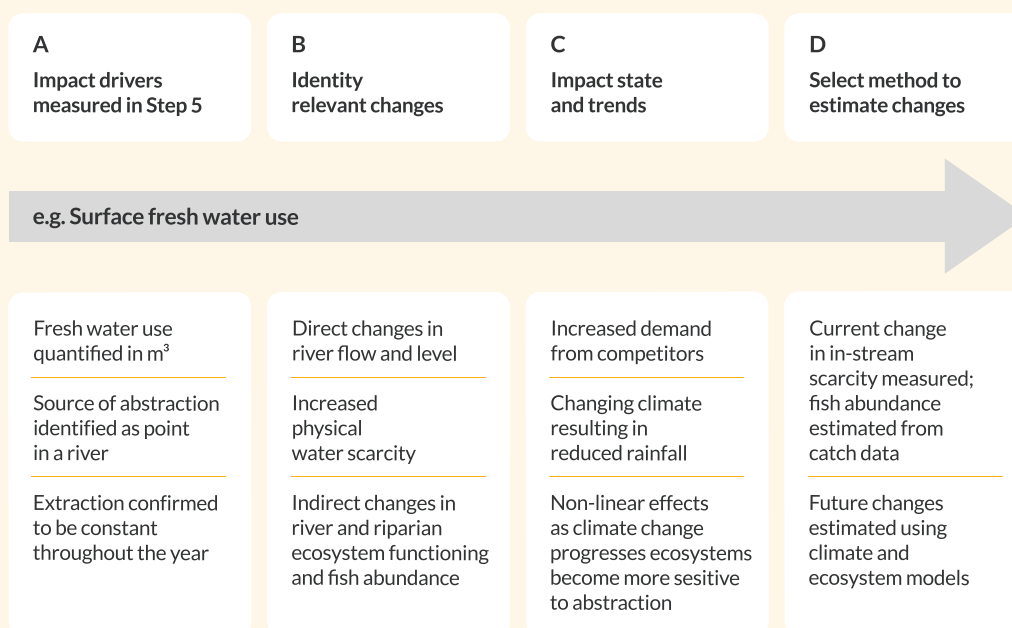


Box 6.3 shows the overall process of assessing changes in capitals using the example of a river. Meanwhile, Box 6.4 highlights a few points relevant to different choices in organizational focus and value-chain boundaries that might be applicable to the chosen scope and boundaries of your assessment.

#### Box 6.3 Example of a business identifying natural capital risks related to fresh water use from a river and assessing these through the Components of impacts on their business and impacts on society

A business uses fresh water from a river (a) leading to a reduction in water availability. The impact pathways identified key changes in natural capital associated with instream flows of water and associated changes in freshwater ecosystems of the river and riparian areas (b). Water availability is predicted to decrease over the next few years due to climate change and increased demand (c). Hence the business wants to understand both current changes and likely future changes based on predictions of climate change for the region (d).

The figure depicts the impact drivers identified in Step 05 and the associated changes in natural capital that relate to the business's impact drivers and to external factors affecting the state and trends. For each of the relevant changes a method is identified to estimate the change in natural capital and attribute it to the impact driver.



#### Box 6.4 How your organizational focus and value-chain boundary influence the choice of measurement methods

Your organizational focus and chosen value-chain boundary are two among many factors to consider when selecting measurement and estimation methods.

In general, a site-level assessment will favor direct measurement approaches, while a broader value-chain boundary often implies more reliance on simulation modeling or indirect estimation methods as direct measurement may not be possible. However, for vertically integrated businesses, or those with strong relationships with suppliers and customers and deep insights into the supply chain, it may be feasible to gather primary data for at least some activities all along the value chain.

A mix of methods may allow the use of the best available data for each part of the assessment. However, mixing different methods requires careful consideration to ensure consistency across different parts of an assessment. For example, if life cycle impact assessment (LCIA) factors are used to estimate changes associated with unobservable activities in the supply chain, while direct measurement methods are used for the business's own operations, it will be important to verify that both methods are based on the same principles and assumptions and therefore comparable to a reasonable degree.

## b. Methods to assess likelihood of changes

For each internal and external factor you identify which could lead to a significant change to the capitals on which your business has impacts or dependencies, you will need to estimate the likelihood of that factor occurring. In addition, you should consider the likely extent or magnitude of change, over what timescale, and at what geographical scale. This is particularly important for assessing dependencies.

A good approach is to develop probability-weighted estimates of changes (see below for reference to calculating this). Such a risk-based approach is especially relevant for dependencies, because many external impact drivers are not under your direct control and therefore their precision is unknown or uncertain; hence the value of interest is “value at risk” or, conversely, the risk-weighted opportunity of increased revenues.

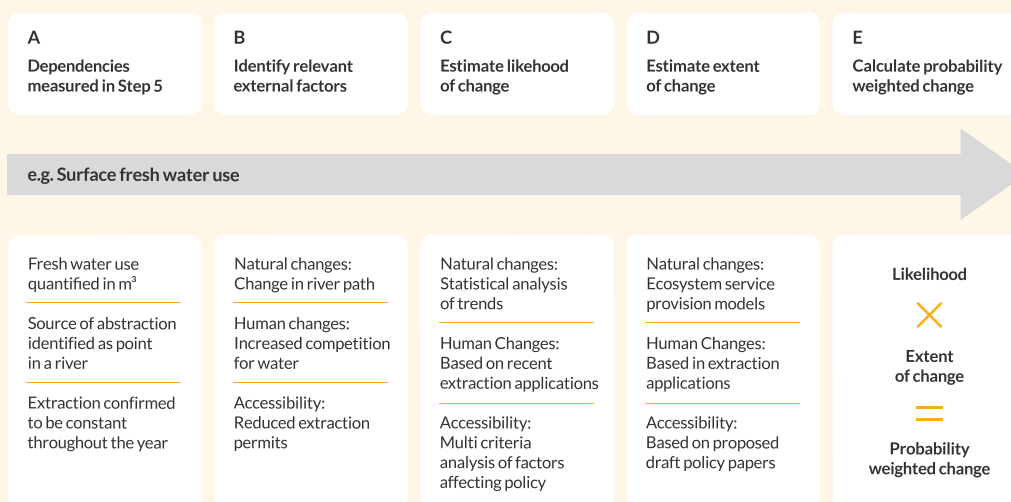
For changes that are directly observed in real time, the relevant probability is 100%. For future or unobserved changes various methods can be used to assess the likelihood of change, including:

- ◆ **Probability-based analysis:** Quantitative estimates of likelihood can be derived by testing the statistical significance of relationships. For example, multivariate regressions can be used to identify the key contributors to observed trends, or Monte-Carlo analysis can be used to test the potential permutations of multiple possible data points, assumptions, and judgments, in order to identify the most likely outcome (central tendency).
- ◆ **Multi-criteria analysis:** Where multiple factors contribute to the likelihood of a change, multi-criteria analysis can be used to generate informed weightings of the influence of different factors on the overall likelihood of change in capitals. This is similar to multivariate analysis but typically uses judgment and expert opinion, rather than statistics, to produce the weightings.
- ◆ **Expert opinion and/or multi-stakeholder assessment:** In some cases, quantitative data will not be available and qualitative judgment or expert opinion is required. For example, the probability of a policy change affecting resource access rights will depend on the political context. In such cases, the views of experts and other stakeholders can help you establish a rough estimate of likelihood.

The likelihood or probability of change is then multiplied by the extent or magnitude of change, giving you an estimate of the probability-weighted change in capitals. Box 6.5 provides an example of a likelihood assessment, again relating to a business depending on fresh water from a river.

### Box 6.5 Example of a business assessing business dependencies on fresh water use from a river

The business is dependent on its extraction and use of river water (a). It has identified potential natural changes in the supply of river water and human-induced changes from increased competition and altered access rights to the river (b). To understand the potential costs and/or benefits of these changes, the likelihood (c) and extent of changes (d) for each factor are required to then calculate the probability-weighted change.



Your assessment of likelihood will have an important influence (directly proportionate) on the final results of your capitals assessment. However, assessments of likelihood are inherently uncertain and may be subjective, particularly when qualitative approaches are used to assess risk. Your sensitivity analysis of the final results (see Step 8) should consider a range of alternative values of likelihood, allowing you to identify the threshold level(s) of likelihood at which the assessment would lead to a different decision. It is often easier to judge whether a given level of likelihood is “reasonable” than to a priori pinpoint the exact probability for your chosen threshold, so threshold analysis can be a useful method to justify the results of the assessment and substantiate your decisions.

### 6.2.5 Undertake or commission measurement

The final action is to undertake, or commission an external provider to conduct, measurement or estimation for each capital change associated with each impact driver and/or dependency using the methods selected above. Outputs of this Step should include information on the likelihood of changes in the capitals and, where possible, weighted estimates of the attribution. This information can then be used as an input for sensitivity analysis (see Step 8) to understand how study results may vary based on changes to the assumptions you have made in this Step.

Measure the change in capitals with reference to the baseline scenario that you selected in Step 3. The baseline takes into account that changes in capitals will occur over time, regardless of your business activity. Consider which external factors are contributing to a change in the baseline independent of your activities. For example, to assess the outcome of your training strategy, you could measure the capabilities of your staff, however staff members may also invest in training on a personal basis for the purpose of improving their career opportunities. To measure these kinds of changes in capitals, comparison to a counterfactual scenario is necessary.

### 6.3 Outputs

The outputs should specify the changes in natural, human, social, and produced capitals associated with your activities, your impact drivers, and external factors. The resulting data may be qualitative and/or quantitative. In addition, where relevant, the outputs should include likelihood-weighted estimates of the attribution of changes. This is related in particular to dependency assessments. Equally, the information on likelihood and extent or magnitude of the changes measured should be retained for subsequent sensitivity analysis (see Step 8). These outputs form the principle input to Step 7, where the consequences of these changes in capitals for the business and society are valued.



# 7 Value impacts and/or dependencies

## 7.1 Introduction

Valuation is the process of determining the relative importance, worth, or usefulness of something in a particular context. Step 7 describes the main valuation techniques\* and helps you select the most appropriate one(s) for your assessment.

Valuation may involve qualitative, quantitative, or monetary approaches, or a combination of these. Note that in practice the distinctions between each type of valuation may become blurred. For example, in semi-structured surveys, respondents provide their qualitative opinion on a reference scale (the Likert scale, for example) that is immediately converted into (quantitative) scores. Likert scale scores are an example of a semi-quantitative technique as they are a conversion of qualitative information into quantitative data. The Guidelines do not define these differences in detail but rather indicate some of the strengths, weaknesses, and appropriateness of various valuation techniques.

To identify the appropriate valuation technique, select the type of value most suited to the information needs of your audience, the objectives of the assessment, and the time and resources available. Based on these criteria, you can then select an appropriate valuation technique. For example:

- ◆ Determine the type of value used: Is the audience interested in qualitative, quantitative, or monetary values, or a mix of these values (Better Evaluation Rainbow Framework) depending on the issue assessed?
- ◆ Select a fit-for-purpose valuation technique: Which valuation technique aligns with the chosen scope and anticipated deliverables?

While completing this Step and in preparation for the Apply Stage keep in mind that:

- ◆ Valuing natural, human, and social capitals can be helpful but is not the only basis for decision making, hence results should be presented as part of a suite of information, including details of the wider socioeconomic, legal, and business context.
- ◆ There will always be estimation or uncertainty of some kind involved in your valuation. It is important to identify where this occurs and clearly document the limitations of your assessment. Even rough approximations of value, when combined with a good understanding of the context, can provide relevant information for decision making.
- ◆ It is likely that you will need assistance from external experts in economic valuation to undertake many of the methods described in this Step, unless you have access to these skills in-house.

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\*To read the full glossary definition click on the word

[Valuation technique](#)



This section of the Guidelines provides additional guidance for answering the following question:

What is the value of your impacts and/or dependencies?



Figure 7.1 Focus of Step 7

## 7.2 Actions

In particular, these Guidelines will help you undertake the following actions:

- 7.2.1 Define the consequences of impacts and/or dependencies
- 7.2.2 Determine the relative significance of associated costs and/or benefits
- 7.2.4 Select appropriate valuation techniques
- 7.2.5 Undertake or commission valuation

### 7.2.1 Define the consequences of impacts and/or dependencies

Now that you have identified your impact drivers and dependencies (Step 5) and measured the associated changes in the capitals (Step 6), you should identify the costs and benefits for your business (the consequences). We split this into three areas: consequences for your business of your impacts on capitals, consequences for society of your impacts on capitals, and the consequences of your dependency on capitals.

#### a. Consequences for your business of your impacts on capitals

Impacts can affect your business directly, resulting in changes such as to the cost of production inputs, or increased compliance costs as labor regulations change, and indirectly through reputational damages (or benefits), delays in permitting, and employee attraction and retention.

As scientific understanding of the relationship between nature and people has increased, the trend in market mechanisms whereby companies must pay for their use of, or their impacts on, natural, human, and social capitals, or are eligible to receive payment for their stewardship of capitals, is growing. For example, the Carbon Pricing Leadership Coalition (2019) reported that there were 57 carbon pricing initiatives implemented or scheduled for implementation in 2019, covering 11 gigatons of carbon dioxide equivalent or about 20% of global GHG emissions. Similarly, payments for ecosystem services (PES) schemes can change a business's relationship with the capitals, as people managing and using natural capital are paid to manage resources to protect watersheds, conserve biodiversity, or capture CO<sub>2</sub> (carbon sequestration) through replanting trees or keeping living trees standing, or through using different agricultural techniques.

If the scope of your assessment extends over several years, you will need to consider not only potential future direct business impacts, but also the possibility that future business impacts may arise indirectly through your company's impacts on society.



## b. Consequences for society of your impact on capitals

Your impacts on capitals will also affect society. Societal impacts include all costs or benefits accruing to individuals, communities, or organizations that are not captured through current market systems and are external to your business—these are often referred to as “externalities\*.” Societal impacts arise from changes in the capitals resulting from the impact drivers of your business and will vary depending on the “receptors” that are affected (for example, stakeholders, or species).

At the agricultural and food production level, societal consequences can be significant. Equity concerns arise when looking at the comparable distribution of productive resources, opportunities for employment and social services, gender and ethnic inclusiveness, and intergenerational opportunity.

Negative externalities from agriculture and food production typically affect human well-being directly, such as through the health impacts arising from the use of agrochemicals. In the European Union alone, exposure to endocrine-disrupting chemicals (mainly found in pesticides) costs approximately USD 174 billion per year in direct medical costs, in addition to indirect costs from lost worker productivity, early death and disability, and loss of intellectual abilities caused by prenatal exposure (Trasande et al. 2015). Indirect, downstream human health costs of agriculture and food production include the grains being manufactured into high-calorie snacks contributing to societal malnutrition and obesity.

On the other hand, most positive externalities (outputs) from agriculture and food production are visible and generally marketed, such as food and raw materials. It is estimated that there are 500 million family farms globally and that farming employs one-quarter of the globally employed population (Sandhu et al. 2019). Less economically visible positive externalities include enhanced ecosystem services (such as pollination, predation, water purification, and soil formation) and cultural and aesthetic amenities of traditionally farmed landscapes and the provision of habitats for plant and animal species (TEEB 2014).

Further down the food value chain, food processing, marketing, consumption, and disposal have important societal externalities. Produced but uneaten food accounts for close to 30% of the world’s agricultural land area. These losses represent USD 2.6 trillion in costs to society because food wastage represents a missed opportunity to improve global food security and to mitigate environmental impacts generated by agriculture (FAO 2014c).

While assessing your company’s impacts on society can be more demanding and challenging than assessing impacts on your business, it is more likely to identify risk and opportunities that may be internalized in the future.

A capitals approach can help to identify where all the externalities of a business fall across a wider scope. It’s highly unlikely that any business activity will be completely free from externalities. All business activity will impact or depend on society at some level with winners and losers to each business decision. Understanding how these manifest is vitally important for changing approaches, mitigating these issues where possible, or compensating those who have lost out.

Current siloed practices have allowed for impacts to be offset in several ways:

- ◆ Between sites – for example where a business emits large amounts of CO<sub>2</sub>e but uses schemes to offset its emissions.
- ◆ Between stakeholder groups – where impacts are shifted from one group of people to another. For example, when waste created in one country is dumped at landfill sites elsewhere.
- ◆ Between capitals – where one type of capital or benefit is prioritized over others. For example, this can be the accumulation of financial capital at the expense of natural or human capital or the accumulation of natural capital at the expense of social capital.

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\*To read the full glossary definition click on the word

[Externality](#)



### c. Consequences of dependencies on capitals

The dependency of your business on the capitals primarily affects the business itself. Dependencies are often addressed within risk analysis and can be part of either the capital stock (natural, human, or social resources) or the services that the stock provides (e.g., ecosystem services, capabilities, cooperation, and trust). Understanding your dependencies will help you to identify risks and opportunities to invest in the capitals, which may simultaneously yield benefits for society.

Variations in resource availability will affect costs and benefits and may result in the necessity of identifying substitute resources, which may be more expensive. Understanding dependencies may help to highlight the resource availability more effectively. Potential costs and benefits associated with business dependencies fall into two categories: consumptive, or goods that you rely upon for your business (for example, water and timber), and non-consumptive, goods or services nature and people provide that are often unseen and unpriced (for example, erosion control and consumer trust). Capitals may decline in size and quality thereby providing reduced benefits (e.g., flood protection or productivity of workers). This may lead to increased risk (e.g., flood risk or loss of market share) or a need to spend money replacing the function of these services from capitals. There may also be opportunities to invest to ensure the long-term provision of these services in a changing world.

Table 7.1 presents some sector-specific examples of the consequences associated with capital impacts that were introduced in Step 1 and Step 6. These capital impacts are presented in terms of their consequences for business and for society. Table 7.2 presents some sector-specific examples of the consequences associated with capital dependencies. These dependencies are presented in terms of their consequences for business.

**Table 7.1** Examples of the consequences of capital impacts

| Capital       | Impact driver category   | Example of changes in capitals resulting from the impact driver                          | Example of relevant impact on people and society from different impact drivers  |
|---------------|--|--|---|
| Natural       | Water use  | Change in water availability in same watershed   | <b>Impact to society:</b><br>Change in infectious diseases incidence (i.e., diarrhea) due to change in intake of low-quality water or lack of water for hygienic purposes (DALY).<br>For a definition of DALY, see Box 7.1. |
|               |  |  | Change in food security due to change in water availability for irrigation and fisheries/aquaculture activities (DALY)  |
|               | Terrestrial ecosystem use  | Change in global/regional species abundance  | <b>Impact to society:</b><br>Change in ecosystem services provision (USD)   |
| GHG emissions | Change in global mean temperature and change in number of terrestrial and marine species | Change in global mean temperature and change in number of terrestrial and marine species | <b>Impact to society:</b><br>Change in disease and flooding incidence (DALY)  |
|               |  |  | Change in ecosystem services provision (USD)<br><br>Change in fish stock availability (tons)  |

Table 7.1 continues on the next page.



| Capital  | Impact driver category      | Example of changes in capitals resulting from the impact driver  | Example of relevant impact on people and society from different impact drivers   |
|--|-----------------------------|--|--|
|  | Pesticide and herbicide use | Change in human intake of potentially harmful chemical substances in pesticides  | <b>Impact to society:</b><br>Change in diseases incidence (DALY)   |
|  |                             | Change in number of species (i.e., pollinators)  | Change in ecosystem services provision (USD)   |
|  | Fertilizer use              | Change in number of species in water ecosystems due to changes in nutrient level in water (eutrophication)   | <b>Impact to society:</b><br>Change in ecosystem services provision (USD)  |
|  |                             | Change in number of marine species due to changes in nitrogen concentration in coastal water   | <b>Impact to business:</b><br>Expenditure of non-absorbed fertilizer (USD)   |
|  | Soil use                    | Change in soil organic carbon  | <b>Impact to business:</b><br>Change in yields due to change in water retention capacity of soil (tons)  |
|  | Waste generation            | Change in number of species affected by plastic littered to marine environment   | <b>Impact to society:</b><br>Change in ecosystem services provision (USD)  |
| Change in capitals due to greenhouse gas emissions, land use, water consumption, and air, land, and water pollution emissions associated with disposal of waste (by waste type) via landfill, incineration, or recycling |                             | <b>Impact to society:</b><br>Change in human health and ecosystem services provision due to greenhouse gas emissions, land use, water consumption, and air, land, and water pollution emissions associated with disposal of waste via landfill, incineration, or recycling (DALY, USD) |  |
|  | Animal welfare conditions   | Change in frequency of cattle infections   | <b>Impact to business:</b><br>Change in livestock production (tons)  |
| Human  | Animal welfare conditions   | Change in frequency of cattle infections   | <b>Impact to business:</b><br>Change in livestock production (tons)  |
|  | Nutritional content of food | Change in daily intake of saturated fats/sugar/refined carbohydrates   | <b>Impact to society:</b><br>Change in disease incidence, such as chronic and acute disease, especially cardiovascular diseases, diabetes, and some cancers (DALY) |

Table 7.1 continues on the next page.



| Capital       | Impact driver category                 | Example of changes in capitals resulting from the impact driver   | Example of relevant impact on people and society from different impact drivers   |
|---------------|--|---|--|
| Capital       | Use of substances harmful to consumers | Change in daily intake of antibiotics by people   | <p><b>Impact to society:</b><br/>Change in duration of infectious diseases (DALY)</p> <p>Change in amount of antibiotics consumed to have effective response (USD)</p> <p><b>Impact to business:</b><br/>Expenditure on antibiotic used in preventive treatments (USD)</p> |
|               | Food safety practices                  | Change in daily intake of pathogens by people   | <p><b>Impact to society:</b><br/>Change in disease incidence (e.g., diarrhea, cancer) (DALY)</p>   |
|               | Employee health and safety conditions  | Change in daily intake of/exposure to endocrine disrupting chemicals from pesticides by workers/workers' family members | <p><b>Impact to business and society:</b><br/>Change in number and severity of injuries and fatalities (lost time injury frequency rate and fatal injury frequency rate)</p>   |
|               |  | Change in fatigue and stress level of workers   |  |
|               | Salaries and benefits                  | Change in caloric intake of workers' families   | <p><b>Impact to business:</b><br/>Change in worker productivity (USD)</p>  |
|               | Workers' living conditions             | Change in risk of occupational illness and injury due to fatigue  | <p><b>Impact to business and society:</b><br/>Change in working fatalities/injuries due to fatigue and stress (DALY)</p>   |
|               | Labor rights                           | Change in number of incidents of forced labor reported  | <p><b>Impact to business:</b><br/>Change in value of the brand (USD)</p>   |
| Gender rights | Change in female employees' motivation | <p><b>Impact to business:</b><br/>Change in productivity of workforce due to lack of motivation (USD)</p>               |  |
| Society       | Food security                          | Change in people's caloric intake   | <p><b>Impact to society:</b><br/>Change in productivity of workforce (USD)</p> <p>Change in potential development of future generations (USD)</p>  |
|               | Food waste                             | Change in global food security levels   | <p><b>Impact to society:</b><br/>Change in productivity of workforce (USD)</p> <p>Change of health impacts (DALY) and potentially disappeared fraction of species (PDF) due to reduction of food waste generation</p>  |

Table 7.1 continues on the next page.



| Capital | Impact driver category                      | Example of changes in capitals resulting from the impact driver | Example of relevant impact on people and society from different impact drivers |
|---------|---|---|--|
|         | Integration of workforce into communities   | Change in number of migrant workers with feeling of exclusion   | <b>Impact to business:</b><br>Change in voluntary turnover rate (%)            |
|         | Benefit sharing with indigenous communities | Change in number of people reached through community engagement | <b>Impact to business:</b><br>Change in duration of license to operate (years) |

#### Box 7.1. Disability-adjusted life years

The disability-adjusted life year (DALY) is one of the existing metrics used to measure impacts on health. A DALY is equivalent to one lost year of “healthy” life. The sum of DALYs across a population affected by different impact drivers (i.e., air or water pollution) measures the gap between the health status with and without the occurrence of these impact drivers. DALYs for a disease or health condition are calculated as the sum of the years of life lost (YLL) due to premature mortality in the population and the years lost due to disability (YLD) for people living with the health condition or its consequences.

Table 7.2 Examples of the consequences of capital dependencies

| Capital  | Dependency category | Example of relevant changes in capitals   | Example of relevant impacts on people and business resulting from dependencies                                       |
|--|---------------------|---|--|
| Natural  | Water supply        | Due to company's increased extraction, local aquifer falls  | Local residents have to comply with a hosepipe ban and launch a legal case against the company (USD)                 |
|  |                     | Global climate change makes rainfall less predictable   | Commodity exporters move farms to less vulnerable geographies, removing job availability in climate-vulnerable areas |
|  |                     | Reduction in water level due to climate change results in higher levels of pollutant concentration in river   | Company experiences an increase in water treatment cost for irrigation (USD)   |
|  | Water purification  | Upstream intensive agriculture results in worsening water turbidity   | Farm loses productivity from irrigating crops with turbid, contaminated water (USD)                                  |
|  |                     | Increase hectares of habitats providing water filtration  | Local farmers have to pay for piped water, reducing profit and income (USD)  |
|  | Soil quality        | Deforestation to make space for farmland results in greater soil runoff and eutrophication of rivers  | The company incurs legal costs and penalties due to health problems caused in local communities downstream (USD)     |
| Removal of harvested material decreases organic matter in soil |                     | Soils need to be supported with artificial fertilizer to maintain yields, causing expense to farmers and enforcing power structures of fertilizer providers (USD) |  |

Table 7.2 continues on the next page.





| Capital | Dependency category    | Example of relevant changes in capitals  | Example of relevant impacts on people and business resulting from dependencies  |
|---------|------------------------|--|---|
|         | Pollination            | Neighboring farm's use of pesticide, or climate change, causes a loss of natural pollination                               | The company needs to import artificial pollinators to its farm, year on year, increasing operational costs (USD)  |
|         | Pest control           | Higher temperatures and heavier rainfall cause more frequent and severe locust swarms                                      | Commodity exporters move farms to less vulnerable geographies, removing job availability in climate-vulnerable areas  |
|         |                        | Global trade increases the prevalence of mealybugs on Asian cassava crops  | Cassava yields decline, and company is forced to reduce their margins to avoid losing market quota (USD)  |
|         | Genetic material       | Decrease of genetic diversity due to extensive hybridization of seeds  | Disease causes crop failure due to reduced resilience from low genetic diversity of seed (USD)  |
|         | Energy                 | Scarcity of fossil fuels increases due to higher global consumption than discovery in new reservoirs                       | Increase in price of fossil fuels (USD)   |
| Human   | Experience             | Migration of youth to nearby cities means locally experienced farmers are less available for employment                    | Company suffers a loss of experience in its workforce, which means more money spent on research and trials (USD)  |
|         |                        | Local farmer networks and seminars increase the sharing of experience, growing the total stock of experience in the region | Company profits are improved due to an increase in the knowledge levels of workforce (USD)  |
|         | Skills and knowledge   | Loss of biodiversity (natural capital) over generations means the knowledge of ecosystem functioning is lost               | Company resorts to expensive, artificial solutions to improved resilience as the knowledge of biodiversity is lost (USD)  |
|         |                        | With new skills in the workforce, the company is able to explore crop-processing activities                                | The company can expand into more value-added activities, sell for higher prices, and pay better salaries (USD)  |
|         | Workforce availability | The availability of local workers declines due to migration of people from rural to urban areas                            | Company must invest in technology to reduce farmer workload, as well as run regional programs to attract younger generations of workers and address their needs (USD) |

Table 7.2 continues on the next page.



| Capital             | Dependency category   | Example of relevant changes in capitals   | Example of relevant impacts on people and business resulting from dependencies  |
|---------------------|---|---|---|
|                     | Health of workers   | Undernourishment trends decline   | Company experiences improvements in productivity due to higher levels of nourishment in the workforce (USD)   |
|                     |   | Depression and stress cause higher turnover of staff  | Company suffers loss of skills and knowledge when workforce leaves due to mental health (USD)   |
| Social              | Social networks and cooperation   | The presence of financial cooperatives provides sustainable finance locally, increasing access to credit for farmers to replace machinery and equipment   | Increase in yields due to the use of modern equipment (USD)   |
|                     | Property rights   | Soil quality (natural capital) and therefore yield are higher as a result of tenure contracts signed for 5+ years   | Increase of yields due to better preservation of soil so tenant farmers have an increase in income (USD). Increased resilience to climatic shocks (USD) |
|                     |   | Increase in protest by local communities about overuse of genetically valuable organisms results in insufficient resources for local community            | The company experiences an increase in expenditure on legal processes and on security to protect installations from the community (USD)                 |
|                     | Social acceptance and trust   | Lack of transparency leads to failure to reach out to all relevant parties and results in minor problem escalating into large conflict                    | Increased cost of hiring people due to a reduction in company's ability to attract and retain employees (USD)   |
|                     |   | Reduced opposition and protest against business activities leads to improved trust among stakeholders   | The value of the brand increases (USD)  |
| Laws and regulation | Agricultural input company stops selling their products to government agencies at a higher price, decreasing the share of profit public officials receive | The company experiences a drop in revenue (USD)   |   |
| Produced            | Access to infrastructure and technology   | Business innovates in line with country culture, resulting in technological and methodological innovation being scaled in surrounding community with ease | The value of the brand increases and crops yields increase due to enhancement of natural capital (USD)  |



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

To identify the most significant impacts and/or dependencies—where you should focus your valuation efforts—you should first reassess the relative significance of each associated cost and benefit from Step 4 now that you have more information from Steps 5 and 6. For example, your prioritization process may have identified water use as a priority issue, but it may not be until you complete Steps 5 and 6 that you are able to identify the associated changes in capitals and the range of accompanying impacts on your business and your impacts on society (e.g., implications for nearby wetlands and recreational impacts).

Note: Depending on the scope of your assessment, you may need to consider the extent of the impacts and/or dependencies both now and in the future, the likelihood of market and/or regulatory change, the geographic area over which impacts occur, and the relevant time horizon of the assessment.

## 7.2.3 Types of valuation techniques

Valuation is the process of determining the importance, worth, or usefulness of something in a particular context. Understanding this context, which can be social, environmental, and/or economic, is essential, as without such understanding you cannot meaningfully estimate value or correctly interpret results. Much of the contextual information you need will have been identified in Steps 1 to 6, but it is important to review this as you proceed.

A popular valuation shortcut is “value transfer.” This involves using the results of previous assessments, rather than collecting primary data for a new analysis. While there are important limitations to the value transfer approach as the results are often less accurate or credible, assessments using this shortcut are often easier and quicker, hence their popularity. You can find more detail about value transfer approaches in Box 7.1 of the Natural Capital Protocol.

For each cost and/or benefit identified, you will need to select an appropriate valuation technique based on whether you intend to assess values in qualitative, quantitative, or monetary terms.

- ◆ **Qualitative valuation** techniques are used to inform the potential scale of costs and/or benefits expressed through qualitative, non-numerical terms (e.g., increase in health impacts from fertilizer use, decrease in value of the brand due to corruption scandals). It relies on data and information that can be descriptive in nature and/or convey more subjective perceptions of change. Normally implemented through questionnaire surveys, deliberative approaches, or expert opinions, qualitative valuation may be useful for a preliminary identification of impacts and/or dependencies and is sometimes the only approach possible given the nature of the assessment and/or data available. Qualitative valuation may express relative value using terms such as high, medium, or low, or ranking options using defined categories. The process of developing scales as part of a relative valuation approach is as important and can be as complex as deciding upon measurement metrics (WBCSD 2016b). Qualitative valuation may also take the form of stories, case histories, selected quotations, or expressions of emotional responses to changes in capitals. Qualitative valuation can be useful for understanding relational values and for capturing some intrinsic values as well.
- ◆ **Quantitative valuation** techniques focus on numerical data which are used as indicators for these costs and/or benefits (e.g., rate of decrease in fish stock in local river, increase in percentage of people undernourished). Such techniques are used to express the value of impacts and/or dependencies in numerical, non-monetary, terms. It is different from quantitative measurement in that quantitative valuation relates to the importance, worth, or usefulness of the impact and/or dependency by taking into account the context and ideally including affected stakeholders. So, for example, a business creating 1,000 jobs in an area with a 15% unemployment rate may cause an impact of far greater value to stakeholders than a business creating 2,000 jobs in an area where there is a 5% unemployment rate. Quantitative valuations typically require quantitative measures as an input (e.g., the number of jobs created); these quantitative measures are also a prerequisite for monetary valuation.



- ◆ **Monetary valuation** techniques translate quantitative estimates of costs and/or benefits into a single common currency. These techniques are used to determine the value of impacts and/or dependencies in a common unit of measure, such as US dollars, euros, etc., for ease of comparison with financial values (e.g., business costs or revenue). Monetary valuation (if sufficient information is available) is best used to provide information on the marginal value/net costs or benefits of an intervention that alters the quality and/or quantity of natural, human, and social capitals, either at a point in time or over a given period. It can also be useful for assessing the distribution of costs and benefits among different stakeholders or the cost–benefit ratio of different interventions. Most monetary valuation techniques aim to measure changes in well-being (see Annex B of the Natural Capital Protocol for more detail on these valuation techniques). The monetary valuation of capital impacts and/or dependencies may require statistical techniques that are best carried out by qualified experts.

For further discussion on advantages and disadvantages of each type of valuation, see Table 7.3 of the Natural Capital Protocol.

Different audiences will have different needs and preferences concerning the information they use to make decisions, including preferences for qualitative, quantitative, or monetary valuation:

- ◆ An assessment designed for external stakeholders, such as local communities, might focus on qualitative and quantitative valuation techniques that are transparent and that non-experts can easily understand, such as total injuries avoided or change in antibiotic resistance.
- ◆ If governments are an intended audience, they may be interested in the monetary valuation of capitals impacts. Certain forms of monetary valuation can reflect the preferences and priorities of citizens or identify opportunities for governments to reduce costs as a result of welfare improvements or improved efficiency in resource use. Examples include: a business's direct contribution to reduction of food loss and waste; government savings from avoided health spending due to improvement in safety measures; and well-being changes among communities due to business reduction in pollution levels.
- ◆ Internal stakeholders may be more interested in performance against quantitative targets or key performance indicators alongside impacts on departmental budgets. These may be in line with targets set for internal or external purposes.

#### 7.2.4 Select appropriate valuation techniques

The choice of valuation technique depends on which impact drivers or dependencies you wish to assess, the chosen value perspective (i.e., business, societal, or both), the ultimate objective of your assessment, the stakeholder perspective valuing the impact, and the time and resources available. You may find that the same impact is valued differently based on who is being impacted. There may be trade-offs between different valuation techniques in terms of their relative precision, time, cost, and utility for the desired use.

All valuation methods have advantages and disadvantages (TEEB 2010) and, generally speaking, a sequential, pragmatic approach of identifying and estimating costs and/or benefits qualitatively, followed by quantification and monetization, when possible, is recommended (TEEB 2011). An important valuation limitation can be uncertainty around potential future costs or benefits, particularly in proximity to critical thresholds (or "tipping points") and potentially irreversible changes which are harder and more expensive or possibly even impossible to reverse. A precautionary approach is therefore advisable in some contexts. It may be worth valuing the impact of these thresholds being exceeded to understand the scale of risk for the organization or society.

Various factors will influence which valuation techniques are best for your assessment. As well as identifying which techniques are most appropriate for your chosen scope, you will want to take account of data availability, budget and time constraints, the level of stakeholder engagement desired, and the degree of accuracy required for your objective.



Qualitative valuation techniques, for example, are good for eliciting contextual detail and intangible values, but do not provide numerical precision, measures of variance within a sample, or results that can be easily compared to financial costs and benefits.

Ultimately the techniques that give you values that help in your decision-making context are most useful. It is possible to include qualitative, quantitative, and monetary values in a single decision if the decision maker is able to balance them against each other either informally or through a weighting process in a multi-criteria analysis.

Table 7.1 of the Natural Capital Protocol summarizes these techniques and will help you select the technique(s) appropriate for your needs. If adequate data do not exist and/or you do not have time or resources for primary research, the most cost-effective approach is to use value transfer and this is a common place to start. Value transfer is not as reliable as primary valuation, so you need to bear this in mind when applying the results. Table 7.1 of the Natural Capital Protocol also gives an indicative time and budget rating on a three-point scale.

Table 7.3 outlines examples of techniques to value consequences of impacts on natural, human, and social capitals identified in Table 7.1.

**Table 7.3** Examples of techniques to value consequences of impacts

| Capital | Impact driver category    | Example of relevant impact on people and society   | Example of quantitative valuation techniques   | Example of monetary valuation approach    |
|---------|---------------------------|--|--|---|
| Natural | Water use                 | Change in infectious disease incidence (i.e., diarrhea) due to change in intake of low-quality water or lack of water for hygienic purposes (DALY) | Life cycle impact characterization factors which measure the changes in incidence of diseases per cubic meter of water use | DALY valuation (see Box 7.2)              |
|         |                           | Change in food security due to changes in water availability for irrigation and fisheries/aquaculture activities (DALY)                            |  |   |
|         | Terrestrial ecosystem use | Change in ecosystem services provision (USD)   | Life cycle impact characterization factors   | PDF valuation (see Box 7.3)               |
|         | GHG emissions             | Change in disease and flooding incidence (DALY)  | Integrated assessment models (IAMs)  | Social cost of carbon (SCC) (see Box 7.4) |
|         |                           | Change in ecosystem services provision (USD)   |  |   |
|         |                           | Change in fish stock availability (tons)   |  |   |

Table 7.3 continues on the next page.





| Capital | Impact driver category      | Example of relevant impact on people and society  | Example of quantitative valuation techniques | Example of monetary valuation approach   |
|---------|-----------------------------|---|--|--|
|         | Pesticide and herbicide use | Change in disease incidence (DALY)  | Life cycle impact characterization factors   | DALY valuation (see Box 7.2)   |
|         |                             | Change in ecosystem services provision (USD)  | Life cycle impact characterization factors   | PDF valuation (see Box 7.3)  |
|         | Fertilizer use              | Change in ecosystem services provision (USD)  | Life cycle impact characterization factors   | PDF valuation (see Box 7.3)  |
|         |                             | Expenditure of non-absorbed fertilizer (USD)  | Direct measurement or studies                | Market valuation   |
|         | Soil use                    | Change in yields (tons)   | Biophysical modeling                         | Market valuation   |
|         | Waste generation            | Change in ecosystem services provision (USD)  | Direct measurement or studies                | Contingent valuation (or value transfer) to assess existence value of marine species |
|         |                             | Change in human health and ecosystem services provision due to greenhouse gas emissions, land use, water consumption, and air, land, and water pollution emissions associated with disposal of waste via landfill, incineration, or recycling (DALY, USD) | Life cycle impact characterization factors   | DALY valuation (see Box 7.2)   |
|         |                             |   |  | PDF valuation (see Box 7.3)  |
|         |                             | Social cost of carbon (SCC) (see Box 7.4)   |  |  |
|         | Animal welfare conditions   | Change in livestock production (tons)   | Livestock epidemiological studies            | Market valuation   |
| Human   | Nutritional content of food | Change in disease incidence, such as chronic and acute disease, especially cardiovascular diseases, diabetes, and some cancers (DALY)   | Nutritional studies/modeling approaches      | DALY valuation (see Box 7.2)   |

Table 7.3 continues on the next page.



| Capital   | Impact driver category                 | Example of relevant impact on people and society  | Example of quantitative valuation techniques                    | Example of monetary valuation approach   |
|---|--|---|---|--|
|   | Use of substances harmful to consumers | Change in duration of infectious diseases (DALY)  | Toxicological studies/modeling approaches                       | DALY valuation (see Box 7.2)   |
|   |  | Change in amount of antibiotics consumed to have effective response (gr)  | Toxicological studies/modeling approaches                       | Market valuation   |
|   |  | Expenditure in antibiotic used in preventive treatments (USD)   | Toxicological studies/modeling approaches                       | Market valuation   |
|   | Food safety practices                  | Change in disease incidence (e.g., diarrhea, cancer) (DALY)   | Toxicological studies/modeling approaches                       | DALY valuation (see Box 7.2)   |
|   | Employee health and safety conditions  | Change in working fatalities/injuries due to fatigue and stress (lost time injury frequency rate and fatal injury frequency rate) | Direct measurement or studies/modeling approaches (see Box 7.6) | Monetary valuation of healthcare costs, productivity/earnings loss, and quality of life loss (see Box 7.5) |
|   | Salaries and benefits                  | Change in worker productivity (USD)   | Studies/modeling approaches                                     | Market prices  |
|   | Workers' living conditions             | Change in worker fatalities/injuries due to fatigue and stress (DALY)   | Studies/modeling approaches                                     | DALY valuation (see Box 7.2)   |
|   | Labor rights                           | Change in value of the brand (USD)  | Direct measurement approaches                                   | Market valuation   |
|   | Gender rights                          | Change in productivity of workforce due to lack of motivation (USD)   | Direct measurement approaches                                   | Market valuation   |
|   | <b>Social</b>                          | Food security   | Change in productivity of workforce (USD)                       | Studies/modeling approaches  |
| Change in potential development of future generations (USD) |  |   |   |  |

Table 7.3 continues on the next page.



| Capital | Impact driver category                      | Example of relevant impact on people and society  | Example of quantitative valuation techniques | Example of monetary valuation approach                      |
|---------|---|---|--|---|
|         | Food loss and waste                         | Change in productivity of workforce (USD)   | Studies/modeling approaches                  | Market valuation  |
|         |   | Change of health impacts (DALY) and potentially disappeared fraction of species (PDF) due to reduction of food waste generation | Life cycle impact characterization factors   | DALY valuation (see Box 7.2)<br>PDF valuation (see Box 7.3) |
|         | Integration of workforce into communities   | Change in voluntary turnover rate (%)   | Direct measurement/studies                   | Market valuation (hiring/adaptation costs)                  |
|         | Benefit sharing with indigenous communities | Change in duration of license to operate (years)  | Direct measurement                           | Market valuation  |

#### Box 7.2 Disability-adjusted life years (DALYs) valuation

In several studies across the food sector, DALYs lost have been valued based on global estimates of the value of a life year. By using global median values, ethical challenges associated with assigning a higher value in high-income countries compared to low-income countries can be avoided. Alternatively, global estimates can be adapted by country using income levels and income elasticity. Please see TEEBAgriFood case studies by Raynaud et al. 2016, Bogdanski et al. 2017, and Balthussen et al. 2017.

#### Box 7.3 Potentially Disappeared Fraction (PDF) valuation

In a number of studies across the food sector, the monetary value of changes in ecosystem service provision has been assessed by measuring how changes in species richness can result in changes in ecosystem function and therefore the value of the ecosystem services provided.

These studies have focused on establishing the link between PDF and a measure of ecosystem function (such as net primary productivity) for specific ecosystem types and then valuing the resulting change in ecosystem services provided by each ecosystem type. Please see studies by Raynaud et al. 2016, Bogdanski et al. 2017, and Balthussen et al. 2017.

#### Box 7.4 Social cost of carbon (SCC)

Greenhouse gas (GHG) emissions can be valued in monetary terms using an estimate of the social cost of carbon (SCC). The social cost of carbon is an estimate of the monetary value of impacts of an incremental increase in GHG emissions in a given year and reflects the full global cost of the damages caused by GHG emissions over their lifetime in the atmosphere. Integrated Assessment Models (IAMs) are used to translate economic and population growth scenarios, and the resulting GHG emissions, into changes in atmospheric composition and global mean temperature.

The Interagency Working Group on the Social Cost of Carbon provides these estimates (IWGSCC 2013).

Other alternatives are: (i) market prices observed in emissions trading schemes (ETS) and (ii) estimates of the marginal abatement cost (MAC) of GHG reductions.

### Box 7.5 Measurement and valuation of injuries and fatalities at work

The measurement of injuries and fatalities at work can be conducted through:

- ◆ Direct measurement of injuries and fatalities at work. Estimation of recovery time due to injuries and/or lost years of life due to a workplace fatality (this can be assessed by, for instance, estimating average workforce age and the average lifespan of individuals in each country).
- ◆ Studies/modeling approaches. For example, some studies assess the potential increase of illness and injury due to overtime (i.e., Dembe et al. 2005) or the risk of stroke due to overtime (i.e., Kivimäki et al. 2015).

For the monetary valuation of injuries and fatalities at work, various studies on the value of socioeconomic impacts in different sectors (including Trucost 2019) consider three components:

- ◆ Healthcare costs. This can be done using national health insurance systems' reference cost of treatments.
- ◆ Productivity losses/earnings losses during recovery time or time unable to work.
- ◆ Lost quality of life due to injury and recovery. Disability weights (World Health Organization 2017) reflect the severity of a disease on a scale from 0, representing perfect health, to 1, representing death. The disability weight for a disease can be interpreted as the fraction of one year of life at full health that is lost, or the number of DALYs lost per annum, due to an illness or injury. DALYs can be valued using the DALY valuation approach outlined above.

When using a mix of techniques and/or measuring different value perspectives, you should ensure that values are consistent with one another—especially if you are going to directly compare or aggregate them. For example, when considering monetary values associated with providing a training course, it is possible to measure in monetary terms both the resource cost to a business of running the course and the well-being benefit to an individual from the increased earnings they can expect as a result of taking the course. The first value represents the value of the impact driver to the business, while the second value represents the value of the impact; therefore, they represent different stages of the impact pathway and should be compared with caution. Only values that represent the same level of the impact pathway and use comparable valuation techniques may be simply aggregated into a total impact figure—apply caution when comparing or aggregating in other circumstances. Also pay attention to the distribution of value between different stakeholder groups. Care should also be taken to avoid double counting, especially where a multitude of impacts are being investigated at the same time.

**Level of rigor and granularity:** Determine the appropriate level of rigor to apply. Some businesses may decide that relatively broad estimates are sufficient to inform key decisions and will withstand critique from internal and external stakeholders. Other businesses may choose techniques that have higher levels of accuracy and credibility but may be time- and labor-intensive. Remember that any valuation that takes place includes a value that was previously missing from the decision-making process. High levels of uncertainty should not be a reason not to carry out an assessment. For example, understanding whether the number of accidents that might occur is in the magnitude of tens versus in the magnitude of hundreds, whilst inaccurate, are decision useful. Whatever the choice, it is advisable to be transparent about the level of uncertainty in the results. You can do this by conducting sensitivity analysis (Step 8) to examine the effect of changes in key data or assumptions on your results.

Techniques to value the consequences of impacts on natural, human, and social capital may be used to assess the value of incremental or marginal changes in capital stocks or flows, which will be relevant for most business applications. The same techniques can be used to assess the total (aggregate) value of capital stocks, although this is rarely necessary and may require additional analysis. Box 7.3 of the Natural Capital Protocol provides an overview of the valuation of natural capital stocks through qualitative, quantitative, or monetary assessments, discussing some of the challenges associated with assumptions required to determine some of these values. For further guidance on using each of the valuation techniques for natural capital assessments, refer to Annex B in the Natural Capital Protocol.

Note: Expert input is likely to be helpful here considering the range of factors that influence the practicality and appropriateness of applying the various techniques.



Willingness to pay (WTP) (as measured through different valuation techniques) and market price for a good or service are different concepts. Willingness to pay measures the maximum amount someone would hypothetically be prepared to pay for a good or service in a hypothetical market. It is determined by an individual's tastes and preferences, and is constrained by their income (i.e., their ability to pay) and can be influenced by a wide range of factors. Market price represents what is actually paid for a good or service. It is determined by market and institutional factors (e.g., market structure and competition, regulatory interventions, and aspects such as property rights). Understanding the difference between WTP and market price gives an insight into the value of your impacts on society.

A key issue for all monetary valuations is to avoid double counting. This can occur, for example, when intermediate costs and/or benefits, rather than only final costs and/or benefits, are assessed. For example, the value of wheels is included in the price of a car sold. So, recording both the price of wheels and the price of cars in a balance sheet is an example of double counting. Note that the classification of ecosystem services, such as in the Common International Classification of Ecosystem Services (EEA CICES 2016) and Final Ecosystem Goods and Services Classification System (FECS 2012) classification systems, may help to avoid double counting.

Note: Refer back to your planning issues from Step 3, as this may influence which valuation technique is most appropriate.

#### Box 7.6 Discounting in capitals valuation

Where capitals valuation relates only to private costs or benefits to a business, it is appropriate to use that business's normal financial discount rate to express future costs or benefits in present value terms (i.e., the standard "hurdle rate" used for project appraisal, or the business's weighted average cost of capital (WACC)).

However, it is rare that decisions relating to capitals have purely private consequences attributable only to the decision maker. It is therefore much more likely that valuation will need to consider costs or benefits accruing to third parties (referred to as impacts on society).

Where these future societal costs or benefits are concerned, it is appropriate to apply a discount rate which reflects the balance of preferences (among all the affected stakeholders) for consumption now versus consumption in the future—this is referred to as a societal or social discount rate (SDR).

Societal discount rates vary but are almost always lower than normal financial discount rates, principally because they attempt to reflect the well-being of future generations as well as generations alive today. This can be particularly important in the context of natural capital which, unlike most other forms of capital, can continue to provide benefits indefinitely if it is managed well.

Typical social discount rates range between 2–5%, but in some contexts higher, lower, and even negative discount rates can be justified. A common approach to address potential debate about the appropriate discount rate is to test the sensitivity of results and conclusions using multiple different discount rates.

A thorough discussion of discounting in the context of biodiversity and ecosystem services is included in Chapter 6 of TEEB's "Ecological and Economic Foundations" report (TEEB 2010).

### 7.2.5 Undertake or commission valuation

You should now be in a position to either undertake or commission the relevant valuation for your chosen assessment.

Note: Because significant training and applied experience are generally required to apply valuation techniques with confidence, these Guidelines do not give details on application and execution of these techniques.

### 7.3 Outputs

The output of this Step should include:

- ◆ A completed valuation (whether qualitative, quantitative, or monetary or a mix of all three) of costs and benefits.
- ◆ Documentation of all key assumptions, data sources, limitations, methods used, and resulting values.

Step 7 of the Guidelines has provided additional guidance to help you define the consequences of natural, social, and human capitals impacts and dependencies.





## Business Case 7.1

# Arvind, India

## A comparative business case on the human and ecological costs of sustainable and conventional cotton production”: PART II MEASURE & VALUE

### FRAME and SCOPE

In paragraph 4.3 the case of Arvind Ltd, an Indian textile-to-retail conglomerate, was introduced. Arvind applied a capitals assessment to evaluate the human and ecological costs of water use per kilogram of seed cotton produced under Better Cotton (BC) principles to compare this to conventional practices. This business case highlights how they advanced in the Measure & Value and Apply Stages.

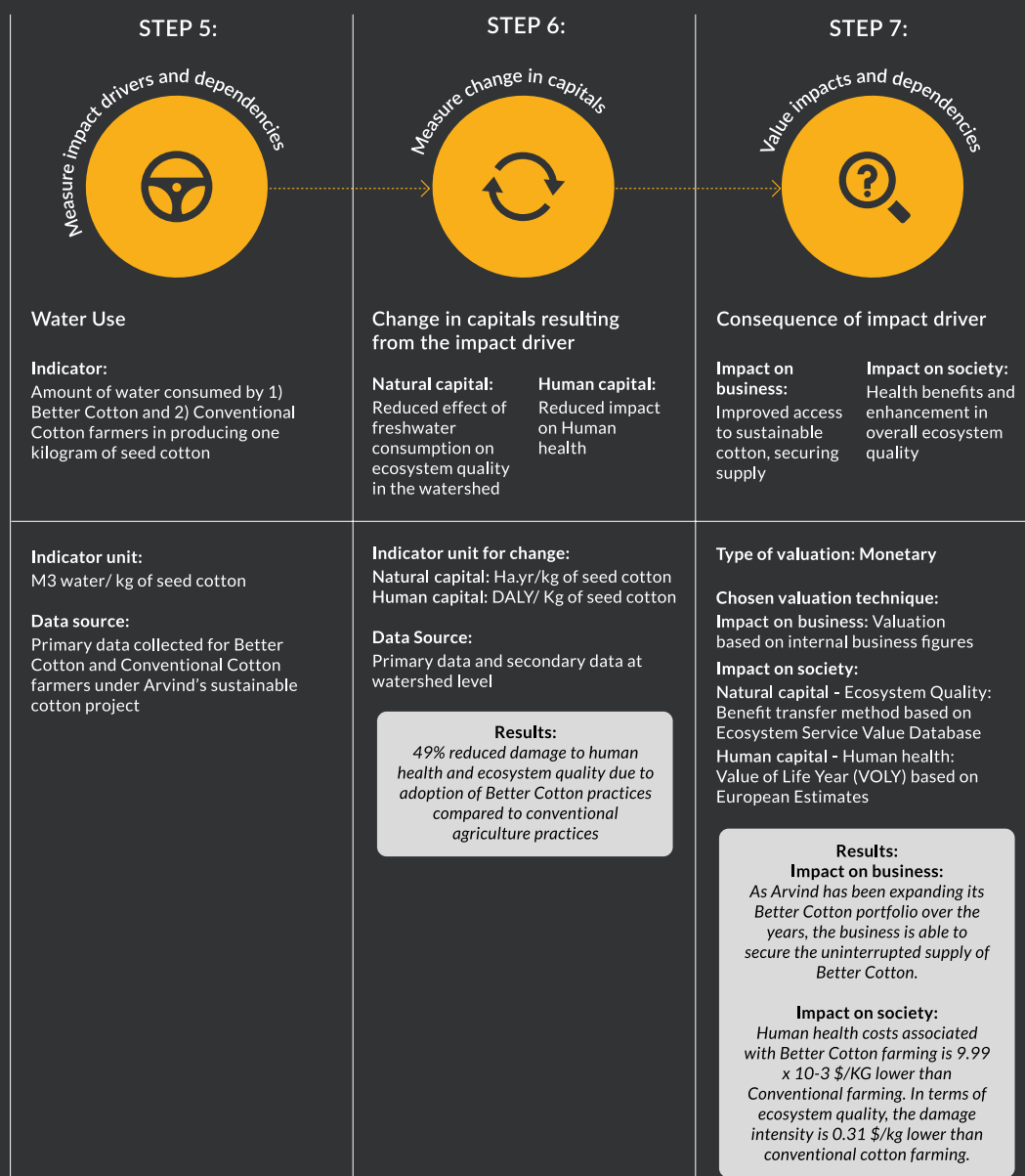


Figure 7.2 Arvind progressing through Step 5, Step 6, and Step 7 of the Measure & Value Stage



Arvind found a 49% reduction in damage to both human health and ecosystem quality as a result of using Better Cotton practices. However, the changes in the values of the capitals have been calculated differently.

For quantifying the impact on human health, Arvind used watershed-level DALY figures based on Pifster (2009) along with the company's primary data on water consumption per kilogram of cotton production. This quantification was done for Better Cotton and conventional cultivation scenarios. Arvind then converted the result into a percentage to compare both scenarios. The company found a 49.31% lower impact on human health under Better Cotton practices.

The same sources have been used to quantify the impact on ecosystem quality. The result was a 49.50% lower impact under Better Cotton practices. Due to the similarity, both calculations have been rounded off to 49%.

### APPLY

Applying a capitals assessment has provided Arvind with a more holistic picture of the company's sustainable cotton portfolio and a justification for incremental shifts from conventional to sustainable cotton projects like Better Cotton. Arvind used the results of the assessment to create a business case for the expansion of sustainable sourcing, to train internal teams and departments (sourcing, marketing, production, and compliance teams, among others), and to communicate with external stakeholders for engagement and collaboration.

In the future, Arvind will incorporate a capitals approach into their sourcing strategy, and use the TEEBAgriFood Evaluation Framework to explore and deepen their understanding of other impact drivers and dependencies like pesticide use, workforce, soil health, emission and waste reduction, and resource circularity.

For more details and updates, please click [here](#).





# Stage 4: Apply

## What next?

### What is the Apply Stage?

The Apply Stage of the Protocols summarizes the capitals assessment process by helping you interpret and apply your results in your business. It also encourages you to consider how to optimize the value from this and future assessments.

The Apply Stage involves two interlinked Steps:

| Step                                       | Question that this Step will answer  | Actions  |
|--|--|--|
| <b>8</b><br>Interpret and test the results | How can you interpret, validate, and verify your assessment process and results? | 8.2.1 Test key assumptions<br>8.2.2 Identify who is affected<br>8.2.3 Collate results<br>8.2.4 Validate and verify the assessment process and results<br>8.2.5 Review the strengths and weaknesses of the assessment |
| <b>9</b><br>Take action                    | How will you apply your results and integrate capitals into existing processes?  | 9.2.1 Apply and act upon the results<br>9.2.2 Communicate internally and externally<br>9.2.3 Make capitals assessments part of how you do business   |

### Additional notes

Businesses operating in the food sector should address all actions associated with each Step in the Apply Stage. The Guidelines provide practical examples of how capitals thinking can be incorporated within business decision making.



# 8 Interpret and test the results

## 8.1 Introduction

This section provides additional guidance for answering the following question:

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

Step 8 will help you interpret and test the results of previous Steps, including validation and formal verification.

The overarching question of Step 8 can be unpacked into the following questions:

- ◆ What do my results mean? This Step provides practical guidance on how to interpret the results of your assessment.
- ◆ How reliable are the assessment process and results? This includes guidance on how to validate the assessment process itself, as well as how to test that your assumptions are correct and to determine the level of confidence in your results.
- ◆ Does the documentation available provide a comprehensive and accurate representation of the assessment process and results? This includes consideration of whether external verification may be necessary.
- ◆ Was the assessment worthwhile? Before exploring what actions you could take as a result of your assessment, consider the value of the assessment you have just completed.

## 8.2 Actions

In order to interpret and use the results of your assessment with confidence, you will need to complete the following actions:

8.2.1 Test key assumptions

8.2.2 Identify who is affected

8.2.3 Collate results

8.2.4 Validate and verify the assessment process and results

8.2.5 Review the strengths and weaknesses of the assessment

### 8.2.1 Test key assumptions

There will always be some estimation or approximation involved in a capitals assessment. You should therefore avoid precision and instead present any numbers in a range or rounded and document your decision to do this. To understand what level of confidence you can have in your results, you will need to carry out a sensitivity analysis. This involves testing how changes in assumptions or key variables affect the results of an assessment (see Table 8.1). Sensitivity analysis may involve simulation modeling to identify critical thresholds, where small changes in the value of assumptions yield large changes in assessment results. Alternatively, it may simply involve reporting a range of potential values for a particular impact or dependency. If value transfer has been used in the assessment, it is essential to conduct a sensitivity analysis to determine if the values used are relevant to your situation.

The potential to undervalue or overvalue costs or benefits exists in any valuation exercise. In the case of natural, human, and social capitals valuation, the likelihood of significant valuation errors can be greatly reduced by involving relevant experts, using recognized



methods, and following good practice guidance which has been developed and tested over many years. Generally, it is preferable to follow the most reasonable assumption, rather than defaulting towards best- or worst-case assumptions. Where proximity to a threshold or potential of severe consequences of valuation exist, it is preferable to adopt a precautionary approach to valuation.

**Table 8.1** Examples of assumptions to test in a sensitivity analysis

| Assumptions you can test:       | How do my results change if...  |
|---------------------------------|---|
| Number of people affected       | 15,000 instead of 1,500 people are affected?  |
| Magnitude of change in capitals | Training hours on health and safety are doubled?  |
| Changes in key prices           | Prices of energy or water change (e.g., what if the cost of carbon goes from USD 5 to 75 per ton of CO <sub>2</sub> e)? |
| Changes to discount rates       | A discount rate of 2%, 5%, or 10% is used?  |
| Time horizon                    | The assessment is carried out over a 10-, 30- or 60-year time frame?  |

There are different methods of carrying out a sensitivity analysis, many of which require knowledge of statistics. All methods are designed to help you understand the degree of confidence you can have in your results, without overstating their accuracy.

As a starting point, you may apply one of the most commonly used models, “one-at-a-time” or “one-factor-at-a-time” sensitivity analysis. As the name suggests, this involves changing one factor (assumption or variable) at a time to see what effect this produces. The output of this analysis:

- ◆ Provides a range of estimates, rather than one single number, which may reflect varying levels of confidence.
- ◆ May help to identify “switching values.” These are values that a particular parameter or factor needs to attain in order to switch or flip the outcome, for example by altering the ranking of multiple options, changing a result from negative to positive, or crossing a threshold.

It is critically important to understand and clearly communicate the level of confidence you have in your results, so that this is taken into consideration when applying them to business decisions. For example, when using value transfer for monetary valuation, existing value estimates in the literature can vary greatly, giving vastly different results depending on the reference value chosen. You should make this variation explicit and discuss its implications, especially if using this information alongside other monetary values.

Furthermore, in the case of monetary valuation, the values may be sensitive to changes that are outside the business’s control, such as fluctuations in exchange rate, inflation, and purchasing power parity. This can mean that a business’s impact could change between assessments without the business having changed its actions. Where possible, and particularly in the case of monetary valuation, businesses should carry out a sensitivity analysis to test assumptions and communicate the results of the sensitivity analysis alongside the assessment results.

### 8.2.2 Identify who is affected

Distributional analysis is used to understand who is affected by a decision, and whether they gain or lose. Use a distributional analysis to identify which stakeholders gain or lose as a result of your natural, human, and social capitals impacts and/or dependencies, and whether they might gain or lose in the future as a result of your anticipated actions or responses following the capitals assessment.





Distributional analysis is not only an important element in the assessment itself, but also influences how your results may be interpreted and used. For instance, to appreciate the impact of increasing wages for one group of workers on wage equality, you need data on the top, median, and bottom wage deciles. Having gender-disaggregated and gender-specific data is also crucial to appreciating potential gender inequalities or discrimination.

Note: Remember that the type of stakeholder affected may influence the type and magnitude of different values. To give an obvious example, recreational or amenity natural capital values for a particular site will vary depending upon whether a person is a local resident or not.

### 8.2.3 Collate results

In order to interpret your results, you first need to bring the values together in a way that is appropriate to your assessment. This is likely to involve some form of analytical approach or framework such as cost-benefit analysis, multi-criteria analysis, Environmental Profit and Loss Account (EP&L), or Total Contribution (see A4S 2015 and WBCSD 2013). If your assessment is designed to support a “total impact” or “net value” application, or to “compare options” using net present value (NPV) analysis, you will need to use a discount rate (see Box 7.6) and you may need to add up the different values that you measured.

#### Box 8.1. Double counting\*

There is a risk that impacts and dependencies on capital assets will be counted twice, or even potentially multiple times. This issue can be exacerbated in integrated capital assessments.

Ensure that capital asset impact values are explicitly categorized between the different capitals and wherever possible are not counted twice. Where you are dealing with a hybrid asset, be clear about under which capital you will account for it. It is advised to organize a process that does not count the impact or asset twice.

Avoiding double counting produces more accurate and valid results and thereby improves decision making.

When adding different values you need to be clear about what can and cannot be added together. For example, combining all the values identified from different parts of your value chain (direct and indirect, upstream and downstream) could lead to additional credit and responsibility being attributed to you and/or double counting of results. In this case, direct and indirect values should be reported separately.

If you are using quantitative valuation rather than monetary valuation, where appropriate you can convert different metrics (e.g., kg and m<sup>3</sup>) into scores for improved comparison. The comparison can be further enhanced by weighting the scores in terms of their overall importance to stakeholders, as is often done using multi-criteria analysis.

A particular difficulty is that different natural, human, and social capital impacts and dependencies require tailored approaches and there may be a number of alternatives to choose from. Differences between these alternatives may include their level of precision, their granularity, and the completeness of the value that they represent. You should aim to produce values that are (as far as possible) consistent with one another—especially if you are intending to directly compare or aggregate them.

To interpret and present the results, businesses must collate them in a way that makes sense internally and for other relevant audiences. This is likely to involve some type of analytical framework, such as a cost–benefit analysis, total profit and loss account, or total societal contribution. Some businesses may take a macro picture of their performance across various capitals—social, human, natural, and produced—to identify the relative positive and negative performance for each and, in some cases, for each part of the value chain.

Just because it is possible to value an impact does not, by itself, justify trading one impact off against another that may be valued more highly. Similarly, the value of the impacts from an activity may be positive in a net figure but there may be negative impacts masked within that. For example, there may be situations where employment and wage payments create



value for workers but working conditions are unfavourable. It is important to look both at the total value and the individual elements, including different groups and capitals impacted (see distributional analysis), to ensure that you do not overlook any key risks or obligations.

#### Box 8.2 Dealing with trade-offs

Applying a multi-capital approach often demonstrates that it's almost impossible to avoid impacts at one location or another, or between stakeholders, or elsewhere. When deciding between alternative courses of action, while the aim is typically to derive positive impacts, there will inevitably be negative impacts somewhere; this is an unavoidable truth of operating in a complex world. Having integrated information gives you greater insight into the consequences of decisions than any other tool. Estimating monetary values for the different positive and negative impacts or applying multi-criteria analysis can help you evaluate and compare trade-offs. Such approaches cannot make these decisions for you, but they can provide you with enhanced insights to make a better informed decision.

How you make your decisions and prioritize between impacts will often depend on the fundamental purpose of your business. 8 9 Maybe your purpose already extends beyond profit, or maybe you want to deliver the greatest value to society you can within the remit of creating shareholder value. When faced with making decisions with no obvious win-win-win outcome, you will have to be led by the most meaningful way forward for your business, and all stakeholders to whom the business is accountable.

The Guidelines encourage the following good practice when making trade-offs in decisions:

- ◆ Be as transparent as you can with decision makers about the range of positive and negative impacts, and their relative value to the different stakeholders affected.
- ◆ Show the trade-offs clearly in terms of the winners and losers.
- ◆ Consider not only the intended but also any unintended consequences of decisions, as revealed by your capitals assessment.
- ◆ Where possible, apply the mitigation hierarchy to any negative impacts.

#### Box 8.3 Comparisons and trade-offs in monetary valuation

Valuing capital impacts and dependencies in monetary terms can be a powerful aid to decision making and can facilitate comparison between diverse categories of impact and dependence. However, exercise caution when interpreting or comparing monetary values because:

- a. different monetary estimates may reflect different value perspectives (e.g., business or societal), and
- b. some monetary estimates will only be partial estimates of the overall value.

#### Impacts on your business and your business dependencies

When valuing impacts on your business or your business dependencies, the intent of valuation is to estimate actual or potential financial costs or benefits to the business. A general rule here is that values based on observed market prices, taxes, or charges are likely to be more readily comparable, whereas estimates based on other techniques should be carefully assessed in terms of their comparability.

#### Your impacts on society

When valuing your impacts on society, the intent of valuation is to estimate costs or benefits accruing to society as a whole or to particular groups within it. These costs or benefits are estimated in terms of changes in human well-being (also referred to as human welfare). Societal values derived using methods consistent with the theory of welfare economics are likely to offer better comparability, but this is not guaranteed. A distinction is frequently drawn between financial/market values\* (often referred to as "exchange values") and welfare/well-being values. However, this distinction is not always helpful for assessing the comparability of values. Exchange values can be either strong or weak proxies for welfare values depending on the characteristics of the market in which the exchange takes place. Furthermore, there can be at least as much variation between values derived using inconsistently applied welfare-based methods as there is between exchange values and welfare/well-being values. If you're unsure about comparability in the results of your assessment you should seek independent expert advice.

For example, in an assessment concerned with natural capital impacts on society, it would not be appropriate to apply a societal cost of carbon to GHG emissions and an internal abatement cost to water consumption and then use the results to prioritize the company's mitigation actions between GHG emissions and water consumption. This is because the internal water abatement cost is not likely to be a good indicator of the societal cost of water consumption.



### 8.2.4 Validate and verify the assessment process and results

The four principles of a capitals assessment provide a guide to validating and verifying your results, highlighting the need to check that your assessment was relevant, rigorous, replicable, responsible, and consistent. Different types of checks require different levels of effort (e.g., systematic or random, process audits, external validation), so you need to decide what levels of validation\* and/or verification\* are required for your assessment, and the desired level of credibility.

Validation and verification may cover either the assessment process or the results or both. The benefits of rigorous validation and verification can be significant:

- ◆ **Validation** of the accuracy and completeness of your results may be required by internal colleagues involved in making the decision that your assessment is intended to inform.
- ◆ **Verification** can provide confidence to various stakeholders that the data and methodologies used are fit for purpose and that the assessment results are sufficiently robust to be used as a basis for business decisions and/or external communication.

As described in Step 1, capitals assessments can be undertaken for different business applications. Each application may have its own validation and verification requirements, whether company-specific or specified by external parties (e.g., for financial reporting to satisfy the requirements of International Financial Reporting Standards or national Generally Accepted Accounting Principles (GAAP)). The extent to which validation and verification are undertaken depends partly on the proposed use and communication of your assessment. There are two main options:

- ◆ **Internal** reviews are “self-checks” that can be carried out within the company, ideally involving colleagues who were not directly involved in the assessment (e.g., internal audit department). This may be sufficient for internal decision making. Internal reviews are often more flexible and easier to conduct but will not deliver the same level of external confidence.
- ◆ **External** reviews typically involve people from outside the company. You may want or need to communicate your results to external stakeholders (e.g., for public reporting, to support customer relations, or to demonstrate compliance to regulators). In such cases, verification by independent experts can enhance the credibility of the assessment process and results. External reviews are typically more expensive and time consuming than conducting an internal review.

If an external review is required you will need to:

- ◆ Identify an appropriate external party to carry out the review.
- ◆ Agree to the scope and timetable for the review.
- ◆ Provide documentation of your decisions and processes.
- ◆ Inform relevant stakeholders (e.g., data owners) if they will be interviewed as part of the review process.

The completed review should include a summary statement of the level of confidence that may be placed on the assessment process and results, as well as any caveats around the assumptions used and remaining uncertainties. The statement of confidence may be qualitative (e.g., using a scale from “very low” to “very high”).

The review may also highlight actions that could be taken to improve confidence in the results. You will then need to decide if you intend to undertake any of these actions, which may involve revisiting part of your assessment.

### 8.2.5 Review the strengths and weaknesses of the assessment

Upon completing a capitals assessment, you and others will want to know what the strengths and weaknesses of the assessment were. This can inform future assessments and help identify what could be improved. This final “assessment of the assessment” will be informed by any structured validation or verification just carried out.



If the assessment fell short of expectations, try to identify how and what could have been done differently. This will be especially important if you plan to undertake more assessments in the future.

You may realize that you have limited confidence in the results. This could be as a result of significant caveats and/or assumptions on which your results are based. Would additional information reduce uncertainty and potentially change your conclusions? This could mean returning to earlier Steps to improve the assessment so that the results can be used as a credible basis to inform your decision. Or you may find that although you are comfortable proceeding based on your results, other stakeholders may require additional information to be convinced of the credibility of the assessment and results. You should be sure to report any relevant caveats and/or assumptions to allow these stakeholders to make this judgment themselves.

As a general rule, if there is uncertainty in the results (e.g., due to lack of data) but you are unable to go back and revisit the assessment (e.g., due to resource constraints), it is recommended to take a precautionary approach. This is particularly important if decisions taken based on the results of a capital assessment might surpass important limits and thresholds (e.g., ecological thresholds). In such circumstances, you may need to postpone making the decision.

You might also have gathered additional information that was not part of the initial objective but can still provide valuable insights – this information can be noted in your review.

Note: Your review can be a simple subjective exercise where you list the strengths and weaknesses of the assessment, or you may consider setting up an internal data collection and management system to track it in more detail. The review should help you to understand whether your assessment has captured enough of the necessary information or whether further iteration is required, either in this version of your assessment or in future assessments.

### 8.3 Outputs

The main output of this Step is a document explaining your interpretation of results. This should include:

- ◆ Results collated in a way that makes sense and can be interpreted internally and for other relevant audiences
- ◆ Key messages, caveats, assumptions, and uncertainties, including the results of sensitivity analysis if appropriate
- ◆ Output(s) from validation and internal/external verification (if appropriate) of the assessment process and results, including an objective acknowledgement of key assumptions and uncertainties around the results
- ◆ Notes on the review process itself, including how critical assumptions were tested, what level of confidence was deemed necessary, and why

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\*To read the full glossary definition click on the word

[Validation](#), [Verification](#), [Double counting](#), [Market value](#)





## Business Case 8.1

# Shengmu Organic Milk, China

## Considerations and caveats in a natural capital assessment

### FRAME

Shengmu Organic Milk, the largest organic dairy company in China, produces raw milk in a circular way integrating planting and cow raising in the Ulan Buh desert. Shengmu chose to use natural capital accounting to further understand their relationship with nature, incorporate natural capital into enterprise management, and provide information for corporate strategy, management, and operational decisions.

### SCOPE

The baseline is December 2019, with temporal boundaries to December 2022. The spatial boundaries include Shengmu headquarters, all subsidiaries, pastures and all production zones in the Ulan Buh desert ecosystem. The company applied natural capital accounting in its direct operations to value the costs and benefits of its activities, both from a business and societal perspective.

### MEASURE & VALUE

Shengmu identified priority impact drivers and dependencies, which they measured and valued in either quantitative or monetary terms.

As a good practice, the company acknowledged where data on value were not available. The company documented their sources on the value used in calculations as a reference.



## APPLY

Shengmu discovered opportunities to reduce operational and financial costs, as their environmental governance has paved the way for easier access to green loans. The nature-based production also boosts their revenue as their organic milk sells for a 21.7% higher price than regular milk. They observed that their ecological value is being partially converted into brand value as their brand value increased from 12 to 17 billion RMB in three years.

Following the mitigation hierarchy of 1) avoid, 2) reduce, 3) mitigate, 4) restore, Shengmu is pursuing solutions for each risk identified using a decision-making framework that adheres to nature-based solution principles. For example, they planted 90 million diverse trees and shrubs, built large water reservoirs, and produced 600,000 square meters of cow dung compost per year to replace chemical fertilizers for pastures. Shengmu committed to China's goals for carbon neutrality and to stay in line with the objective of the Paris Climate Agreement, and the company has set science-based carbon reduction targets.

Despite all efforts, the company recognizes the challenges ahead, specifically for biodiversity. In their interpretation, they highlight that 1) the lack of standardization and policy requirement for biodiversity disclosure and measurement is a barrier and 2) in the short term, implementing good biodiversity management practices outweighs the financial benefits such practices generate, so present incentive mechanisms are not substantial enough.

Shengmu also points out that currently carbon and biodiversity strategies usually exist in silos, where they should be integrated into a cohesive management system, but no regulatory measures show how to do so.

Finally, the milk company is now expanding their scope to complete a multi-capital accounting assessment that includes impacts and dependencies on human and social capitals. They aim to value their contributions to local community benefits, poverty alleviation, job creation, and tax contribution.

For more details and updates, please click [here](#).



# 9 Take action

## 8.1 Introduction

This section will provide additional guidance to allow you to answer the following question:

How will you apply your results and integrate the capitals into existing processes?

Step 9 considers how to act upon the results, how to communicate them to inform decisions and engage stakeholders, and how to build capitals assessments into your company's policies and processes on an ongoing basis. Previous Steps help you to complete an assessment. Conducting an assessment is the first of the high-level business actions on nature and is primarily covered in Steps 1-8 (see Box 9.1). The rest of the high-level business actions on nature, including Commit, Transform, and Disclose, are more related to this Step.

The overarching question may be broken down as follows:

- ◆ **What further capitals assessments are worthwhile?** Do you need to revisit or deepen certain aspects of the assessment just completed? Would your business benefit from conducting new or additional assessments? Does your assessment go far enough to capture all significant consequences? Is your understanding of the system developed enough? (Assess)
- ◆ **How will you use the results?** This includes guidance on how your results may be used to inform business decisions, given your objective and scope, and potentially to set targets. (Commit)
- ◆ **How should the results be communicated?** A few considerations are provided about how to communicate the results of your assessment, as well as the process you went through, keeping in mind any confidentiality concerns. (Disclose)
- ◆ **How can a capitals assessment be integrated into your business?** How does the assessment process relate to existing or new decision-making processes within your company, and what resources or decisions would be needed to embed capitals assessments into your business systems? (Transform)

When undertaking this Step, it is worth considering how to:

- ◆ Leverage your existing business strategy. To integrate the capitals into what you already do, the results should not just sit in your sustainability department but should be used in strategic and operational decision making. Ultimately a separate capitals approach should not be needed as this will automatically be part of how you do business.
- ◆ Establish clear, consistent, and relevant criteria for the success of capitals assessments. This will help you judge the business case for carrying out further assessments.
- ◆ Learn from and link to other related assessment processes in your company. Sometimes projects and activities that are closely related to capitals use language that obscures the link. For example, environmental, human, and social risk management can be considered a form of capitals protection but your colleagues may not make the connection.



### Box 9.1. High-Level Business Actions on Nature

Businesses are on a journey when applying the capitals approach. Capitals Coalition, along with Business for Nature, WBCSD, TNFD, Science Based Targets Network, WEF and WWF, have developed the high-level business actions for nature which can be utilized along this iterative journey.

ACT-D stands for Assess, Commit, Transform, and Disclose. The journey starts by assessing impacts and dependencies in an Assessment (A), the process that has been explained in these Guidelines. Once a business has a clear understanding of its impacts and dependencies on the capitals, it should Commit (C) to science-based targets for improvement. Transform (T) is the process in which a business acts on the information and intentions set out in Assess and Commit and makes changes to its practices to make improvements to the value created for itself and for society more widely. Disclosure (D) is an accountability process where a business publicly shares its progress. Disclosure may be voluntary or mandatory. The disclosure process should be a positive one where a business is able to share the positive impacts and dependencies on different capitals, and where if there is a negative relationship this offers an opportunity for improvement in the next iteration of the ACT-D process. Feedback from management and other stakeholders of the disclosure process can help shape future assessments, commitments, and transformations.

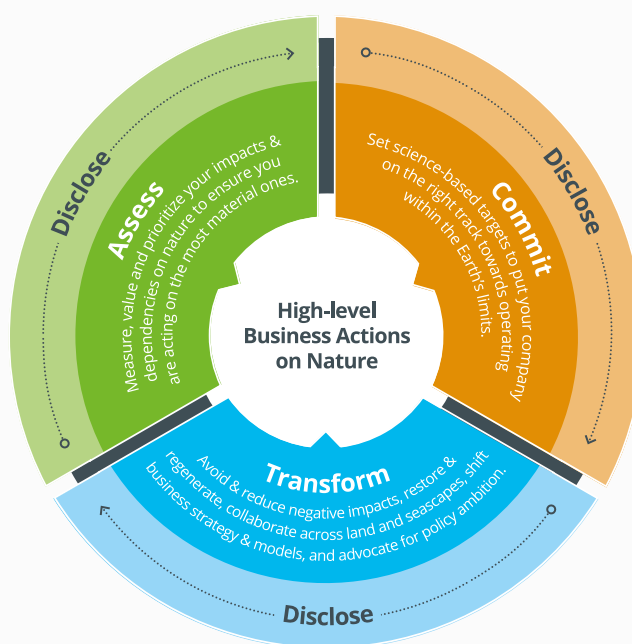


Figure 9.1 High-Level Business Actions on Nature

## 9.2 Actions

In particular, the Guidelines will help you undertake the following actions:

- 9.2.1 Apply and act upon the results
- 9.2.2 Communicate internally and externally
- 9.2.3 Make capitals assessments part of how you do business

### 9.2.1 Apply and act upon the results

At this stage in the process, you have framed and scoped your assessment, measured and valued your interaction with capitals according to a specific objective, and interpreted the results. The next Step is to apply the results to inform business decision-making processes using new information. The application of the results is the real measure of success for your assessment and a crucial step.

This section provides examples of business decisions for each of the material impact drivers (Table 9.1) and dependencies (Table 9.2) assessed in Steps 5–7. Some additional practical examples are included to show how to make decisions based on assessments of the interactions of different capitals.





## Business Case 9.1

# APEAM, Mexico

## **A multi-capital assessment to build and apply strategies for sustainable avocado production in Mexico**

### **FRAME**

APEAM is a Mexican civil association of avocado growers, packers, and exporters.

In order to develop a strategy and targets towards regenerative agriculture, the board of directors first needed an evaluation of the conservation state of forests, biodiversity, water, and soils and to gain a deeper understanding of a best “agricultural practices” scenario for avocado production in Mexico. The envisioned business application was to assess risks and opportunities and impacts on stakeholders.

### **SCOPE**

The objective of the pilot application was to assess environmental and social impacts in order to shift production practices, evaluate packaging and exporting methods, and to fulfil the environmental requirements of international markets.

### **MEASURE & VALUE**

The impact drivers and dependencies prioritized in relation to the objective were biodiversity, land and soil, fresh water, employment, and remuneration.

### **APPLY**

The results of the valuation were integrated into the association’s “Green Agenda” technical report, establishing a baseline and informed the environmental and social strategy of APEAM.

By implementing the assessment, the association gained robust information on the benefits of establishing forest reserves in the region for both business and society. The assessment concluded that these should be financed by avocado growers in order to preserve ecosystem services. This is currently piloted. The assessment furthermore led to the creation of standards for water use and soil conservation. To implement conservation efforts, while also improving worker’s health, training and capacity building on the application of agrochemicals was provided.





The results of the assessment motivated APEAM to introduce more strategies to improve workers' living conditions.

With a new way forward, APEAM has integrated best agricultural practices into their operations and has applied to gain the sustainable avocado certificate issued by the federal government. Furthermore, the association has become a strategic partner of the government to jointly develop a national norm for sustainable avocado production. Following the assessment results, APEAM is also collaborating with the Mexican bank Banorte to further develop strategies for the financing of sustainable avocado production.

For more details and updates, please click [here](#).





Table 9.1 Examples of business decisions taken based on the assessment of impacts

| Capital                   | Impact driver category  | Example of business decision taken   |
|---------------------------|---|--|
| Natural                   | Water use   | Business adopts a human-rights-based approach to water, committing to transparency and accountability of its water use and setting up a scheme to remedy any victims of poor water management. Remedies include direct payments and investment in piping and filtration infrastructure to make safer water accessible. |
|                           | Terrestrial ecosystem use   | Business uses assessment to inform science-based targets for land conversion.  |
|                           |   | Business decides to convert from monoculture to polyculture to restore pollination services and therefore reduce artificial pollination costs.   |
|                           | GHG emissions   | Business engages in policy discussions to explore options to reduce impacts of emissions through regulations that would most benefit operations and reduce consequent impacts on society. Solutions explored include local cap-and-trade system, emission limits, or mandated technology updates.                      |
|                           | Pesticide and herbicide use   | Management decides to switch to a more ecologically friendly form of pesticides. This leads to a healthier working environment, a decrease in sick employees, and therefore restored productivity, in addition to a more resilient ecosystem that requires fewer expensive agrochemical inputs.                        |
|                           | Phosphorus and nitrogen pollution   | Business carries out further studies to create a strategy for fertilizer application. The time and method of application can significantly reduce runoff leading to less impact on regulating ecosystem service provision.   |
|                           |   | Business elaborates a watershed-level manure management strategy, mapping ways to reduce livestock waste from entering waterways.  |
|                           | Soil use  | Business adopts a regenerative soil strategy, planning their operations to include a fallow year, cover crops, and adapting machinery to preserve soil structure.  |
| Waste generation          | Business invests in R&D of cellulose packaging with the aim of transitioning to a fully circular manufacturing process.                       |  |
| Animal welfare conditions | Business decides to change its strategy and reduce the density of livestock to obtain better food quality and access to better market prices. |  |
| Human                     | Caloric value of product  | Business decides to diversify their production and focus resources on developing a healthy range of products with the view of phasing out high calorie manufacturing over time. This improves access to an emerging market opportunity for healthier products.   |
|                           | Nutritional value of product  | Business decides to add vitamins with evidence-based health benefits to their products and therefore has a competitive advantage to attract consumers.   |
|                           | Antibiotic application to cattle  | Business decides to gain certification in animal welfare standards, allowing it to charge a higher export price to buyers from countries with stricter meat-quality regulations.   |
|                           | Pathogens in food   | Business decides to provide employees with basic training about hygiene and food.  |

Table 9.1 continues on the next page.



| Capital                                     | Impact driver category   | Example of business decision taken  |
|---|--|---|
| Capital                                     | Occupational conditions  | Business redesigns the work schedules to establish a limit on maximum of working hours a day per employee.  |
|   | Salaries and benefits  | Business offers childcare packages that allow more female employees to stay employed. Employees have more expendable income and the company experiences productivity gains as a result.   |
|   | Labor rights   | Business changes recruitment provider and brings more hiring processes in-house, to improve transparency of hiring and contracting.   |
|   |  | Business invests in an internal awareness campaign to report suspected slavery internally and in contracted suppliers.  |
|   | Gender equality  | Business offers equal pay for women and men and reports on its gender pay gap annually.   |
| Availability and standards of housing       | Business invests in higher quality complementary housing which is more sensitive to local living standards and preferences.  |   |
| Social                                      | Food security  | Business develops strategy to enhance the accessibility of nutritious and diverse food within the surrounding area by facilitating access to inputs, technology, and markets, generating employment in downstream activities, and setting up community storage facilities to reduce post-harvest losses and price volatility. |
|   | Food waste   | Business introduces new product lines made from food that otherwise would have been lost or wasted.   |
|   | Integrity and protection of communities  | Business decides to raise its wages above the national rate to support local workers and strengthen the local community and workforce retention.  |
|   |  | The business looks to source from local businesses where possible to support the local economy. In the long term, this also supports the business's own expansion in the region.  |
| Benefit sharing with indigenous communities | Business establishes a focus group with representatives from a local indigenous community, which helps identify and respond to grievances at an early stage.<br><br>Farmer decides to develop training materials and ethnographic reports based on local knowledge to maintain knowledge for future generations. |   |
| Produced                                    | Fertilizer loss  | Business carries out independent study on fertilizer-spreading techniques for farm.   |
|   | Antibiotic lost in preventive treatment  | Business halts preventative antibiotic use in livestock, and instead improves animal living conditions to reduce chance of disease.   |



Table 9.2 Examples of business decisions taken based on the assessment of dependencies

| Capital   | Dependency category  | Management decision made by the business   |
|---|--|--|
| Natural   | Water supply   | Business partners with a nearby non-profit to conduct hydrological research and uses the findings to trial operational changes that coincide extraction with heavier rainfall periods, and/or recycle water already in the system.         |
|   | Water purification   | Business invests in reforestation to prevent eutrophication and supports farmer education programs across the catchment.   |
|   |  | Business explores the regeneration of wetlands and marshy swamps which help mitigate pollutant concentrations in the water at lower cost than a processing plant.  |
|   | Soil quality   | Business sets aside land for buffer zones and initiates a payments for ecosystem services (PES) scheme.  |
|   |  | Smallholder farmers collaborate with a local landscape management program to trial alternative soil management practices that maintain healthy organic matter.   |
|   | Pollination  | Business invests in pollinator habitat meadows and works with a local non-profit to agree on minimum standards for all businesses in the landscape.  |
|   | Pest control   | Business forms an alliance across the industry, funding research into climate-related locust swarms, while also supporting farmers in original sourcing geographies who offer better quality produce.                                      |
| Business funds research into parasitic wasps which predate on mealybugs, as a lower-cost alternative to pesticides. |  |  |
| Genetic material  | Business opts to use open-pollinated seeds to increase genetic diversity of crops and improve resilience to disease.   |  |
| Human   | Experience   | Business offers competitive wages and youth employment schemes with attractive training and incentives to help encourage local people to work in the agri-food sector.   |
|   |  | Business encourages and supports learning events between its employees at different sites and operating locations to help share information and experience. Local experts on issues like biodiversity are invited to share their research. |
|   | Skills and knowledge   | As above.  |
|   | Workforce availability   | As above.  |
| Health of workers   | Business invests in water, sanitation, and hygiene (WASH) facilities for local communities, reducing the vulnerability of its workforce to waterborne diseases and therefore reducing productivity losses. |  |
|   | Business HR department invests in awareness and support for mental health issues, resulting in higher retention rates.   |  |
| Social  | Social networks and cooperation  | Business funds local finance cooperatives.   |
|   | Property rights  | Business reviews its tenant farmer strategy and starts offering longer tenure contracts in struggling locations.   |

Table 9.2 continues on the next page.



| Capital         | Dependency category                     | Management decision made by the business   |
|-----------------|---|--|
|                 | Social acceptance and trust             | Business engages a local community engagement group, who meet with management regularly to voice concerns or emerging issues.  |
|                 | Law and regulation                      | Business introduces an anti-corruption and anti-bribery policy and makes regular reports to its board on the topic. Managers are compensated on the actions taken to discourage corruption and bribery appearing and spreading within the company. |
| <b>Produced</b> | Access to infrastructure and technology | Business educates its buyers on local innovation initiatives and therefore attracts more environmentally and socially conscious investors. The company grows this innovation program to other operating regions over subsequent years.             |

Remember that business decisions are rarely based upon objective information alone, and that emotion and relationships often play a part in the decision-making process. It is therefore important to make sure that the people involved in the decision-making process (identified in Step 2) are provided sufficient background information to understand the assessment and to have confidence in the process and its results.

You should of course consider whether and how the assessment met the objective (identified in Step 2) and can inform the decision you need to make. The results of your assessment may have led to a change of activity, or to smaller adjustments in a plan of action or additional mitigations, or they may simply provide further justification for the activities already underway meaning no change is necessary. You may need to measure the contribution of the assessment to your business strategy or targets, for example, the amount of money saved (or lost) relative to an alternative approach. Additional actions that you may consider include:

**a. Carrying out another assessment**

Applying these Guidelines may already have generated ideas about additional business decisions that could be improved by a capitals assessment. These additional business decisions could be based upon clarifying what is of highest priority (as identified in Step 4) or they might focus on new and unexpected capital impacts and dependencies that were revealed in your first assessment. Consider if there are other strategic focus areas that could be used as an entry point for further capitals assessments and to secure wider support internally. Some ideas for undertaking further assessments include exploring new business opportunities, expanding the scope of your assessment, or broadening your assessment to include societal values.

**b. Internalizing externalities**

You may want to consider whether externalities that you have identified could, or would, be internalized in the future as you take action based on the results of the assessment. An example might be the inclusion of an internal carbon or water “shadow” price in your future decisions, or even adjusting your financial books to account for these externalities.



## 9.2.2 Communicate internally and externally

You now have a completed assessment and can provide decision makers with the necessary information to inform their decision or to disclose information. This should include information to explain the assessment process and results, including assumptions, uncertainties, or limitations that may apply.

### a. Providing decision makers with the information needed to inform the decision

In the Scope Stage, you identified the assessment objective and the different people involved in making the decision that the assessment is to inform. For assessment results to most effectively inform the business decision, you will need to provide all relevant parties with the necessary information in a suitable format. Where possible, information should be shared through existing processes within your business. For example, you might add content to existing management board papers, integrate information into your corporate risk process, or build information into a business operations program.

### b. Communicating with internal and external stakeholders

Sharing information about your capitals assessment and the decisions informed by it in a clear and transparent way can help to strengthen relationships, build the case for further assessments, and integrate capitals into the way you do business.

The outputs from the Measure and Value Stage will provide you with information to assess the relevance of risks and opportunities to your organization from its impacts and dependencies on capitals:

- ◆ Risks are the potential threats posed to an organization linked to its dependencies and impacts on the capitals. These can derive from the risk categories described in Step 1.
- ◆ Opportunities are activities that create positive outcomes for organizations by creating positive impact on the capitals or mitigating negative impacts on them.

Risks and opportunities related to impacts and dependencies on the capitals can have financial implications for your organization through changes to revenue streams, cost base, and potential cost of capital. In addition, they can change the valuation of assets and influence financing conditions. These transmission channels can have a positive or negative effect on credit, operational, market, liquidity, liability, reputational, and strategic risk and opportunity.

The valuation informs you about the relative importance of impacts and dependencies and so, the potential magnitude of risk and opportunities to your business.

The scope of your reporting will depend on your audience:

- ◆ If you are reporting to your investors, you should at least communicate those impacts and dependencies that could result in the most relevant risks and opportunities.
- ◆ If you are reporting to any kind of stakeholder, you should communicate any impact and dependency that you consider relevant for them.

Depending on your needs, you may wish to consider:

- ◆ Who will you communicate with and how?
- ◆ Who will the communication come from? Communication that is clearly connected with the core business, and with the business area responsible for the decision informed by the capitals assessment, can often provide the most benefit.
- ◆ Will you publish an internal or external report? Will you present the result of your assessment at an industry event? Will you include a news story on your website? Will you refer to other similar studies?





- ◆ How much information will you share, and with whom? While some results may be sensitive, external communication could still be possible and beneficial. Rather than report monetary values, for example, you can “anonymize” the most sensitive results using an index or ratios, allowing you to share key outcomes. For example, instead of reporting publicly that “the cost of option 1 was valued at USD 100 million and option 2 at USD 150 million” you might say that the “cost of option 2 was valued at 50% more than option 1.”
- ◆ How much did the natural capital assessment inform the decision and how confident are you in the results and the actions that will or have been taken? Transparency is important, and it is often worthwhile to share any assumptions, uncertainty, or limitations upfront.

Communications experts can provide guidance on reaching out internally, including getting your colleagues on board and more familiar with the topic and explaining how assessment results may affect them, and externally, including recommending which messages can be disclosed and how.

External stakeholders may challenge and question not only the assessment process and the results, but also the company’s reasons for carrying out the assessment in the first place. Some questions you may want to think about include:

- ◆ Do you already know your key external stakeholders and have relationships with them?
- ◆ Are you ready to discuss with, and be confronted by, those who might challenge you?
- ◆ Have you got some “critical friends” among conservation bodies or other external stakeholders who can challenge you in a constructive way?





## Business Case 9.2

# Agronegocios del Plata (ADP), Uruguay

**Decision-making system based on multi-capital analysis for the production and commercialization of meat and grains with added value**

### FRAME

ADP is a family-run agribusiness producing grains and livestock in Uruguay.

The company faces risks of negative perception due to its sector's impact. However, ADP also identifies opportunities to offer a differentiated product, positioning itself as a company that considers sustainability, animal welfare, and human well-being. They were supported by Bidegaray and Eftec consultancy to conduct this assessment.

### SCOPE

The objective was to generate information and tools to make strategic and operational decisions to integrate sustainability.

The assessment focused on their impacts and dependencies on food provisioning, carbon sequestration and emissions, water quality, soil regulation (formation and fertility), animal welfare, and biodiversity.

## MEASURE & VALUE

ADP developed a Corporate Natural Capital Account following the BSI:/632:2021, the British Standard for Natural Capital Accounting, which involves producing:

- ◆ A Natural Capital Balance Sheet showing the dependencies on nature by estimating the present value of the future flow of benefits from natural capital assets;
- ◆ A Natural Capital Income Statement that shows a yearly flow of benefits and disbenefits linked to natural assets management and other business impacts. The accounting process is detailed in figure 9.2

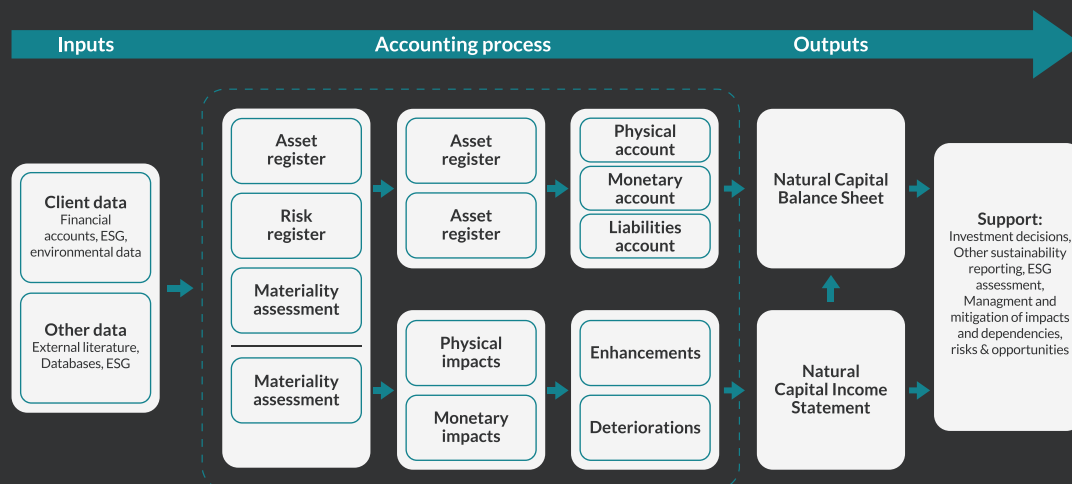


Figure 9.2 ADP natural capital accounting process

## APPLY

The measurement, valuation, and visualization of natural capital in a balance sheet is helping the company to set targets towards nature-positive and take adequate action. ADP hopes to define science-based targets for nature (SBTN) and disclose information using the Taskforce on Nature-related Financial Disclosures (TNFD) framework.

ADP considers the assessment as a way to communicate results internally, for example to the board of directors, as their support is key and the results inform their decisions.

The data are also helpful to communicate externally as ADP is the first Uruguayan company to have developed a Natural Capital Account. Their vision is to involve and inspire more companies to do the same and influence their sector for the better.

For more details and updates, please click [here](#).

### 9.2.3 Make capitals assessment part of how you do business

A capitals assessment can and should lead to new ways of thinking about how your business relates to natural, social, and human capital. The efforts that you put into conducting an assessment should lead your business to transform the way it operates. Consider whether, and how, your assessment might have challenged your existing business model or management processes. For example, it may flag significant dependencies on ecosystem services, workforce, and/or social networks that you were not previously aware of or cases where you were not aware of the extent of the dependencies. It may also reveal previously unrecognized risks or opportunities associated with the indirect impacts of your business on society, through changes in capital.

Although in extreme cases a capitals assessment may fundamentally challenge or support your business model, it is most likely that it will be one of many factors that will inform your decision and you may not be able to identify exactly how it has supported this.

You should not be afraid to disclose where your capitals assessment highlights deficiencies in your business practices with regard to any other forms of capital. By highlighting these you are setting a baseline from which you are able to take action, show improvements, and be clear about your business activities in a holistic manner. Business activity is fundamentally about trade-offs and understanding and accepting this is key to moving beyond the limited scope that traditional accounting and business practice provides.

In general, as you begin to include capitals more systematically in your decisions, more and more of your business will be affected. Specific business applications (see Table 1.2) can be considered more regularly and built into existing or new business processes.

For example:

- ◆ Which environmental, human, and social systems and processes are currently used by your company, and how do capitals assessments connect, complement, or integrate with them?
- ◆ Does your company already have a strategic environmental, human, and/or social focus (e.g., on water, soil, safety) that could be used as an entry point for further capitals assessments and to secure wide internal support? To make capitals part of how you do business, it is important to not focus only on the Measure and Value Stage (Steps 5–7) but to apply all Steps in the Guidelines.

It may also help to consider:

- ◆ Developing a system to track and monitor assessments, preferably built into an existing system, such as the financial reporting system, can aid integration. A review of existing systems and processes currently used and how they might connect, complement, or integrate with capitals assessments is a good starting point.
- ◆ Embedding natural, human, and social capitals will only happen if key internal stakeholders see business value and actively contribute to the process. Assessing all capitals must be included in the board agenda and senior leaders need to be involved in developing and implementing these assessments.
- ◆ Some of your company's employees, who may already be charged with addressing environmental, human, and/or social challenges, such as GHG emissions or nutrition, could be trained to undertake capitals assessments. They may become your "capitals champions" of the future.

Below, some practical examples show how capitals assessments inform integrated capitals decisions. Table 9.3 outlines some existing processes commonly used in business that could make use of data and results from a capitals assessment.







## Business Case 9.3

# Go4fresh, India

## Transforming the fresh fruit and vegetable value chain in India - Applying a capitals assessment to the core business operations

### FRAME

Go4fresh aims to transform the farm-to-enterprise fresh fruit and vegetable supply chain in India which is fragmented and creates livelihood for more than 30 million people. The business has established itself as a preferred food aggregator for online retail and trade, as well as for cloud kitchens and restaurants. In recent years, Go4fresh has pivoted its business model towards building a digital marketplace empowering small-scale farmers and small and microenterprises to access markets, information, and finance and improve livelihood. It leverages technology and climate-smart practices to achieve scale and efficiency, reduce food loss, and offer healthy food options.

### SCOPE

Planning to scale up their business model across the Indian market and to expand globally, Go4fresh conducted a capitals assessment to effectively communicate the uniqueness and potential positive impact of its business model on nature and people including marginal communities and potential investors.

Using the criteria of risks and opportunities visible to Go4fresh (operational, legal and regulatory, financial, reputational, marketing, and social), the prioritization resulted in the selection of three key impact drivers related to their objective:

1. Food loss and waste
2. Livelihood improvement of marginal communities
3. Use of chemical inputs



## MEASURE & VALUE

To assess food loss and waste, Go4fresh chose a quantitative valuation technique using farm-level data. They found a 10.5% decrease in food loss (6.4% at farm level and a 4.1% from farm-to-enterprise level) comparing their business model impact to historical data.

The change related to improved livelihoods was valued in monetary terms. Go4fresh found an 18.7% reduction in cost of production and a 7.5% increase in income levels. The reduction in chemical inputs was also valued in a monetary analysis. The results were a 14.1% reduction in costs of production from chemical inputs.

## APPLY

The assessment gathered supporting evidence for the benefits of Go4fresh business models with regard to the impact drivers food loss and waste, livelihood improvement, and reduction in use of chemicals.

Following the measurement and valuation of food loss and waste as well as use of chemical inputs, Go4fresh plans to provide training for farmers on crop planning and food safety practices, as well as supporting farmers in the tracking of input seeds, dosages, frequency of application, and costs.

As a result of assessing livelihood improvement, the business will keep developing their market access program for farmers. Furthermore, the findings of the capitals assessment will be translated into infographics to easily communicate to a wide variety of internal and external stakeholders. The outcomes are integrated into the Go4fresh core business strategy, with identified indicators included in regular business planning, budgeting, and monitoring processes. The results of the assessment are envisioned to support the design of an internal management dashboard, to assess and improve business results, to improve smallholder farmer and small enterprises engagement, and to facilitate collaboration opportunities with research institutions and social organizations.

All in all, Go4fresh used the results of the assessments to refine their strategic and business objectives, setting the following action items and next steps:

1. Minimize risks, prioritize operational plans, and allocate resources optimally
2. Identify tools to share and accelerate learnings for marginal communities
3. Set up internal dashboard to track performance on capitals assessment
4. Prepare and implement effective communication plan for target audience

For more details and updates, please click [here](#).



Table 9.3 Examples of business processes that could leverage capitals assessment

| Existing or new company process                  | Dependency category  | Management decision made by the business  |
|--|--|---|
| Cost-benefit analysis                            | An analysis that compares the costs and benefits of a project or policy. It can be used to analyze net benefits including benefit- cost ratio, Net Present Value (NPV), or internal rate of return (IRR) from a business or societal perspective.  | <ul style="list-style-type: none"> <li>Identify which cost savings and/or revenue opportunities are linked to the capitals.</li> <li>Estimate reliable “shadow prices” for impact drivers associated with your business, based on societal values, to help inform decision making.</li> </ul>   |
| Damage assessment                                | An approach involving various techniques to calculate environmental, human, and/or social damages, remediation requirements, and costs and compensation relating to liability and incidents.   | <ul style="list-style-type: none"> <li>Include a value for your associated impacts on society, as well as cleanup and/or restoration costs and benefits to society and business.</li> </ul>   |
| Strategic target setting and monitoring progress | Companies are increasingly incorporating sustainability targets into their strategies. Capitals assessments can help inform the target-setting process, including to establish baselines, scope assumptions, assess feasibility, etc. Furthermore, they can highlight if progress is on track.   | <ul style="list-style-type: none"> <li>Prioritize issues based on materiality.</li> <li>Ensure a sound understanding and definition of scope, impact, and baseline.</li> <li>Establish feasible but ambitious and meaningful targets.</li> <li>Measure success based on reliable data that show positive and negative impacts to the business and/or to society.</li> </ul> |
| Environmental, human, and/or management systems  | Structured frameworks for managing an organization’s significant environmental, human, and/or social impacts. They include an assessment of activities, products, processes, and services that might affect the environment, people, and society and a mitigation or improvement program. Businesses can use the Guidelines process in continuous improvement planning – particularly where real-time data indicators are available. | <ul style="list-style-type: none"> <li>Provide a framework for ensuring consistent and appropriate use of capitals information and analysis.</li> </ul>   |
| Risk assessment                                  | An analysis of the risks of a company’s products or operations, including impacts on nature and people directly exposed or affected via various media.   | <ul style="list-style-type: none"> <li>Add valuation elements to inform decision making, thereby providing richer information to operations, finance, strategy, etc. Introduce a broader range of measures of value to assess risk in context.</li> </ul>   |
| Impact assessment                                | Businesses can align their existing impact assessment, or due diligence processes, with capitals measurement and valuation principles.   | <ul style="list-style-type: none"> <li>Help to better connect activities to the wider business and provide a more complete view of natural, human, and social capitals performance.</li> </ul>  |

Table 9.3 continues on the next page.



| Existing or new company process | Dependency category   | Management decision made by the business   |
|---------------------------------|---|--|
| Internal audit                  | Process to provide independent assurance that an organization's risk management, governance, and internal control processes are operating effectively. The scope of internal audit may extend beyond financial risks to address issues such as growth, reputation, the environment, and labor relations (adapted from the Chartered Institute of Internal Auditors 2015). | <ul style="list-style-type: none"> <li>◆ Assure compliance with natural capital assessment procedures established by the company.</li> <li>◆ Improve the quantification of risks and their impacts.</li> </ul>   |
| Life Cycle Assessment           | Life Cycle Assessment (also known as Life Cycle Analysis) is a structured management tool for quantifying emissions, resources consumed, and environmental and health impacts associated with products over their entire life cycle.  | <ul style="list-style-type: none"> <li>◆ Provide a structured approach for valuing and prioritizing environmental impacts to be included in an LCA.</li> <li>◆ Use monetary valuation for aggregating and comparing different impacts in an LCA.</li> </ul>  |
| Social Life Cycle Assessment    | Social Life Cycle Assessment is a structured management tool for assessing the social impacts associated with products over their entire life cycle.  | <ul style="list-style-type: none"> <li>◆ Provide a structured approach for valuing and prioritizing human and social impacts to be included in an LCA.</li> <li>◆ Use monetary valuation for aggregating and comparing different impacts in an LCA.</li> </ul>   |
| Company reporting               | Reporting of environmental, social, and/or financial information for external use, and in particular for use by shareholders and other external stakeholders.   | <ul style="list-style-type: none"> <li>◆ Provide a structured approach for prioritizing environmental, human, and social impacts to include in company reports.</li> <li>◆ Enhance corporate reputation and reduce market risk by providing more rigorous, reliable information to shareholders and other stakeholders.</li> </ul> |
| Financial accounting            | Financial analysis for external or internal purposes. It focuses on costs and benefits with direct financial implications for a company's financial bottom line. It includes inputs to the profit and loss account and balance sheet of a company or business unit.   | <ul style="list-style-type: none"> <li>◆ Specify which costs, revenues, assets, and liabilities are related to different capitals.</li> <li>◆ Develop a set of shadow prices or accounts for environmental costs and benefits, based on societal values.</li> </ul>  |
| Management accounting           | Financial analysis for internal company purposes, focusing on costs and benefits with direct financial implications relating to a product line, activity, or investment. Includes, for example: pricing decisions, budgeting, capital investment decisions, discounted cash flows, net present values, internal rates of return, return on investments, payback periods.  | <ul style="list-style-type: none"> <li>◆ Identify which financial costs and revenues are linked to significant natural capital impacts and/or dependencies.</li> <li>◆ Include a set of shadow prices or accounts for environmental costs and benefits, based on societal values.</li> </ul>                                       |

Table 9.3 continues on the next page.



| Existing or new company process | Dependency category   | Management decision made by the business   |
|---------------------------------|---|--|
| (Sustainable) product portfolio | A process to assess the products and services of a company against various criteria on a regular basis. | <ul style="list-style-type: none"> <li>◆ Capitals assessment results can provide a more holistic picture of a company's product portfolio and may justify incremental shifts within the portfolio to improve sustainability performance.</li> <li>◆ Bring potentially valuable information for design, risk management, and/or strategic decision making.</li> </ul> |

Adapted from WBCSD et al. 2011

### c. Embedding the assessment process

Applying these Guidelines may already have generated ideas about additional business decisions that could be improved by a capitals assessment. These additional business decisions could be based upon clarifying priorities (as identified in Step 4) or they might focus on new and unexpected capital impacts and dependencies that were revealed in your first assessment.

Consider if there are other strategic focus areas that could be used as an entry point for further capitals assessments and to secure wider support internally. Some ideas for undertaking further assessments include exploring new business opportunities, expanding the scope of your assessment, or broadening your assessment to include societal values.

It is advisable to embed the process of conducting regular capitals assessment in your business-as-usual as a way to monitor and track the progress you make in managing the capitals within your business operations.

### 9.3 Outputs

The outputs from this Step are:

- ◆ Actions that you will take as a result of the assessment
- ◆ A communication plan about results and decisions
- ◆ A plan for making capitals assessments part of how you do business

Step 09 has provided guidance and recommendations to help you take action and embed the results of your assessment in business decision making.

You now have an understanding of the nine steps of the TEEBAgriFood Operational Guidelines for Business. If you haven't started to implement the Steps yet, we encourage you to take up the accompanying TEEB Operational Guidelines for Business [User Template](#). This User Template provides you with guiding questions and examples to support you in conducting a capitals assessment.

The Capitals Coalition warmly welcomes any feedback, experiences, or learning that you can share from your assessment. This information can help us all progress towards the Coalition's vision of a world where business conserves and enhances natural, human, and social capitals.



# Glossary

NOTE: In writing the Guidelines we have tried as much as possible to use standard English (US) and standard terminology in environmental economics, for which any dictionary or a good textbook (respectively) can supply appropriate definitions. In some cases it was necessary to introduce new terminology specific to the Guidelines. Definitions for these terms are adapted from the scientific literature or based on expert opinion and are prefaced by the phrase "In the Guidelines."

|                             |   |
|-----------------------------|---|
| <b>Abiotic services</b>     | The benefits arising from fundamental natural and geological processes (e.g., the supply of minerals, metals, oil and gas, geothermal heat, wind, tides, and the annual seasons).   |
| <b>Asset</b>                | A source of value.  |
| <b>Baseline</b>             | In the Guidelines, the starting point or benchmark against which changes in capitals attributed to your business activities can be compared.  |
| <b>Biodiversity</b>         | The variability among living organisms from all sources including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems (UN 1992).   |
| <b>Business application</b> | The intended use of the results of your capitals assessment to help inform decision making, answering to how you intend to use the results.   |
| <b>Capitals assessment</b>  | A capitals assessment is the process of understanding, measuring, and valuing an organization's relationship with natural, social, human, and/or produced capital to answer a specific question or inform a decision. Assessments often inform internal decisions rather than disclosure.   |
| <b>Components</b>           | The three elements of a complete capitals assessment: impacts on your business, your impacts on society, and your business dependency.  |
| <b>Counterfactual</b>       | A form of scenario that describes a plausible alternative situation, and the environmental conditions that would result if the activity or operation did not proceed (adapted from Cambridge Natural Capital Leaders Platform 2013).  |
| <b>Dependency pathway</b>   | A dependency pathway shows how a particular business activity depends upon specific features of natural, human, social, or produced capital. It identifies how observed or potential changes in capitals affect the costs and/or benefits of doing business.  |
| <b>Double counting</b>      | <p>There is a risk that impacts and dependencies on capital assets will be counted twice, or even potentially multiple times. This issue can be exacerbated in integrated capital assessments.</p> <p>Ensure that capital asset impact values are explicitly categorized between the different capitals and wherever possible are not counted twice. Where you are dealing with a hybrid asset, be clear about under which capital you will account for it. It is advised to organize a process that does not count the impact or asset twice.</p> <p>Avoiding double counting produces more accurate and valid results and thereby improves decision making.</p> |
| <b>Ecosystem</b>            | A dynamic complex of plants, animals, and microorganisms, and their non-living environment, interacting as a functional unit. Examples include deserts, coral reefs, wetlands, and rainforests (MA 2005a). Ecosystems are part of natural capital.  |

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The glossary continues on the next page.





|                                       |   |
|---------------------------------------|---|
| <b>Ecosystem services</b>             | <p>The most widely used definition of ecosystem services is from the Millennium Ecosystem Assessment (MA 2005a): “the benefits people obtain from ecosystems.”</p> <p>The MA further categorizes ecosystem services into four categories:</p> <ul style="list-style-type: none"> <li>◆ Provisioning: Material outputs from nature (e.g., seafood, water, fiber, genetic material).</li> <li>◆ Regulating: Indirect benefits from nature generated through regulation of ecosystem processes (e.g., mitigation of climate change through carbon sequestration, water filtration by wetlands, erosion control and protection from storm surges by vegetation, crop pollination by insects).</li> <li>◆ Cultural: Non-material benefits from nature (e.g., spiritual, aesthetic, recreational, and others).</li> </ul> <p>Supporting: Fundamental ecological processes that support the delivery of other ecosystem services (e.g., nutrient cycling, primary production, soil formation).</p> |
| <b>Externality</b>                    | A consequence of an action that affects someone other than the agent undertaking that action, and for which the agent is neither compensated nor penalized. Externalities can be either positive or negative (WBCSD et al. 2011).   |
| <b>Human capital</b>                  | An individual’s knowledge, skills, competencies, and attributes.  |
| <b>Impact driver</b>                  | In the Guidelines, an impact driver is a measurable quantity of a natural, human, social, or produced resource that is used as an input to production (e.g., volume of water used for crop irrigation) or a measurable non-product output of business activity (e.g., a kilogram of CO <sub>2</sub> e emissions released into the atmosphere by a manufacturing facility).  |
| <b>Impact pathway</b>                 | An impact pathway describes how, as a result of a specific business activity, a particular impact driver results in changes in capitals and how these changes in capitals affect different stakeholders.  |
| <b>Integrated capitals assessment</b> | A capitals assessment which explicitly takes into account the interconnections both within and between all of the capitals.   |
| <b>Life cycle assessment</b>          | Also known as life cycle analysis. A technique used to assess the environmental impacts of a product or service through all stages of its life cycle, from material extraction to end-of-life (disposal, recycling, or reuse). The International Organization for Standardization (ISO) has standardized the LCA approach under ISO 14040 (UNEP 2015). Several life cycle impact assessment (LCIA) databases provide a useful library of published estimates for different products and processes.  |
| <b>Market value</b>                   | The amount for which something can be bought or sold in a given market.   |
| <b>Measurement</b>                    | In the Guidelines, the process of determining the amounts, extent, and condition of a capital or the benefits that flow from it, in physical terms.   |
| <b>Monetary valuation</b>             | Valuation that uses money (e.g., \$, €, ¥) as the common unit to assess the values of capital impacts or dependencies.  |
| <b>Multi-capital assessment</b>       | A capitals assessment measuring and valuing all the capitals in terms of a business’s impacts and dependencies on them, showing the results for each capital “side by side” (i.e., in a series).  |
| <b>Natural Capital Protocol</b>       | A standardized framework to identify, measure, and value direct and indirect impacts (positive and negative) and/or dependencies on natural capital.  |

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|  |   |
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| <b>Objective</b>                           | The motivation to conduct a capitals assessment in relation to your business context, answering “why.”  |
| <b>Organizational focus</b>                | <p>In the Guidelines, the part or parts of the business to be assessed (e.g., the company as a whole, a business unit, or a product, project, process, site, or incident). For simplicity, these are grouped under three general headings:</p> <ul style="list-style-type: none"> <li>◆ Corporate: assessment of a corporation or group, including all subsidiaries, business units, divisions, different geographies or markets, etc.</li> <li>◆ Project: assessment of a planned undertaking or initiative for a specific purpose, and including all related sites, activities, processes, and incidents.</li> <li>◆ Product: assessment of particular goods and/or services, including the materials and services used to produce these products.</li> </ul> |
| <b>Primary data</b>                        | Data collected specifically for the assessment being undertaken.  |
| <b>Price</b>                               | The amount of money expected, required, or given in payment for something (normally requiring the presence of a market).  |
| <b>Prioritization</b>                      | In the Guidelines, prioritization refers to a less rigid version of materiality that helps focus your resources on the issues that are of higher priority for you to take forward into the Measure and Value Stage.   |
| <b>Produced capital</b>                    | The human-made goods as well as all financial assets that are used to produce goods and services consumed by society.   |
| <b>Qualitative valuation</b>               | Valuation that describes capital impacts or dependencies and may rank them into categories such as high, medium, or low.  |
| <b>Quantitative valuation</b>              | Valuation that uses non-monetary units such as numbers (e.g., in a composite index), areas, mass, or volume to assess the magnitude of capital impacts or dependencies.   |
| <b>Rigor</b>                               | The quality of being detailed, careful, and complete.   |
| <b>Robust</b>                              | Strong and unlikely to break or fail.   |
| <b>Scenario</b>                            | A storyline describing a possible future. Scenarios explore aspects of, and choices about, the future that are uncertain, such as alternative project options, business as usual, and alternative visions.  |
| <b>Secondary data</b>                      | Data that were originally collected and published for another purpose or a different assessment.  |
| <b>Single capital assessment</b>           | Measures and values impacts and dependencies on a single capital.   |
| <b>Social capital</b>                      | Networks and their shared norms, values, and understanding.   |
| <b>Social &amp; Human Capital Protocol</b> | A standardized framework to identify, measure, and value direct and indirect impacts (positive and negative) and/or dependencies on social and human capital.   |
| <b>Spatial boundary</b>                    | The geographic area covered by the assessment, for example, a site, watershed, landscape, country, or the planet. The spatial boundary may vary for different impacts and dependencies and will also depend on the organizational focus, value-chain boundary, value perspective, and other factors.  |
| <b>Stakeholder</b>                         | Any individual, organization, sector, or community with an interest or “stake” in the outcome of a decision or process.   |
| <b>Stock</b>                               | A store of value that can be enhanced or eroded.  |

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|                              |   |
|------------------------------|---|
| <b>Target audience</b>       | The main users of the assessment output (i.e., the people who will read and use the output to make decisions).  |
| <b>Temporal boundary</b>     | The time horizon of the assessment. This could be a current “snapshot,” a 1-year period, a 3-year period, a 25-year period, or longer.  |
| <b>Trade-offs</b>            | A balance achieved between two desirable but incompatible impacts; a compromise.  |
| <b>Transmission channels</b> | The complex interplay of nature-related dependencies and impacts over multiple time periods can result in earning and cashflow vulnerability. This can transmit into a broader range of financial risks, including market, credit and liquidity risks. These transmission channels include both micro-channels (such as supply chain uncertainty due to disruptions to production activities and value chains imposing unexpected costs; changes in profitability and asset values; and increased litigation) and macro-channels (such as changing demand and raw material price volatility). (TNFD, 2023)  |
| <b>Validation</b>            | Internal or external process to check the quality of the assessment, including technical credibility, the appropriateness of key assumptions, and the strength of your results. This process may be more or less formal and often relies on self-assessment.  |
| <b>Valuation</b>             | The process of estimating the relative importance, worth, or usefulness of capitals to people (or to a business), in a particular context. Valuation may involve qualitative, quantitative, or monetary approaches, or a combination of these.  |
| <b>Valuation technique</b>   | The specific method used to determine the importance, worth, or usefulness of something in a particular context.  |
| <b>Value perspective</b>     | The perspective or point of view from which value is assessed; this largely determines which costs or benefits are included in an assessment. Business value: The costs and benefits to the business, also referred to as internal, private, financial, or shareholder value. Societal value: The costs and benefits to wider society, also referred to as external, public, or stakeholder value (or externalities).   |
| <b>Value transfer</b>        | A technique that takes a value determined in one context and applies it to another context. Where contexts are similar or appropriate adjustments are made to account for differences, value transfer can provide reasonable estimates of value.  |
| <b>Value-chain boundary</b>  | The part or parts of the business value chain to be included in a capitals assessment. For simplicity, the Guidelines identify three elements of the value chain: upstream, direct operations, and downstream. An assessment of the full lifecycle of a product would encompass all three parts. Upstream (cradle-to-gate): covers the activities of suppliers, including purchased energy. Direct operations (gate-to-gate): covers activities over which the business has direct operational control, including majority-owned subsidiaries. Downstream (gate-to-grave): covers activities linked to the purchase, use, reuse, recovery, recycling, and final disposal of the business’s products and services. |
| <b>Verification</b>          | Independent process involving expert assessment to check that the documentation of the assessment is complete and accurate and gives a true representation of the process and results. “Verification” is used interchangeably with terms such as “audit” or “assurance.”  |

If you have clicked on a glossary hyperlink you can click on the same word to return to the page you were reading.



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## Annex A

Examples of sector-specific published literature to inform capitals assessments for food sector businesses

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| Author   | Name   | Description   | How could it be used in capitals assessments  | Capitals                         | Relevant Steps |
|--|--|---|---|----------------------------------|----------------|
| Accountability Framework Initiative              | <a href="#">Accountability Framework Initiative</a>  | Roadmap for companies on ethical supply chains that protect forests, natural ecosystems, and human rights.  | The framework can be used as a benchmark scenario for a capitals assessment, leading to key action identification   | Natural, human, social, produced | All steps      |
| Accreditation/certification schemes              | Varied – includes Fairtrade, RSPO, Rainforest Alliance, Alliance for Water Stewardship, RTRS | The most widely established and adopted certification schemes are in agriculture, though they vary in commodities, geographical diffusion, and on capitals issues | The quantitative and monetary data collected by companies and standard-setters to achieve accreditation and certification to these schemes can be leveraged in capitals assessments | Natural, human, social           | 5              |
| British Standard on Natural Capital BS 8632:2021 | <a href="#">Natural Capital Accounting British Standard</a>                                  | Standard guidance on Natural Capital Accounting process to produce a balance sheet and income statements  | Can be used to complete a natural capital assessment from an accounting perspective   | Natural                          | All steps      |
| Cambridge Institute for Sustainable Leadership   | E.Valu.a.te: The practical guide. How to perform an environmental externality assessment     | Evidential support around the process of valuation of externalities, using a step-wise, bottom-up approach  | Methodologies, indicators, and practical examples and real case studies from food and beverage companies  | Natural, human                   | All Steps      |
| Capitals Coalition, WBCSD, MIT Sloan             | <a href="#">Natural Capital Toolkit - Shift</a>  | Online platform to search sustainability frameworks and environmental, social, and governance tools   | Can be used to find the best tools using filters by sector, resource type, natural, social, or governance issue   | Natural, human, social           | 5, 6, 7        |
| Delft University of Technology                   | <a href="#">Sustainability Impact Metrics</a>  | The databases include monetary values: Eco-costs, a measure to express the environmental burden of a product  | Provides monetary value for materials, agricultural and animal products, resource depletion, water scarcity, fair wage, child labor, poverty, health and safety                     | Natural, human, social           | 5, 6, 7        |

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| Author                                | Name  | Description   | How could it be used in capitals assessments   | Capitals                         | Relevant Steps |
|---------------------------------------|---|---|--|----------------------------------|----------------|
| Ecosystem Services Partnership        | Ecosystem services valuation database   | Database on ecosystem services valuation on a per hectare basis. Continuously updated, it currently contains more than 600 studies and 4,000 values records distributed across services and regions | Vast repository of case studies and ecosystem services values; datasets can be used to inform decisions about trade-offs or activity affecting ecosystems and biodiversity | Natural, produced                | 5, 6, 7        |
| Environment and Climate Change Canada | <a href="#">Environmental Valuation Reference Inventory (EVRI)</a>  | EVRI is a searchable storehouse of 4,000 valuation studies on the economic value of environmental assets and human health effects   | EVRI can support methodological approaches and estimates of monetary values based on real examples   | Natural, human, social, produced | 5, 6, 7        |
| Esmeralda MAES – Sciences partners    | <a href="#">Esmeralda Maes Explorer Enhancing ecosystem services mapping for policy and decision-making</a> | Online tool that provides directions on the process and assessment of ecosystem services  | The tool helps to set up a knowledge base on ecosystems and their services; designed to inform policy decisions but can support private-sector action as well              | Natural, human, social           | 2, 9           |
| ESU-services                          | <a href="#">ESU World Food Life Cycle Assessment Database</a>   | Database includes over 1,600 processes related to agriculture, food processing, and consumption. As far as possible data include information on food waste  | Provides information on food waste that can support the end-of-life assessment of a product, meals, and household appliances   | Human, social                    | 5              |
| European Commission Science Hub       | <a href="#">Joint Research Centre Data Catalogue</a>  | Data catalogue on agriculture, food security, environment, climate change, health, etc.   | Data can be used in indirect measurement of capitals   | Natural, human, social, produced | 5, 6           |

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| Author                                  | Name  | Description   | How could it be used in capitals assessments   | Capitals                         | Relevant Steps |
|---|---|---|--|----------------------------------|----------------|
| European Union                          | <a href="#">Regulation 2019/2088 on sustainability-related disclosures in the financial services sector</a> | Harmonized rules for the financial market on transparency, reporting, and disclosure around sustainability risks and impacts concerning financial products  | The regulation is helpful for EU financial institutions that want to implement capitals assessments and harmonize their disclosure practices related to their financial products and clients | Natural, human, social, produced | 2, 3, 4, 9     |
| Food and Agriculture Organization (FAO) | <a href="#">Natural capital impacts in agriculture: Supporting better decision making</a>                   | The framework measures net environmental benefits associated with agricultural management. Dataset of natural capital costs per crop, livestock per country | Guides on impacts and dependencies of farming operation. It presents useful case study findings for specific commodities   | Natural, produced                | 4, 5, 6, 7     |
|   | <a href="#">Food waste footprint - Full-cost accounting - Final Report</a>                                  | Includes a list of full cost accounting estimates of food waste under the categories: atmosphere, water, soil, biodiversity, social, and economic           | Framework provides quantification, monetization, and methods to calculate environmental cost of food waste footprint on well-being and natural resources                                     | Natural, social                  | 5, 6, 7        |
|   | <a href="#">FAOSTAT - Food and Agriculture Organization of the United Nations</a>                           | Country and time-specific data on agricultural production, trade, food security, indicators, food balance sheets, and other updated information             | Can be used to identify material natural capital impacts associated with commodities, products, and practices and for estimating impacts and dependencies                                    | Natural, human, social, produced | 3, 4, 5        |

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| Author | Name  | Description   | How could it be used in capitals assessments  | Capitals                         | Relevant Steps |
|--------|---|---|---|----------------------------------|----------------|
|        | <a href="#">Sustainability Assessment of Food and Agriculture systems (SAFA)</a>    | SAFA was developed to assess the impact of food and agriculture on the environment and people. The SAFA tool is designed to support the implementation of SAFA Guidelines for assessment of a supply chain. | The Guidelines provide examples of “fit for purpose” assessments and indicators according to business aim and dimensions of sustainability: governance, environmental, economics, and well-being. The tool can be used for supply-chain mapping, to select metrics and represent activities graphically | Natural, human, social, produced | 4, 5, 9        |
|        | <a href="#">CropWat</a>   | Calculation of crop water requirements based on soil, climate, and crop data  | Can be used for assessments that list water use as a material impact or dependency pathway  | Natural                          | 5              |
|        | <a href="#">Voluntary Guidelines on the Responsible Governance of Tenure - VGGT</a> | <a href="#">Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security</a>  | The Guidelines provide direction on policy and legal requirements to improve governance of tenure rights, which can inform a business assessment  | Natural, human, social, produced | 2              |
|        | <a href="#">Aquastat – Global Information System on Water and Agriculture</a>       | Collection of 180 variables and indicators by country related to water management, availability, and sanitation   | Aquastat indicators can be used to measure and value impact or dependencies   | Natural                          | 5, 6, 7        |
|        | <a href="#">Water Productivity Open-Access Portal (WAPOR)</a>                       | Database on water and land productivity with diverse map layers   | The database can be used to measure and value impact or dependencies related to water and productivity  | Natural                          | 5, 6, 7        |
|        | <a href="#">Global Livestock Environmental Assessment Model (GLEAM)</a>             | Modeling framework to simulate activities and processes between the environment and livestock through supply chains   | The model can be used to represent impact pathway and causal loop diagrams for advanced assessment  | Natural, produced                | 4, 5, 6, 7     |

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| Author   | Name  | Description   | How could it be used in capitals assessments  | Capitals                         | Relevant Steps |
|--|---|---|---|----------------------------------|----------------|
|  | <a href="#">Technical Platform on the Measurement and Reduction of Food Loss and Waste</a>                              | Database with information on food loss and waste measurement across products, value-chain stage, and geographical area                            | Data can be used in indirect measurement and modeling approach of a capitals assessment   | Natural, human, social, produced | 5, 6           |
|  | <a href="#">Hand-in-Hand Geospatial Platform</a>  | Geospatial map of food system with food security, crop, livestock, production, land, water, climate, and demographic datasets                     | Data can be used in indirect measurement and modeling approach of a capitals assessment   | Natural, human, social, produced | 5, 6           |
| FAO GeoNetwork and partners                        | <a href="#">GeoNetwork</a>  | GeoNetwork provides metadata edition and interactive maps, satellite imagery and spatial databases at global, continental, and regional levels    | Includes meta spatial data that can help to understand landscape characteristics of a region  | Natural                          | 3, 5           |
| FAO and United Nations Statistics Division         | <a href="#">UN System of Environmental -Economic Accounting for Agriculture, Forestry and Fisheries</a>                 | Specific indicators for agriculture, forestry, and fisheries sectors  | The statistical system provides a wide range of data that can be used in indirect measurement and environmental accounting processes  | Natural                          | 2, 3, 5, 6, 7  |
| Food System Impact Valuation Initiative (FoodSIVI) | <a href="#">Valuing the impact of food: Towards practical &amp; comparable monetary valuation of food system impact</a> | The framework provides in-depth insight into measurement and valuation methods including case studies, ethical choices, footprints, and scenarios | Framework guides business into scientific-based valuation methodologies for impact, analysis, internalization of externalities, statistics, standardization, and disclosure | Natural, human, social, produced | All Steps      |
| GAIN & Johns Hopkins University                    | <a href="#">Food Systems Dashboard</a>  | Scorecard and map based on country profiles with key drivers and outcomes of food systems per year  | The dashboard can be used for benchmark comparison and indirect measurement in a capitals assessment  | Natural, human, social, produced | 4, 5, 6, 7     |

Annex A continues on the next page.





| Author                                  | Name  | Description   | How could it be used in capitals assessments   | Capitals                         | Relevant Steps |
|---|---|---|--|----------------------------------|----------------|
| Global Farm metric                      | <a href="#">Global Farm metric</a>  | Framework for farmers to understand environmental, social, and economic aspects of their system. It defines farm impacts and agreed metrics   | The metrics can be used in impact measurement and valuation for capitals assessments related to farming activities   | Natural, human, social, produced | 5, 6           |
| GreenDelta/ UNEP /SETAC                 | <a href="#">nexus open LCA &amp; open LCA</a>   | Search engine for Life Cycle Assessment data that allows filtering data sets by database, year, location, sector, product, and price. Resource for Sustainability and Life Cycle Assessment | Map and software are useful for LCA assessment. Includes Agri FootPrint database with an inventory of food, feed and beverage ingredients, fertilizers, vegetable oil, and protein meal  | Natural                          | 5              |
| Harvard Business School                 | <a href="#">Harvard Impact Weighted Accounts</a>  | Framework to create financial accounts that reflect a company's financial, social, and environmental performance and capture external impacts   | The impact-weighted accounts can be used in capitals assessment to build accounting statements that capture external impacts   | Natural, human, social, produced | 5, 6, 7 8      |
| Integrated Modelling Partnership        | <a href="#">ARIES - Artificial Intelligence for Ecosystem Services</a>                        | The modeler chooses appropriate ecological process to connect and value flow between nature and society. Dynamic assessment of how nature provides benefits to people                       | Can be used to represent and assess capital flows and stocks including natural capital accounting, ecosystem services, food security, poverty, climate adaptation, conservation planning | Natural, social, produced        | 5, 6, 7        |
| International Standard. ISO 14008: 2019 | <a href="#">Monetary valuation of environmental impacts and related environmental aspects</a> | Normative references, definitions, principles, guidance on monetary valuation, requirements, details about procedures and methods   | Provides a straightforward explanation about the recognized procedures for monetary valuation (with calculation formulas) and what it should encompass                                   | Natural                          | 5, 6, 7        |

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| Author  | Name   | Description   | How could it be used in capitals assessments  | Capitals                 | Relevant Steps |
|---|--|---|---|--------------------------|----------------|
| International Standard. ISO 14007: 2019                       | <a href="#">Environmental management – Guidelines for determining environmental costs and benefits</a> | Guidelines for organizations on determining the environmental costs and benefits (qualitative, quantitative or monetary) associated with their activities | Provides standardized guidance about cost and benefit values and addresses the dependencies of an organization on natural capital   | Natural                  | 5, 6, 7        |
| Natural Capital Project / Stanford University                 | <a href="#">InVEST</a>   | Software that maps and values outputs, locations, and activities of people and values ecosystem services that benefit human life                          | Can be used to balance environmental and economic goals in a decision-making process to quantify and value trade-offs of alternative scenarios  | Natural, human, produced | 5, 6, 7        |
| New Earth B   | <a href="#">The Social Hotspots Database</a>   | A tool to assess social risks and opportunities. It provides maps, risk analyses, and comparisons between social hotspots, by country and sector          | Based on Social Life Cycle Assessment, the database offers a model to calculate social footprints. It can be useful to measure human and social impacts and dependencies along the supply chain | Human, social            | 3, 4, 5, 6     |
| Organisation for Economic Co-operation and Development (OECD) | <a href="#">OECD Due Diligence Guidance for Responsible Business Conduct</a>                           | Due diligence recommendations for enterprises to avoid and address adverse impacts related to human rights, the environment, workers, and governance      | The guidance can be used to direct a capitals assessment objective and specifically to better implement the “responsibility” principle  | Natural, human, social   | 2, 9           |
|   | <a href="#">OECD-FAO Guidance for Responsible Agricultural Supply Chains</a>                           | Guidance for agricultural supply chains to enhance labor rights, health and safety, food security, tenure rights, governance, and other aspects           | Helps business understand existing standards along their supply chain and prevent risk of adverse environmental, social, and human impacts  | Natural, human, social   | 3, 4, 5, 9     |
| S&M Global  | <a href="#">The Trucost Carbon Earnings at risk</a>  | Quantified current pricing schemes in 130 regions together with carbon pricing scenarios. The tool models potential future carbon price                   | The tool is useful to assess the carbon price for companies that want to model potential financial risk exposures   | Natural, produced        | 5, 6, 7        |

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| Author  | Name  | Description  | How could it be used in capitals assessments   | Capitals               | Relevant Steps |
|---|---|--|--|------------------------|----------------|
| SimaPro   | <a href="#">SimaPro</a>   | Science-based tool to collect, analyze, and monitor sustainability performance data of company's products and services                         | It can be used to model LCA to assess carbon and water footprint. SimaPro includes the Agri-footprint database and Ecoinvent                       | Natural                | 4, 5, 6, 7, 9  |
| Social Value Initiative, PRÉ-Sustainability       | <a href="#">Handbook for Product Social Impact Assessment</a>     | Framework for Social Life Cycle Analysis (SLCA) designed to make the social benefits and burdens of a product visible                          | Provides practices, guidance, and examples of indicators that can be used for an assessment related to social and human capitals                   | Social, human          | 5, 7           |
| Sustainability Accounting Standards Board (SASB)  | <a href="#">SASB Materiality Map</a>                              | The Materiality Map identifies 26 sustainability issues that are likely to affect financial condition or operating performance                 | Map provides accounting metrics issues in a matrix with their related level of materiality. It helps to quickly identify material issues to assess | Natural, human, social | 4, 5           |
|   | <a href="#">Standards for 8 industries on Food &amp; Beverage</a> | Disclosure guidance and accounting standard including agricultural products, beverages, processed foods, meat, poultry, retailers, restaurants | Capitals assessments can be enriched using these standards in areas such as materiality, sector-relevant issues, scope, and disclosure             | Natural, human, social | 3, 4, 9        |
| Sustainable Agriculture Initiative (SAI) Platform | <a href="#">Library of guidance and resource</a>                  | Reports and publications to support global and local sustainable sourcing, to support impact and agriculture best practices                    | Tools and materials can support companies, particularly in framing and scoping a natural capital assessment  | Natural                | 3, 4, 5        |
| The Cool Farm Alliance                            | <a href="#">Cool Farm Tool</a>                                    | Tool for growers to measure carbon footprint, biodiversity, water footprints of crops and livestock products                                   | The tool can feed into the measurement and estimation of impacts related to crop and livestock products at the farm level                          | Natural                | 5              |

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| Author  | Name  | Description   | How could it be used in capitals assessments   | Capitals                         | Relevant Steps |
|---|---|---|--|----------------------------------|----------------|
| The Economics of Ecosystems and Biodiversity for Agriculture and Food | <a href="#">TEEBAgriFood – Measuring What Matters: a Synthesis Report</a>               | A comprehensive framework that addresses the core issues and economic valuation of the eco-agri-food-system highlighting biodiversity and externalities including all the capitals  | Framework undertakes measurement and valuation of economically invisible interdependencies between humans, agriculture, food systems, biodiversity, and ecosystems | Natural, human, social, produced | 5, 6, 7        |
| The Economist Intelligence Unit                                       | <a href="#">Global Food Security Index</a>  | A map presenting country indexes calculated on food security issues: affordability, availability, quality and safety and natural resources, and resilience                          | Helps business to understand the local food (in) security of the activities they depend on and how this can be a risk or an opportunity for positive impact        | Social                           | 2, 3           |
| The Food and Land Use Coalition                                       | <a href="#">Growing Better: Ten Critical Transitions to Transform Food and Land Use</a> | The report presents essential actions and aggregated financial value on scenarios and opportunities related to a transformative approach  | Document provides an overview of the future under business as usual or implementation of needed actions in the agri-food sector                                    | Natural, human, social, produced | 3, 9           |
| True Cost, Think Tank for Sustainability, Soil & More impacts         | <a href="#">True Cost Accounting AgriFood handbook</a>                                  | Capital based assessment, focused on cost (monetary value) of negative impacts induced by business activities   | The handbook provides a well-explained list of indicators and their units for natural, human, and social impacts   | Natural, human, social           | 5, 6, 7        |
| UN Convention on Biological Diversity                                 | <a href="#">Kunming-Montreal Global Biodiversity Framework (GBF)</a>                    | Intergovernmental agreement on 4 goals and 23 targets for achievement by 2030. Targets 7, 10, and 16 relate to agri-food, while Target 15 relates to biodiversity impact assessment | The GBF can be used for businesses that want to comply with future requirements of biodiversity impacts  | Natural                          | 5, 6, 7, 9     |
| United Nations Development Programme                                  | <a href="#">SDG Impact Standards</a>  | SDG standards inform better management practices to guide businesses to embed sustainability into their decision making   | Capitals assessment can inform SDG performance and vice-versa as both are core and complementary sustainability topics   | Natural, human, social, produced | 2, 3, 4        |

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| Author  | Name  | Description   | How could it be used in capitals assessments   | Capitals                         | Relevant Steps |
|---|---|---|--|----------------------------------|----------------|
| United Nations Environment Programme              | <a href="#">Guidelines for Social Life Cycle Assessment of Products</a>   | Social Life Cycle Analysis (SLCA) framework provides analysis about the effects of a product on social and human capital  | Framework for business to assess social and human capital using LCA approach   | Social, human                    | 2, 3, 4        |
| United Nations Environment Programme/ GRID-Geneva | <a href="#">MapX</a>  | Online platform for mapping, monitoring, and managing geospatial data on natural resources from 900 public datasets   | Applications include chemicals management, disaster risk reduction, biodiversity and land-use planning, renewable energy, and security   | Natural                          | 5, 6           |
| UN Global Compact, CEO Water Mandate              | <a href="#">Quantis Water Database</a>                                    | Water footprint of products, services, and organizations. Water footprints can be calculated throughout the supply chain  | Provides information about water use, consumption, and water pollution of products and processes   | Natural                          | 5              |
| United Nations Statistical Commission             | <a href="#">System of Environmental - Economic Accounting</a>             | A standardized framework and statistical system for structuring information on environmental stocks and flows relevant to sectors, linked to standard measures of economic activity such as GDP and national wealth | The standards and structures of SEEA directly complement corporate-level natural capital accounting work. Datasets compiled using the SEEA should provide relevant, contextual benchmarking information for corporations | Natural, produced                | 5, 6, 7        |
| United Nations Statistics Division                | <a href="#">UN data explorer</a>  | Data service with a variety of statistical resources. The database contains over 60 million data points and covers agriculture  | The explorer can provide data on spatial, social, economic, and environmental contexts. It can be useful for materiality and pathways analysis   | Natural, human, social, produced | 3, 4, 5        |
| World Bank-led global partnership                 | <a href="#">Wealth Accounting and the Valuation of Ecosystem Services</a> | The WAVES Knowledge Center is a useful platform with a broad collection of publications on natural capital stock  | Platform provides contextualized information to help business in their assessment  | Natural                          | 3              |

Annex A continues on the next page.





| Author   | Name  | Description   | How could it be used in capitals assessments  | Capitals                         | Relevant Steps |
|--|---|---|---|----------------------------------|----------------|
| World Benchmarking Alliance  | <a href="#">Methodology for the food &amp; Agriculture benchmark</a>                                      | The frameworks has been benchmarked with 350 keystone companies across the value chain using a scoring and weighting approach on governance, environment, nutrition, and social inclusion         | The study and results can be used as a scenario to compare global benchmark indicators with business performance in the scope of a capitals assessment  | Natural, human, social, produced | 2, 3, 4, 5     |
| World Business Council for Sustainable Development                               | <a href="#">Developing Nature Positive Food &amp; Agriculture roadmap</a>                                 | The roadmap provides support for companies in the land-use sector to drive change in value chains   | When published, the roadmap will provide a step-by-step approach for action-setting aligned with the capitals approach to avoid and reduce negative impacts while restoring and regenerating nature         | Natural                          | 9              |
|  | <a href="#">Guidance on the assessment of freshwater impacts by food and agriculture sector companies</a> | Specific guidance, closely aligned with TEEBAgriFood and Capitals approach for freshwater impacts   | The Guidance can be used for measuring and valuing water consumption and discharge impacts  | Natural                          | 5, 6, 7        |
| World Business Council for Sustainable Development and World Resources Institute | Green Gas Protocol - a Corporate Accounting and Reporting Standard  | Revised protocol for corporations with guidance and standard on GHG emissions boundary setting, tracking, accounting, and reporting   | The Protocol can be used in capitals assessment for impacts drivers and impact valuation related to GHG emissions   | Natural                          | 2, 4, 5, 6, 8  |
| Zurich University of Applied Science & others                                    | <a href="#">Eaternity Database (EDB)</a>  | A CO <sub>2</sub> equivalent values and unit processes database for food. It includes 550 food items based on seasonality, farming procedure, transportation, conservation, and processing models | It can be used to measure CO <sub>2</sub> e emissions values and compares those of organic and traditional farming. Contains nutrition values and CO <sub>2</sub> values for meals and restaurant purchases | Natural                          | 5              |



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# About Capitals Coalition

Capitals Coalition is a global collaboration transforming the way decisions are made by including the value provided by nature, people, and society. Our ambition is that by 2030 the majority of business, finance, and government will include all capitals in their decision making, and that this will deliver a more fair, just, and sustainable world.





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