NATURAL CAPITAL PROTOCOL

APPAREL SECTOR GUIDE

NATURAL CAPITAL COALITION

Contents

Foreword by Mark Gough, Executive Director, Natural Capital Coalition

This sector guide was developed to accompany the Natural Capital Protocol (hereafter, the Protocol). The guide is intended as a supplement to the Protocol and, as such, you will need to have a copy of the Protocol with you as you read this.

The Protocol and sector guides form a suite of work that has been produced by the Natural Capital Coalition, to harmonize approaches and simplify the sometimes confusing landscape of natural capital initiatives.

It has been produced through collaboration, and proves that by working together we can create widely accepted outputs that are robust and accessible and that recognize the needs of the many different stakeholders involved.

Continuing this collaboration at the sector level allows for a greater understanding of common challenges and the ability to develop system-wide solutions that will benefit not just the sector as a whole, but society and nature as well.

I would like to thank all of the people who have been involved in developing this sector guide. This is a significant step forward and provides a strong platform for future integration of natural capital into the way that we think and work.

Orientation

Introducing natural capital, the Protocol and the sector guides

The Protocol is a standardized framework to help businesses identify, measure, and value their impacts and dependences on natural capital. However, natural capital impacts and dependencies are often specific to the sector in which a business operates. In 2013, the Natural Capital Coalition (hereafter the "Coalition") valued the unpriced natural capital consumed by primary production (including agriculture, forestry, fisheries, and mining) and some primary processing (including cement, steel, pulp, and paper) sectors at USD 7.3 trillion. Moreover, most of these sectors did not generate sufficient profit to cover their environmental impacts, with consumer sectors amongst those most exposed (Natural Capital Coalition 2013). Recognizing the sector specificity of natural capital impacts and dependencies, the Protocol is supported by sector guides that provide additional guidance for businesses applying the Protocol in specific sectors. The first guides, produced in 2016, were for the food and beverage and apparel sectors, with additional sector guides to follow.

The appetite amongst business for a standardized framework to help assess impacts and dependencies on nature was evidenced in an extensive business review conducted by the Coalition in the summer of 2015. The review provided insight into the opinions of a broad range of businesses representing 15 sectors (including consumer products, construction, food and beverage, apparel, and financial institutions) across all geographic regions. Businesses said that any measure of success in the uptake of a Protocol would be evidenced in improved risk management, increased competitive advantage, and enhanced corporate reporting (Natural Capital Coalition 2015). Ultimately, these benefits are encapsulated in more informed business decision making.

Responding to this call to action, the sector guides help demonstrate the manner in which natural capital assessments can help businesses in specific sectors achieve these benefits through applications of the Protocol.

Glossary

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

Natural Capital Protocol
A standardized framework to identify, measure, and value direct and indirect impacts (positive and negative) and/or dependencies on natural capital.

Sector guide
Additional, sector-specific guidance to be used alongside the Protocol by businesses in a relevant sector conducting a natural capital assessment.

How do the sector guides support the Protocol?

The sector guides support the Protocol by providing additional guidance and sector-specific business insights. The sector guides do not provide additional methodologies, but assist in the implementation of the Protocol. Like the Protocol itself, the sector guides have been developed for business, aimed primarily at managers from sustainability, environmental, health and safety, and operations departments to help them integrate natural capital into existing business processes.

More specifically, the sector guides:

- Provide context on why natural capital is relevant to your business and how your business benefits from it
- Develop the business case for natural capital assessments
- Identify natural capital impacts and dependencies relevant to your business
- Use practical examples to demonstrate sector-specific business applications of the Protocol

Principles

The sector guides are underpinned by the same principles as the Protocol to help guide your natural capital assessment.

Relevance
Ensure that you consider the most relevant issues throughout your natural capital assessment including the impacts and/or dependencies that are most material for the business and its stakeholders *(Adapted from original in CDSB, 2015; and WRI and WBCSD, 2004).*
Rigor
Use technically robust (from a scientific and economic perspective) information, data, and methods that are also fit for purpose.
Replicability
Ensure that all assumptions, data, caveats, and methods used are transparent, traceable, fully documented, and repeatable. This allows for eventual verification or audit, as required *(Adapted from GRI, 2013).*
Consistency
Ensure the data and methods used for an assessment are compatible with each other and with the scope of analysis, which depends on the overall objective and expected application *(Adapted from WRI and WBCSD, 2004; and IIRC, 2013).*

Note: Whereas **Relevance** is a principle to adhere to throughout the application of the Protocol, **Materiality** is covered in Step 04, "Determine the impacts and/or dependencies".

Although it is recommended that the principle of **Consistency** is adhered to throughout your assessment, the Protocol does not propose that outputs will be consistent and comparable between companies, as they are context specific. Comparability of results is something that will be addressed at a later date.

The Protocol Framework, Stages, and Steps and their relevance in the sector guides

The Protocol Framework covers the four stages of a standard decision-making process, "Why", "What", "How", and "What Next". These Stages are further broken down into nine Steps, which contain specific questions to be answered when carrying out a natural capital assessment (Figure 0.1).

The Stages and Steps are iterative, and you should expect to revisit previous Steps as necessary. For example, after identifying your most material impacts and dependencies in Step 04, you may need to go back and change the objective or scope of your assessment in Steps 02 and 03.

Each Step in the Protocol follows the same structure. Steps begin with a statement of the 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.

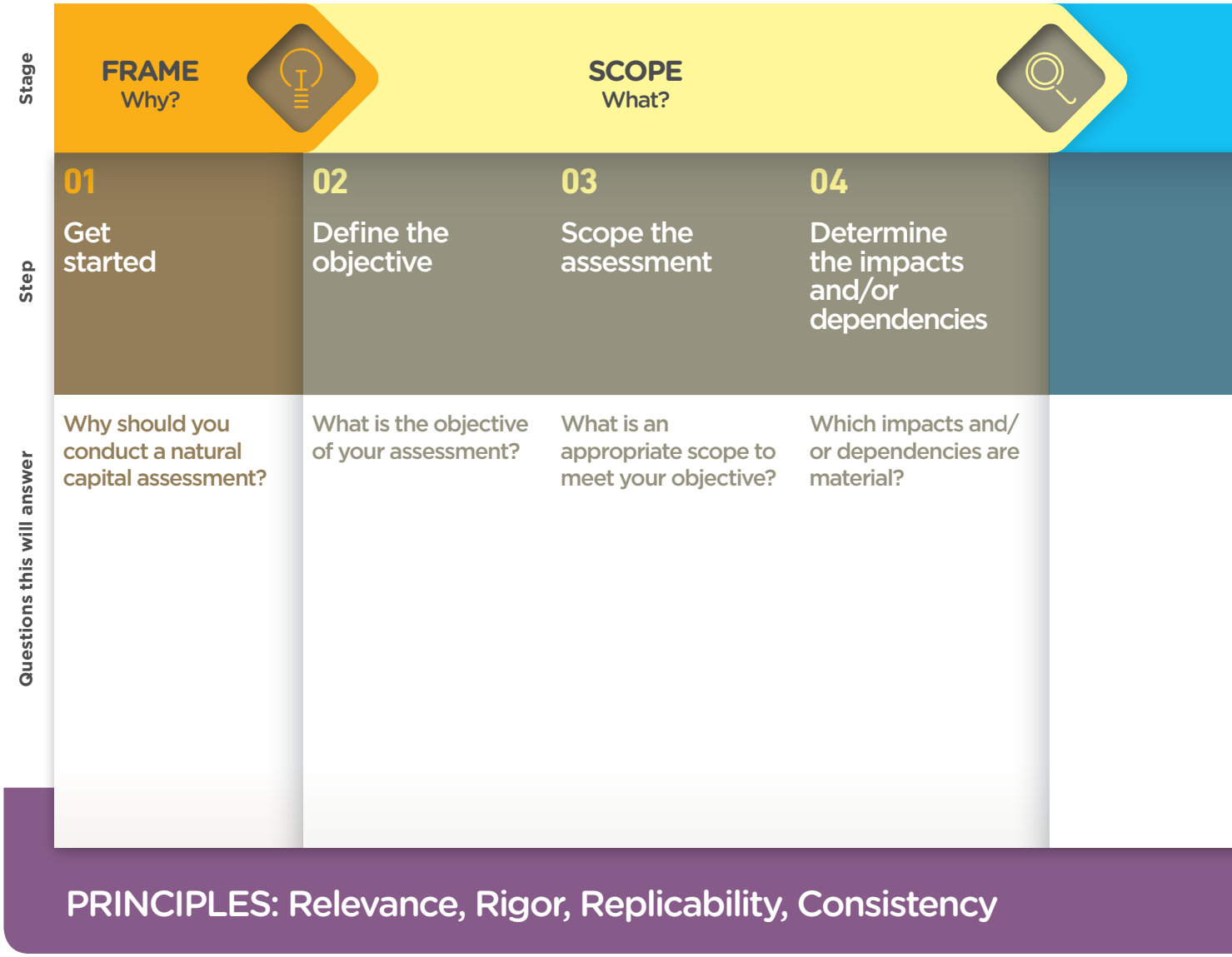

Figure 0.1
The Natural Capital Protocol Framework

MEASURE AND VALUE
How?

APPLY
What next?

05 Measure impact drivers and/or dependencies

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

06 Measure changes in the state of natural capital

What are the changes in the state and trends of natural capital related to your business impacts and/or dependencies?

07 Value impacts and/or dependencies

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

08 Interpret and test the results

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

09 Take action

How will you apply your results and integrate natural capital into existing processes?

The sector guides follow the overarching Protocol Framework exactly and do not introduce any additional Stages or Steps. Each Step in the sector guides contains additional guidance that will help your business complete the actions within that Step and navigate through the Protocol Framework.

For some actions, additional sector-specific guidance may not be appropriate. At the beginning of each Stage and Step, the sector guides outline the actions that have been extended to provide additional sector-specific guidance.

Businesses implementing the Protocol should follow all Stages and Steps as described in the Protocol Framework. The sector guides should be used together with the Protocol rather than in isolation. To help bring sector-specific business applications to life, the sector guides include hypothetical examples that summarize how a business would complete all actions outlined in the Protocol.

Useful definitions of key terms are provided when they are first introduced. For a complete glossary, please refer to the Protocol.

Definition of the apparel sector and its value chain

Apparel can include any item of adornment, but, for the purposes of this sector guide, it is used to refer specifically to clothing, excluding footwear and accessories which are beyond the scope of this guide. In 2013, the global apparel retail market was worth USD 1.3 trillion, based on revenue (Marketline 2014a). Apparel manufacturing specifically has a total value of USD 504 billion (Marketline 2014b) (excluding leather, footwear, and knitted goods).

The apparel sector encompasses a wide range of sub-sectors spanning different tiers of production, and is reliant on international trade and complex, widely distributed supply chains. It is an extremely fragmented industry with no individual dominant companies and is experiencing rapid growth in Asia and emerging markets, though a decline in developed nations (IBIS World 2015).

Apparel can be produced from synthetic, cellulosic (plant-based), animal-based, or hybrid materials, often blended to include more than one of these. Though exact processes vary depending on raw material inputs, vertical integration and processing the basic stages are represented in Figure 0.2.

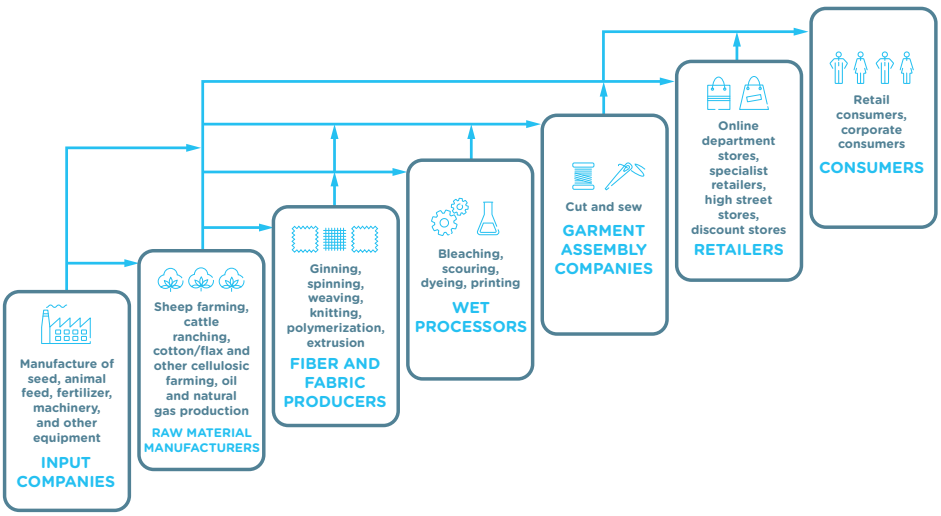

Figure 0.2
The apparel value chain (Trucost 2016)

This sector guide considers the natural capital impacts and dependencies of businesses operating across the apparel value chain including the consumer use and end-of-use stages, as well as input companies throughout the value chain. However, certain sub-sectors are prioritized based on their relevance.

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.

Hypothetical examples running through the apparel sector guide

To help your business navigate through each Step of the Protocol Framework, the apparel sector guide contains three hypothetical examples that help bring sector-specific business applications to life. Although purely illustrative, the examples demonstrate how businesses operating in the apparel sector can use the Protocol to frame, scope, measure, value, and apply a natural capital assessment to inform business decision making. The hypothetical examples will appear at the end of each Step to provide a summary of what was concluded. Table 0.1 introduces these examples, the context for each organization's engagement with the Protocol, the benefit that was obtained, and the decision that was informed.

Table 0.1
Sector-specific hypothetical examples

	Allsortsofwear Plc.	Color World	Cotton Fields Ltd.
Organization	Large multi-brand, multinational apparel retailer	Wet processor	Medium-sized cotton farm
Context	A large apparel retailer sells multiple brands as well as its own brand, and has never reviewed its environmental performance.	A company operates ten dye-houses across four different countries in Asia. A key customer is pressuring the company to report good environmental performance, and the company needs to expand its processing capacity with new equipment.	A medium-sized cotton farm is receiving financial assistance to develop improved farming systems which are less detrimental to local ecosystems. To encourage a further round of investment, it would like to assess and report to its funders on the significant natural capital benefits delivered as a result of their funding.
Natural capital assessment undertaken (Business application)	The company conducted a quantitative assessment to identify the material natural capital impacts and dependencies across the entire value chain of its own-brand products. *(Assess risks and opportunities—see Step 02)*	A natural capital impact valuation was undertaken on a range of different technologies. This was used to conduct an option appraisal that considered both natural and financial capital to help inform the purchase of the new equipment. *(Compare options—see Step 02)*	The cotton farm conducted a monetary assessment to report back to its funders the net impact delivered by their investments from the reduction of agrochemical use polluting soil and water ecosystems. *(Estimate total value and/or net impact—see Step 02)*
Business benefit	The assessment identified significant risk areas across the value chain that may be linked to reputational or future legislative risk.	Previous purchasing decisions had been primarily informed by cost. By incorporating natural capital into traditional return on investment (ROI) calculations, Color World reduced the likelihood of being subjected to environmental fines or clean-up costs should regulations become more stringent in the future.	Cotton Fields Ltd.'s effective communication with its funders on the net benefit returned on their investment allowed the farm to receive a further round of funding and diversify its investor base.
Business decision	Allsortsofwear engaged suppliers to improve efficiency and reduce negative impacts associated with production of its products.	Color World used the information to select and purchase the technology with the highest natural capital benefit.	Following the success with its funders, Cotton Fields Ltd. used the results of the monetary assessment to differentiate itself to buyers and secure longer-term purchase agreements.

FRAME STAGE
Why?

What is the Frame Stage?

The Frame Stage of the Protocol helps you to frame why you would undertake a natural capital assessment and to consider the benefits this could deliver.

How does the sector guide map to the Protocol?

Table F.1 provides an overview of the questions and actions of the Frame Stage in the Protocol and an outline of the actions for which the sector guide provides additional guidance.

Table F.1:
Mapping between the Protocol and the sector guide

Step	Question that this Step will answer	Actions	Additional guidance included in the sector guide?
01 Get started	**Why should you conduct a natural capital assessment?**	1.2.1 Familiarize yourself with the basic concepts of natural capital	**No**
		1.2.2 Apply the basic concepts of natural capital to your business context	**Yes**
		1.2.3 Prepare for your natural capital assessment	**No**

Additional notes
Businesses operating in the apparel sector should address all of the actions associated with Step 01 in the Frame Stage. The sector guide provides additional guidance for some of actions, where it is most appropriate, but it is important that you familiarize yourself with the foundational concepts and terms introduced in Step 01 of the Protocol as you use the sector guide.

01 Get started

This section of the sector guide provides additional guidance for answering the following question:
Why should you conduct a natural capital assessment?

In particular, the sector guide will help you undertake the following action:
1.2.2 Apply the basic concepts of natural capital to your business context

Apply the basic concepts of natural capital to your business context

In this section, the sector guide builds on the basic concepts of natural capital that are outlined in Step 01 of the Protocol and demonstrates how they relate to your business. In undertaking this action, you will consider the potential natural capital impacts and/or dependencies and explore the potential risks and opportunities that are relevant to your business and its stakeholders.

Apparel companies depend on natural capital to provide inputs including raw materials and fibers, energy and water used in manufacturing, and ecosystem services such as climate regulation. This dependency directly affects operations in agriculture and production and indirectly affects all operations through the value chain. Over-exploitation of, and damage to, natural resources, particularly in vulnerable ecosystems, presents a very real financial risk to businesses operating in the sector. For example, cotton price volatility halved the profits of some apparel retailers in recent years (Natural Capital Coalition 2013), while toxic discharges from dye houses to water systems can result in large financial penalties from fines and clean-up fees.

The sector also has significant impacts on natural capital, including the "wet-processing" stages which require the use of large quantities of chemicals, and raw material stages that can require significant resource extraction and land use. Not only do these impacts threaten ecosystems on which apparel companies depend, they can also represent significant costs for wider society if business activities are not responsibly managed. Further to this, biodiversity is critical to the health and stability of natural capital and to flows of ecosystem services; it underlies resilience to shocks like floods and droughts, and supports fundamental processes such as the carbon and water cycles as well as soil formation. The mismanagement of natural capital is increasing the risk of financial costs for companies as they become targets of NGO campaigns, such as the Greenpeace "Detox" campaign against irresponsible fashion (Greenpeace 2012a), or find supply chains unexpectedly vulnerable. Conversely, well-managed natural capital can provide opportunities. Agricultural practices can be optimized to protect and enhance the vital ecosystem services on which businesses depend, while the use of recycled materials can reduce the negative impacts associated with landfill and incineration practices.

Before considering some of the potential natural capital impacts and dependencies that are relevant to your business, Figure 1.1 outlines the main risk categories that have a direct link to business performance: higher resource costs, new government regulations, reputational damage, reduced market share, and fewer financing options. These types of risks are already affecting corporate income statements and balance sheets. In contrast, businesses that already manage natural capital create for themselves a range of opportunities from new products, services, and technology that positively affect their bottom lines. For more examples of risks and opportunities, please refer to the Protocol.

Glossary

Natural capital impact
The negative or positive effect of business activity on natural capital.

Impact driver
In the Protocol, an impact driver is a measurable quantity of a natural resource that is used as an input to production (for example, volume of sand and gravel used in construction) or a measurable non-product output of business activity (for example, a kilogram of NOx emissions released into the atmosphere by a manufacturing facility).

Wet processing stage
The stage of textile production that includes largely chemical processes, such as bleaching, dyeing, and finishing.

Ecosystem
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 2005). Ecosystems are a component of natural capital.

Ecosystem services
The most widely used definition of ecosystem services is from the Millennium Ecosystem Assessment: "the benefits people obtain from ecosystems". The MA further categorized ecosystem services into four categories: Provisioning, Regulating, Cultural, and Supporting (MA 2005).

Biodiversity
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).

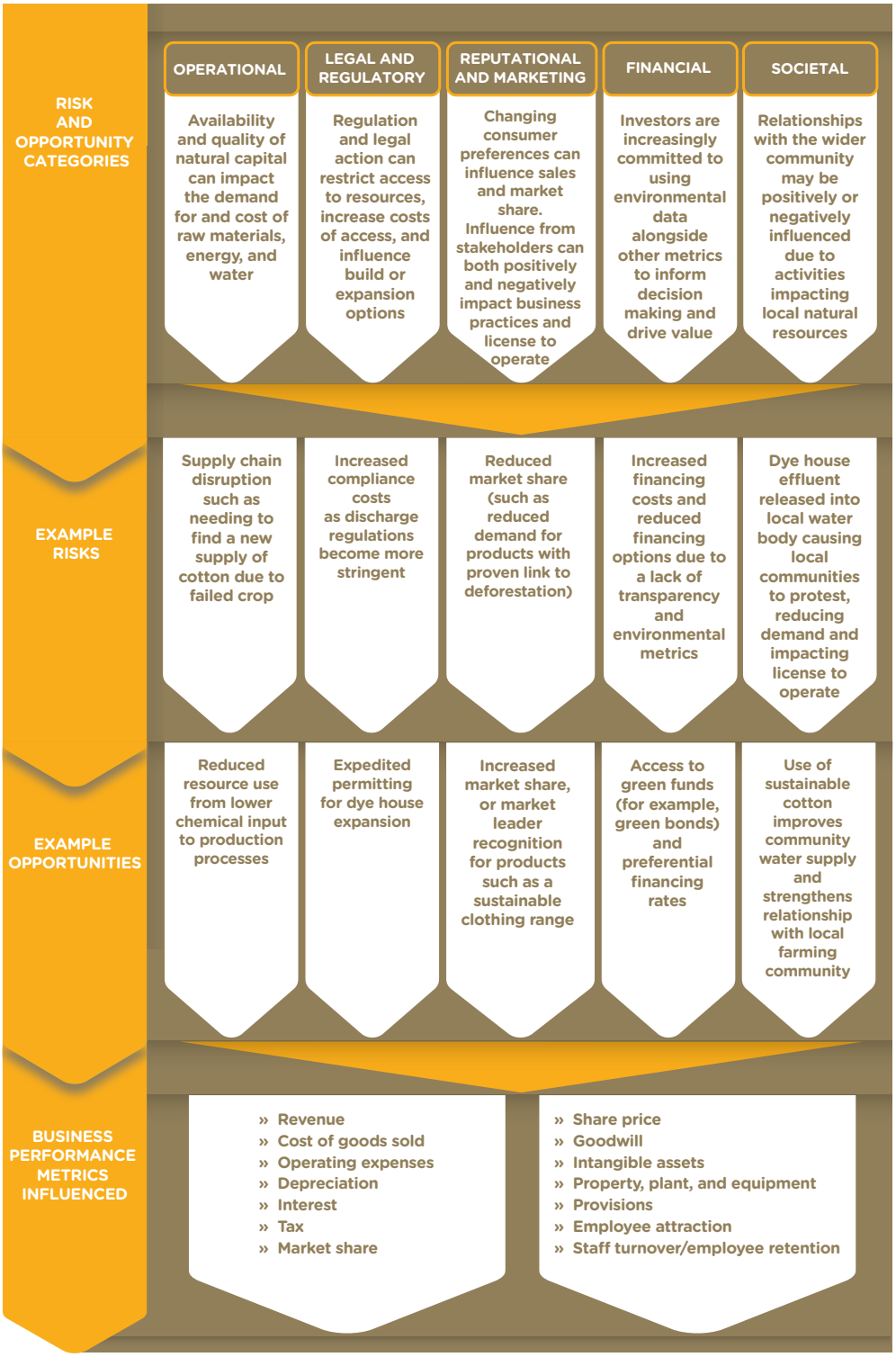

Figure 1.1:
Examples of business implications from key natural capital risks and opportunities

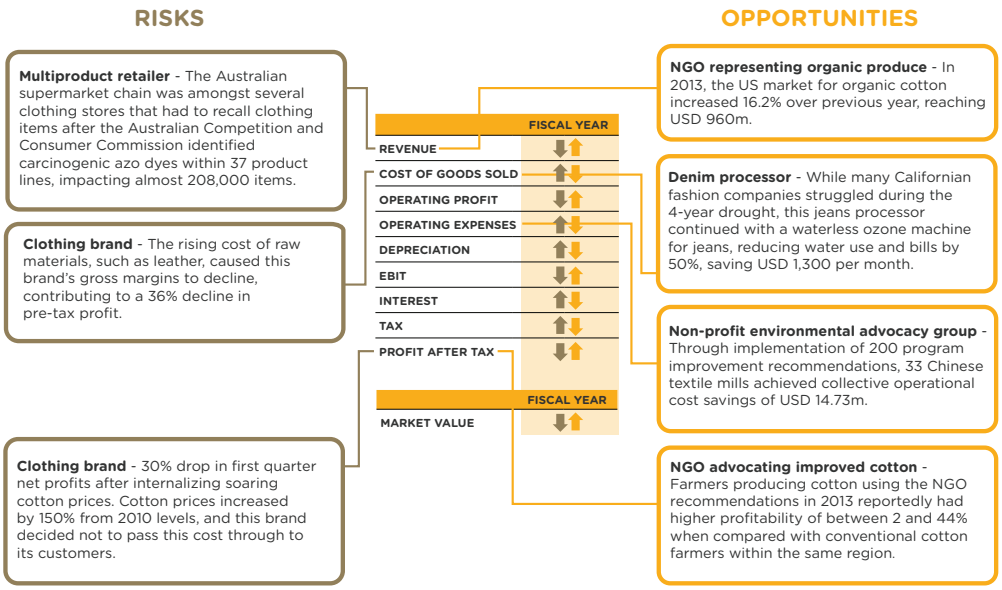

Figure 1.2:
Case study of business implications from some key natural capital risks and opportunities as experienced by real apparel sector stakeholders

Figure 1.2 translates these theoretical risk and opportunity categories into practice through a growing list of real world examples where business implications have been realized. The examples have been anonymized.

An example of a regulatory risk is demonstrated by the experience of a large Australian retailer. During standard garment testing by the Australian Competition and Consumer Commission (ACCC) in 2014, products on the market from various brands and retailers were identified to contain azo dyes—chemicals known to break down into carcinogenic compounds called aromatic amines. Women's and children's jeans sold by the retailer were found to exceed the acceptable limit and were recalled. The reputation of the company was damaged by bad publicity and profits were reduced due to refunds of implicated products (ACCC 2014).

In 2013, a large clothing brand experienced operational risks resulting from increasing cotton prices. Increasing cotton prices resulted in rising cost of goods sold and the company did not pass this cost through to the end consumer. Cotton prices increased significantly following growth in global demand coinciding with floods and droughts that impacted cotton crops (Financial Times 2010).

Natural capital management can also provide opportunities and financial benefits. While fashion companies in California struggled to contend with a four-year drought, a jeans company involved in the washing and dyeing of denim operated successfully with a waterless ozone machine. The machine creates the stonewashed and bleached look without using water. As a result, the company maintained production levels and also achieved a 50% reduction in its water bill (Wall Street Journal 2015).

Other examples reflect the opportunity of marketing and product development, with organic cotton in the United States reaching a market value of USD 960 million in 2013, an increase of 16.2% (Bloomberg 2014). A premium was also available on the crop, with organic cottonseed prices ranging from USD 500 to USD 700 per metric ton for the same year. This compares to USD 240 to USD 320 per metric ton for conventional cotton (USDA 2014).

What underpins all of the real world examples identified above is the way a business interacts with natural capital through impacts and dependencies across its value chain. Business activity across the apparel value chain can impact upon natural capital and its ability to continue to supply goods and services. There are, however, some examples of positive impacts including ecological recovery due to site remediation, improved quality of rivers and lakes due to pollution abatement, and improved soil fertility due to organic farming practices.

Table 1.1 provides a small selection of some of the relevant impact drivers for the apparel sector. The table also provides examples of both risks and opportunities relating to each impact driver and business performance metrics than can be influenced. Other important impact drivers to consider include freshwater and marine ecosystem use, water use, non-GHG air pollutants, soil pollutants, solid waste, disturbances, and other resource use.

Table 1.1:
A selection of natural capital impact drivers in the apparel sector

	GHG emissions	Water pollutants	Terrestrial ecosystem use
Overview	Synthetic and man-made fibers and fabrics can be highly energy intensive to produce and responsible for the release of substantial GHG emissions. According to WRAP (2012a), the conversion of viscose and acrylic fibers to yarn is responsible for over 18,000 kg CO_2e per ton of fiber—over twice as much as any other fiber. Disposal of cellulose- or animal-based fabrics to landfill releases methane, an important greenhouse gas, in decomposition.	Apparel production is associated with water pollution at many stages of the value chain. Agricultural crop production (particularly cotton) has been linked with inefficient agrochemical use, resulting in over-application and excess chemicals leaching into water systems. Wet processing is also particularly impactful. The World Bank, for instance, estimates that 17–20% of industrial water pollution worldwide comes from textile coloration and treatment alone (WWF 2012).	Terrestrial ecosystems include all land-based natural systems. Many of the fibers used in apparel are sourced from either crops or animal sources requiring significant land conversion (in particular cattle ranching for leather), while others may be sourced from forests (such as rayon). According to Canopy Research, up to 30% of pulp for fabrics is sourced from ancient and endangered forests (Ecotextile News 2014). Land-use change causes 15% of global GHG emissions, and disrupts local water cycles (WWF 2015c).
Risk and opportunity category	– Operational – Legal and regulatory – Reputational and marketing – Financial – Societal	– Operational – Legal and regulatory – Reputational and marketing – Financial – Societal	– Operational – Legal and regulatory – Reputational and marketing – Societal
Example risk	Energy use is one of the most significant drivers of GHG emissions for the sector. Regulations such as carbon taxes may become material, particularly to chemical companies supplying synthetic fibers.	Potential implications for water availability if pollution occurs in a water basin used for own sourcing. Mitigation costs can rise when local regulations are breached.	Illegal deforestation in supply chains or changes in legislation to protect endangered or ancient forests could result in supply chain disruption. Media and NGO campaigns are also a risk to reputation and could result in pressure to improve business practices.
Example opportunity	Managing energy use through resource efficiency and energy efficient equipment can provide significant cost savings.	Recapturing chemicals before discharge can potentially allow for recycling, reducing operational costs, and reducing wastewater treatment costs.	Potential to meet sustainable procurement specifications of eco-labelling if forestry standards adhered to and certifications achieved.
Significant value chain stage	Throughout value chain	Agricultural practices in raw material acquisition, as well as processing stages	Most critical at raw material stage
Geographical relevance	Global	Local	Local
Business performance metrics influenced	– Increased cost of goods sold due to compliance costs – Decreased operational costs from reduction of inputs and energy consumption – Improved customer loyalty and market share through reputational benefits of good management	– Increased cost of goods sold due to compliance costs – Increased resource costs such as higher water charges – Fines and compensation increasing operating costs – Decreased operational costs through recovery of chemicals and internal reuse	– Increased cost of goods sold due to compliance costs – Fines and compensation increasing operating costs – Revenue losses from negative publicity or consumer demand for better sourcing – Increased cost from business relocation due to loss of land and soil

Natural capital dependencies for the apparel sector span all categories of ecosystem service, including provisioning services, regulating services, and cultural services. Table 1.2 focuses upon some of the critical dependencies relevant to the sector. The raw material stage in a value chain typically interacts with nature directly through agricultural or extraction activities. As such, this stage tends to have the most significant dependency on natural capital. However, in many stages of the apparel value chain, business activities depend on energy and water.

Table 1.2:
A selection of natural capital dependencies in the apparel sector

	Consumptive: Water	Consumptive: Materials	Non-consumptive: Regulation of living environment
Overview	Water consumption in the sector is vast. Cotton is the most common water-intensive crop, but all fibers have significant water demands, whether due to agricultural demand, cleaning and processing of raw material (such as wool), or during the later stages of processing. For the period 1997 to 2001, Chapagain et al. (2006) calculated that worldwide consumption of cotton products required 256 Gm^3 of water per year.	Over 40% of the fibers worn are cellulosic (plant based) (Oerlikon 2010), the most significant being cotton, though flax (linen) and others are important. Other fibers are produced from animals such as silk, wool, and leather, while "hybrid" fibers can be produced from wood pulp or bamboo. Even abiotic fibers, produced from petrochemicals (such as polyester and acrylic), are sourced from fragile ecosystems where raw materials are generally extracted from below the ground.	Regulation of the living environment includes services that are required to maintain systems for the success of agricultural processes (for example, crop pest control and pollination).
Risk and opportunity category	– Operational – Financial – Legal and regulatory – Reputational and marketing – Societal	– Operational – Financial – Reputational and marketing – Societal	– Operational – Legal and regulatory – Reputational and marketing – Societal
Example risk	A risk to a company's access to water or ability to discharge to water exists through increased competition, or through pollution of water systems, climate change, or land-use change impacting on ecosystem functioning and fresh water provision.	Land-use change, increased competition for materials, and climate events (such as droughts and floods) can lead to reduced supply of raw materials for textile production.	Land-use change, climate events (such as droughts and floods), and anthropogenic activities can damage an ecosystem's ability to provide these services, which underpin all goods provided by them. Efforts to replace these services (for example, mechanical pollination) introduce important operational costs.
Example opportunity	Sourcing raw materials from regions with a plentiful water supply means that the acquisition of key inputs is less likely to be impacted by water shortages and reduced yields.	Responsibly managed lands can produce higher yields and improve revenue.	Soil management programs and reforestation can improve the ability of an ecosystem to regulate the living environment.
Significant value chain stage	Raw material acquisition, particularly agricultural, alongside processing of both fibers and fabrics, and wet processing and consumer use phases.	Raw material acquisition.	Raw material acquisition.
Geographical relevance	Local	Local	Local
Business performance metrics influenced	– Increased operating costs to source alternative materials – Revenue implications due to constraints on production – Reduced operating costs if onsite management allows internal recycling of water	– *Revenue implications due to constraints on production* – *Increased operating costs to source alternative materials* – *Stability of supply chain if managed* – *Market share increase through marketed use of sustainable materials*	– Supply chain disruption leading to increased operating costs to source an alternative supply – Loss of revenue to farmers due to low crop quality – Increased costs due to artificial replacement of services provided by ecosystems (such as higher agrochemical input costs)

Glossary

Natural capital dependency
A business reliance on or use of natural capital.

Step 01 of the apparel sector guide has provided additional guidance to help you explore potential risks and opportunities and help you understand your relationship with natural capital. Table 1.3 illustrates the completion of this Step for each of the sector-specific hypothetical examples, including the completion of all actions required in the Protocol for this Step.

Table 1.3
Sector-specific hypothetical examples – Step 01

	Allsortsofwear Plc.	Color World	Cottons Field Ltd.
Context	A large apparel retailer sells multiple brands as well as its own brand, and has never reviewed its environmental performance.	A company operates ten dye-houses across four different countries in Asia. A key customer is pressuring the company to report good environmental performance, and the company needs to expand its processing capacity with new equipment.	A medium-sized cotton farm is receiving financial assistance to develop improved farming systems which are less detrimental to local ecosystems. To encourage a further round of investment, it would like to assess and report to its funders on the significant natural capital benefits delivered as a result of their funding.
Which risks and opportunities might a natural capital assessment help to address?	Reputational risks (of inaction) and opportunities (of action) for consumers and investors.	Financial risk of lost business; Legal risk of non-compliance; Marketing opportunity from improvement.	Financial opportunity from better access to funding.

SCOPE STAGE
What?

What is the Scope Stage?

The Scope Stage of the Protocol sets out what you will need to consider in order to set the specific objective for your natural capital assessment.

How does the sector guide map to the Protocol?

Table S.1 provides an overview of the questions and actions of the Scope Stage in the Protocol and an outline of the actions for which the sector guide provides additional guidance.

Table S.1:
Mapping between the Protocol and the sector guide

Step	Questions each Step will answer	Actions	Additional guidance included in the sector guide?
02 Define the objective	**What is the objective of your assessment?**	2.2.1 Identify the target audience	**No**
		2.2.2 Identify stakeholders and the appropriate level of engagement	**No**
		2.2.3 Articulate the objective of your assessment	**Yes**
03 Scope the assessment	**What is an appropriate scope to meet the objective?**	3.2.1 Determine the organizational focus	**No**
		3.2.2 Determine the value-chain boundary	**No**
		3.2.3 Specify whose value perspective	**No**
		3.2.4 Decide on assessing impacts and/or dependencies	**No**
		3.2.5 Decide which type of values you will consider	**No**
		3.2.6 Consider other technical issues (i.e., baselines, scenarios, spatial boundaries, and time horizons)	**Yes**
		3.2.7 Address key planning issues	**No**
04 Determine the impacts and/or dependencies	**Which impacts and/or dependencies are material?**	4.2.1 List potentially material natural capital impacts and/or dependencies	**Yes**
		4.2.2 Identify the criteria for your materiality assessment	**No**
		4.2.3 Gather relevant information	**No**
		4.2.4 Complete the materiality assessment	**No**

Additional notes
All businesses operating in the apparel sector should address all of the actions associated with each Step in the Scope Stage. The sector guide provides additional guidance for some of the actions where it is most appropriate.

02 Define the objective

This section of the sector guide provides additional guidance for answering the following question:
What is the objective of your assessment?

In particular, the sector guide will help you undertake the following action:
2.2.3 Articulate the objective of your assessment

Articulate the objective of your assessment

In Step 01 of the Protocol, you have already started to think about how you intend to use the results of your natural capital assessment—your potential business application. In Step 02, you develop and articulate the objective, or why you are doing it. In addition, it is important to articulate the anticipated benefits that your business stands to gain from undertaking an assessment. Table 2.1 sets out a list of potential business applications alongside example objectives and benefits for the apparel sector. The list is not exhaustive and you may use different terms within your company.

Glossary

Business application
In the protocol, the intended use of the results of your natural capital assessment to inform decision making.

Table 2.1
Examples of business applications, objectives, and business benefits of natural capital assessments in the apparel sector

Business application (Intended use)	Example business decisions	Example outputs
Assess risks and opportunities	An overarching assessment is often a good starting point to understand the implications of your company's impacts and dependencies, informing decisions regarding strategy development and risk mitigation. For example, an apparel company that has never previously measured natural capital may choose to assess its entire value chain to identify and value areas of potential natural capital risk to determine where targeted improvements can be made.	Improved decision making; improved risk management
Compare options	Option appraisals can help compare the trade-offs of alternative options in natural capital terms, when presented with various scenarios. This can be used to inform business decisions relating to procurement such as new technologies or processes, or for prioritization. For example, a dye house wanting to improve its environmental performance may have a selection of water treatment technologies to choose from. In addition, option appraisals can be used to inform investment decisions by identifying potential solutions which yield the greatest natural capital return.	Improved decision making; increased competitive advantage; enhanced reporting and communication
Assess impacts on stakeholders	Ascertain which stakeholders are affected by a change in natural capital due to your business activity, such as a leather tanner discharging chromium into a water system used by local communities.	Improved decision making; improved risk management
Estimate total value and/or net impact	A means to assess the total value of natural capital generated by a system, for example, a cotton farm or forest. This analysis would inform strategic planning and decisions on capital investment and land management.	Improved decision making; increased competitive advantage
Communicate internally and/or externally	Reporting of natural capital assessments, such as the publication of Environmental Profit and Loss accounts (EP&Ls), can help inform communication strategies with internal and external stakeholders. Natural capital valuation in particular can be integrated within conventional financial accounting for a comprehensive understanding of business activities. This can help inform business decisions on communications strategies and context-based target setting across the apparel sector.	Increased competitive advantage; enhanced reporting and communication

Step 02 of the apparel sector guide has provided additional guidance to help you develop and articulate the objective of your assessment. Table 2.2 illustrates the completion of this Step for each of the sector-specific hypothetical examples, including the completion of all actions required in the Protocol for this Step.

Table 2.2
Sector-specific hypothetical examples – Step 02

	Allsortsofwear Plc.	Color World	Cottons Field Ltd.
Context	A large apparel retailer sells multiple brands as well as its own brand, and has never reviewed its environmental performance.	A company operates ten dye-houses across four different countries in Asia. A key customer is pressuring the company to report good environmental performance, and the company needs to expand its processing capacity with new equipment.	A medium-sized cotton farm is receiving financial assistance to develop improved farming systems which are less detrimental to local ecosystems. To encourage a further round of investment, it would like to assess and report to its funders on the significant natural capital benefits delivered as a result of their funding.
What is the intended business application?	Assess risks and opportunities	Compare options	Estimate total value and/or net impact
Who is the targeted audience?	Senior management	Senior management and then customers	Investors
Who are the right stakeholders and what is the appropriate level of engagement?	First-tier suppliers	Internal only—site manager/ operators	No external stakeholders
What specific benefits do you anticipate from the assessment?	The assessment will identify significant risk areas across the value chain that may be linked to reputational or future legislative risk.	Previous purchasing decisions had been primarily informed by cost. By incorporating natural capital into traditional return on investment (ROI) calculations, Color World will reduce the likelihood of being subjected to environmental fines or clean-up costs should regulations become more stringent in the future.	Cotton Field Ltd.'s effective communication with its funders on the net benefit returned on their investment will allow the farm to receive a further round of funding and diversify its investor base.
What is the specified objective?	To measure the extent to which products within the own-brand portfolio impact and depend on natural capital. This will inform a corporate strategy of reducing future impacts and risk associated with volatile supply.	To identify one technology from a range of potential technologies to invest in, based on financial and natural capital performance.	To quantify the net impact of improved practices and communicate this to current and future funders.

03 Scope the assessment

This section of the sector guide provides additional guidance for answering the following question:
What is an appropriate scope to meet the objective?

In particular, the sector guide will help you undertake the following action:
3.2.6 Consider other technical issues (i.e., baselines, scenarios, spatial boundaries, and time horizons)

Consider other technical issues (i.e., baselines, scenarios, spatial boundaries, and time horizons)

There are several details to consider during the Scope Stage in terms of the technical specifications of the assessment. If the assessment includes a comparison, appropriate baselines, scenarios, spatial boundaries, and time horizons need to be defined. Consideration of these technical issues will be dependent on the results of Step 01 and Step 02, in particular the identification of potential business applications. Table 3.1 provides some considerations on baselines, scenarios, spatial boundaries, and time horizons for the apparel sector specifically.

Table 3.1
Consideration of technical issues in the apparel sector

Technical issue	Considerations for the sector
Baselines	When selecting a baseline for an assessment, it is important to consider the unit of comparison. In the apparel sector, comparisons are often undertaken on different garments or materials. Consider whether a like-for-like comparison of one piece is appropriate (for example, the comparison of two cotton t-shirts) or, if the material/fiber used differs, whether the number of wears or the number of washes would be more suitable to incorporate longevity and durability characteristics. Baselines will be influenced by the objective of the assessment, alongside other scoping decisions, and may also involve spatial boundaries and time horizon considerations (for example, if assessing a mill technology that will be in place for 25 years, consider how the baseline would change over the same time period).
Scenarios	In addition to the baseline, comparisons may involve scenarios for potential future outcomes. In the apparel sector, scenarios may include "intervention" scenarios—which may be selected if your company wishes to determine how an activity or business decision may impact current practice. This could include the use of innovative fibers or the results of achieving sustainability targets (such as moving to organic or certified suppliers). "Vision" scenarios are also used in the sector, for example, identifying the implications on the supply of a particular fiber should water availability decrease.
Spatial boundaries	The apparel sector includes a complex and fragmented supply chain, with limited traceability. For many apparel companies, their supply chain can be quite dynamic (particularly in "fast fashion") and raw material suppliers may vary significantly from one year to the next. As such, consideration should be given to the spatial boundaries used in an assessment and particularly if collecting primary data. Furthermore, your direct operational impacts on natural capital may extend beyond your operational boundaries, for example air pollutants from a factory being dispersed over a wide geographical area. Some considerations are given below: – Impacts: It is important to consider the geographical range of an impact. For example, how far will the impact driver cause change in natural capital. Is it localized, regional, or global? – Dependencies: Where possible, spatial boundaries for specific sourcing regions should be set according to the objective—for example, the specific field of fiber production or livestock farm. If this level of detail is unavailable, the country of origin should be used.
Time horizons	While apparel is no longer limited to just a few "seasons" in a year, there are seasonal variations in production such as fiber use, sales of garments, and the chemical treatment of products sold. As such, any corporate-level assessment should ensure that the appropriate temporal boundary is selected to provide accurate findings. Depending on the objective of the assessment, it may be appropriate to focus on a historic, current, or future time horizon. For example, the company may consider changes in natural capital relative to some original "pristine" state, or relative to conditions when the company took effective control. Some considerations are given below: – Impacts: It is important to consider how persistent the impact driver is in the environment, to assess whether it will create long- or short-term natural capital changes. For example, releases of GHGs today are likely to result in persistent GHGs in the atmosphere over many hundreds of years (US EPA 2016) – Dependencies: Where possible, spatial boundaries for specific sourcing regions should be set according to the objective of the assessment —ideally as granular as the field where natural fiber production takes place or the livestock farm. If this level of detail is unavailable, the country of origin should be used.

Step 03 of the apparel sector guide has provided additional guidance to help you consider other technical issues of your assessment. Table 3.2 illustrates the completion of this Step for each of the sector-specific hypothetical examples, including the completion of all actions required in the Protocol for this Step.

Table 3.2
Sector-specific hypothetical examples – Step 03

	Allsortsofwear Plc.	Color World	Cotton Fields Ltd.
Context	A large apparel retailer sells multiple brands as well as its own brand, and has never reviewed its environmental performance.	A company operates ten dye-houses across four different countries in Asia. A key customer is pressuring the company to report good environmental performance, and the company needs to expand its processing capacity with new equipment.	A medium-sized cotton farm is receiving financial assistance to develop improved farming systems which are less detrimental to local ecosystems. To encourage a further round of investment, it would like to assess and report to its funders on the significant natural capital benefits delivered as a result of their funding.
What organizational focus?	Product	Corporate	Project
Which value-chain boundary?	Whole value chain (upstream, direct operations, and downstream)	Direct operations	Operational at farm level
Will the assessment cover impacts and/or dependencies?	Both	Impacts	Impacts
Which value perspective?	Business	Society	Society
What types of value?	Quantitative	Monetary	Monetary
Other technical issues to consider			
a) Baselines	a) Current practice	a) No single baseline required as different technologies compared against each other	a) Typical impacts of cotton farming in country of operation
b) Scenarios	b) No additional scenarios were considered	b) Four individual scenarios of installation and use of different technology options were assessed	b) The two scenarios were the baseline of standard cotton production and the impacts of production under the new agriculturally improved system.
c) Spatial boundaries	c) All products within own-brand portfolio	c) Site and potential area of influence	c) Owned farmland and potential areas of influence
D) Time horizons	d) Product life	d) One year of production	d) From point of intervention until full implications of farming practice changes evidenced, estimated to be three years
Key planning issues to consider (for example, resource and time constraints)	Resources were assembled internally within the sustainability department, with assistance from buyers and designers.	The dye house has a small sustainability team and limited previous experience of impact assessment and valuation, so a third-party consultant was commissioned to undertake the analysis.	The farm has detailed data collection and can quantify the impact drivers in physical terms. A third-party consultant was sought to assist in determining how these translate into impacts (Step 06 and 07)

04 Determine the impacts and/or dependencies

This section of the sector guide provides additional guidance for answering the following question:
Which impacts and/or dependencies are material?

In particular, the sector guide will help you undertake the following action:
4.2.1 List potentially material natural capital impacts and/or dependencies

List potentially material natural capital impacts and/or dependencies

The first activity in a materiality assessment is to consider all potentially relevant impacts and dependencies for the chosen objective and scope. At this point, the Protocol introduces the concepts of impact pathways and dependency pathways. Understanding these terms is fundamental to conducting a natural capital assessment. Impact pathways describe how, as a result a specific business activity, a particular impact driver results in changes in natural capital and how these changes affect different stakeholders. Figure 4.1 provides an example of an impact pathway for chromium water pollution from a leather tannery. A dependency pathway shows how a particular business activity depends upon specific features of natural capital, or associated natural processes which are often external to your business. Figure 4.2 provides an example dependency pathway for the water dependency of a cotton farm.

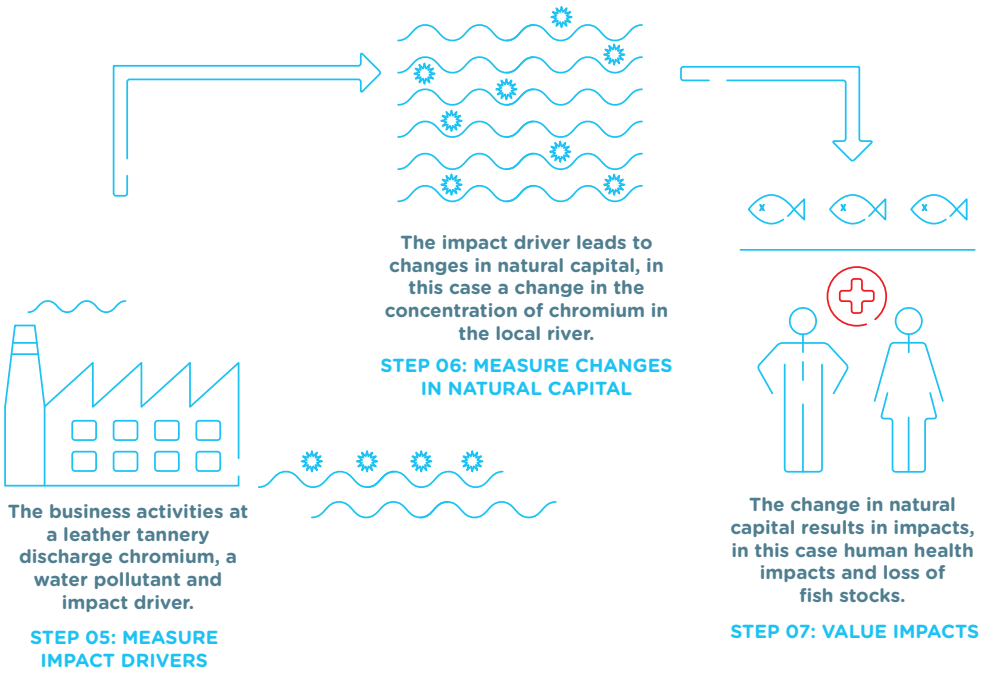

Figure 4.1
Example impact pathway for chromium water pollution from a leather tannery

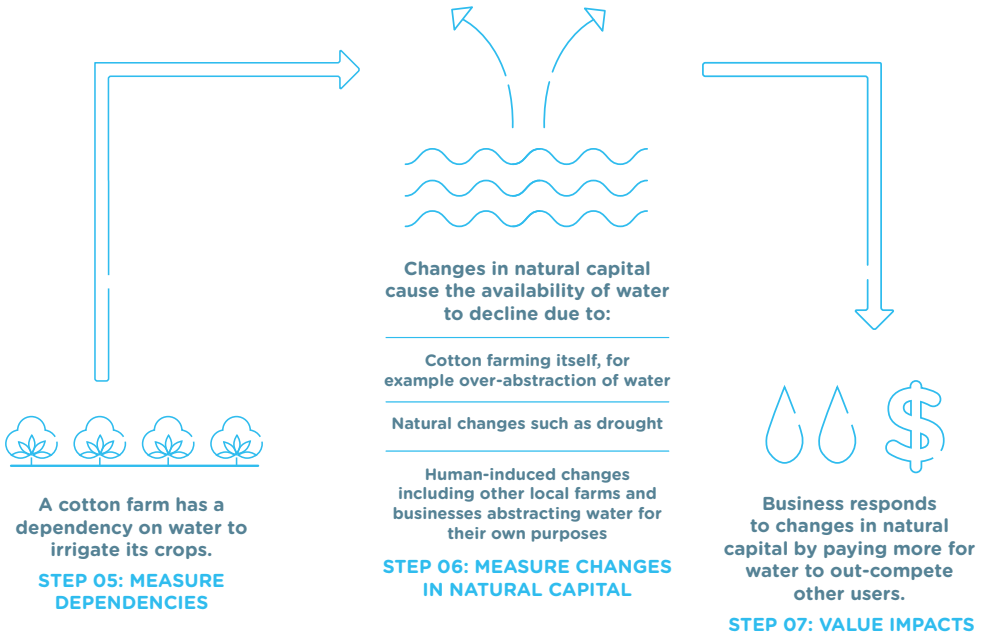

Figure 4.2
Example dependency pathway for the water dependency of a cotton farm

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

The Protocol does not specify one particular method for assessing materiality, but instead sets out the importance of carrying out an assessment through a generic, systematic, and transparent process. This process includes the following four activities:

- List potentially material natural capital impacts and/or dependencies
- Identify the criteria for your materiality assessment
- Gather relevant information
- Complete the materiality assessment

This section of the sector guide supports your business in completing the first step of the process by providing a narrowed list of potentially material impact drivers and dependencies relevant to the apparel sector. The narrowed lists are presented in materiality matrices conducted across four different apparel value chains:

- A cotton t-shirt
- A pair of polyester trousers
- A woolen sweater
- A leather jacket

These fibers and products have been selected via a stakeholder engagement process to ensure they are relevant to a wide audience of apparel sector stakeholders and reflect a diverse range of geographies and business practices.

The materiality matrices can be used as a building block to complete your own materiality assessment when you are assessing similar fibers and products. However, even if this is the case, it is still important that you identify the criteria for a materiality assessment that are relevant to your objectives and complete all Steps outlined in the Protocol. Large companies with many different products should undertake an initial screening to determine which products are the most important to consider.

Glossary

Materiality
In the Protocol, an impact or dependency on natural capital is material if consideration of its value, as part of the set of information used for decision making, has the potential to alter that decision (Adapted from OECD 2015 and IIRC 2013).

Materiality assessment
In the Protocol, the process that involves identifying what is (or is potentially) material in relation to the natural capital assessment's objective and application.

The materiality matrices

The example materiality matrices can be used to identify the likely most significant natural capital impact drivers and dependencies of different fibers and products.

The color of the cells represents the materiality across the whole value chain. If you are only assessing direct operational materiality (such as a wet processor attempting to understand site-specific impacts and dependencies), the cells marked with an 'O' reflect materiality at that particular stage of the value chain. As such, the materiality matrices can be applied at a corporate, project, and site level.

The materiality of a natural capital impact driver or dependency was initially determined through a literature review of business and academic literature that considered the three criteria listed below. These criteria are derived from groupings of the key materiality criteria recommended in the Protocol.

Materiality matrix criteria	Key materiality criteria groupings recommended in Protocol
Business financial implications — evidence of financial implications relating to the interaction of apparel businesses with natural capital	Financial; Operational; and Legal and regulatory criteria
Potential environmental and societal consequences — evidence of environmental and social consequences relating to the interaction of apparel businesses with natural capital	Reputational and marketing; and social criteria
Business stakeholder interest — evidence of apparel sector stakeholder interest in natural capital impacts and dependencies	Reputational and marketing criteria

If all three criteria were evidenced within the literature review then the materiality of the impact drivers and dependencies were qualitatively appraised as "High". If only two criteria were met, they were appraised as "Medium" and if only one criterion was met they were appraised as "Low". If none of the criteria were met, they were appraised as "Not material". For example, if an apparel company disclosed that it had experienced increases in the cost of goods sold due to water scarcity in its natural fiber supply chain, this would meet the "Business financial implications" criteria for water dependency. Similarly, if there was evidence in the literature of the societal cost of water pollution emanating from the wet processing stage for a particular product then this would meet the "Potential environmental and societal consequences" criteria for the water pollutants impact driver. The materiality matrices were then verified by apparel sector stakeholders and other experts to ensure that they reflect the current state and interests of the apparel sector. The sources used for the initial literature review are summarized in References. For an explanation of the different impact drivers and dependencies, please refer to the Protocol.

Important note regarding disclosure

Materiality is both a general and legal concept (Corporate Reporting Dialogue 2016). Materiality within the Natural Capital Protocol does not necessarily equate to the legal concept of materiality, which applies to formal corporate reporting in many jurisdictions (for example as defined in the US by the Supreme Court). Many companies around the world regularly disclose information about their impacts and dependencies on natural capital. However, if you have concerns about the potential interpretation of disclosures you plan to make on natural capital impacts or dependencies (for example by investors, regulators, or other stakeholders), you are advised to seek independent legal advice relevant to your industry and jurisdiction.

A cotton t-shirt

As the most commonly used fiber in the world, cotton is essential to most apparel companies. It is grown in more than 70 countries and covers more than 35 million hectares of land (International Cotton Advisory Committee 2011). According to WWF, its production provides income for more than 250 million people worldwide and employs almost 7% of all labor in developing countries (WWF 2015a). The cotton plant provides seed used as animal feed, while lint is converted into fiber. Cotton is used within a huge variety of products.

Cotton factsheet	
Commodity value	USD 11.6 billion (UN Statistics Division 2015)
Main countries of production	China 26%, India 25%, United States 14% (National Cotton Council of America 2015)
Main countries of consumption	China, India, Pakistan (Cotton Incorporated 2014)
Typical product use	Used in almost all forms of apparel; upholstery; domestic textiles; medical supplies; and also has industrial uses such as within filters and fishing nets.
Additional notes	Several initiatives exist to improve environmental performance of cotton farming, including Better Cotton Initiative (BCI), Cotton made in Africa (CmiA) and organic cotton. The materiality matrix is based on the conventional production of cotton.

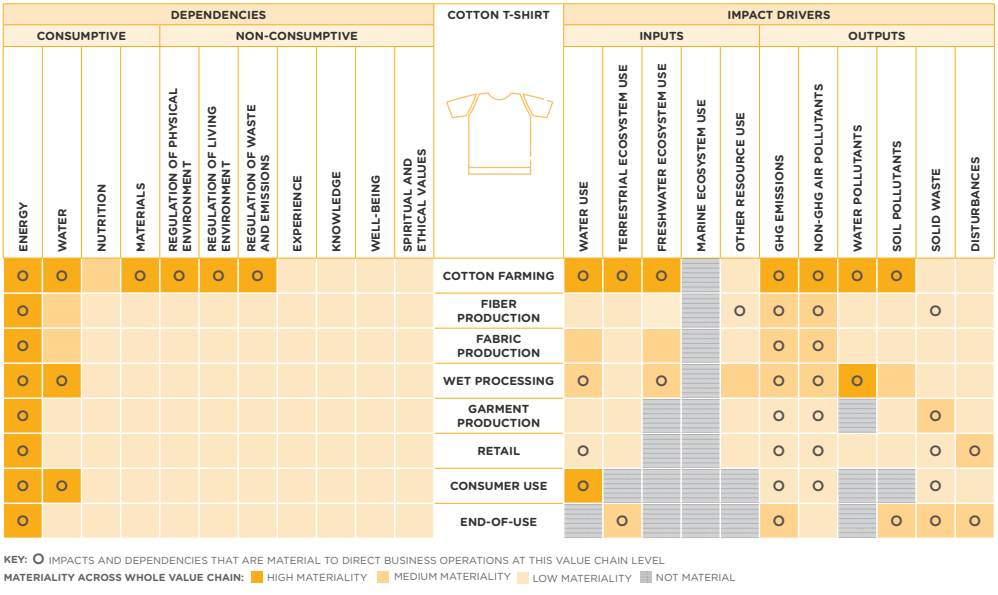

Figure 4.3
Indicative materiality matrix for the value chain of cotton used to produce a cotton t-shirt

	Description	Example of operational impacts and dependencies	Variation in size of impact and dependency
Cotton farming	impacts and dependencies	Variation in size of impact and dependency	Country of operation, Irrigation or rain-fed, irrigation technology, agrochemical use, farming practices (Better Cotton Initiative, Cotton made in Africa, organic).
Fiber and fabric production	Ginning, classing, spinning, blending for sale, weaving, knitting.	This value chain stage is dependent upon energy to run equipment and machinery. In turn, energy used is associated with both GHG emissions and non-GHG air pollutants (WRAP 2012b).	Efficiency of equipment used within gins and mills, country of operation.
Wet processing	Typically highly chemically intensive phases of water-related textile processing, including bleaching, dyeing, and printing.	Wet processing depends on both energy and water. In addition, typical processing involves heavy chemical use (NRDC 2012).	Country of operation, management of effluent, technology use, type of treatment (for example, batch or continuous dyeing used).
Garment production and retail	Cut and sew, addition of adornments, transportation, and display and sale of garments.	GHG emissions and non-GHG air pollutants are operationally material due to the energy requirements of equipment use, distribution vehicle fuel, and lighting/heating of retail stores (WRAP 2012a).	Efficiency of equipment and level of automation can create variation. This phase also includes distribution, therefore transport mode and distance of travel influence materiality.
Consumer use and end-of-use	Washing, drying, maintenance, disposal or recovery.	Consumers washing, drying, and ironing their garments depend on water and energy, resulting in GHG emissions and non-GHG air pollutants (WRAP 2012a). At the end-of-use stage, GHG emissions (in the form of methane) are associated with decomposition of cotton fiber sent to landfill.	Product life time and consumer behavior assumptions can lead to wide variation. Waste management route (including collection for recovery or recycling) is influential.

A pair of polyester trousers

Polyester is the most widely used synthetic material in the world, with 72% market share (IHS 2014). Asia dominates both the production and consumption of polyester, where it is used to produce apparel and a wide range of other products. The fiber is available as a continuous filament or as a staple fiber, with the latter often blended with other fibers to provide added durability or use characteristics. For example, dry-clean fabrics can be blended to become more easily washable (Centre for Remanufacture and Reuse 2009).

Polyester factsheet	
Commodity value	The value of polyester fiber production is estimated at USD 5.9 billion (Oerlikon 2010)
Main countries of production	China dominates both staple and filament production with approximately 65% of global manufacturing (Qin 2014).
Main countries of consumption	China, India (IHS 2014, 2013 data).
Typical product use	Polyester is used across a wide range of products, not just in apparel. Polyester fabric specifically is widely used in all types of apparel, often blended with cotton. In addition, it is used within domestic textiles such as blankets and bedding, upholstery and cushioning.
Additional notes	There are many different types of polyester, but the type most often produced for use in textiles is polyethylene terephthalate (PET). Polyester recycling is possible, but fiber to fiber re-polymerization can be expensive. Plastic bottles can also be recycled and spun into fiber for apparel production. The materiality matrix is based on the conventional production of polyester.

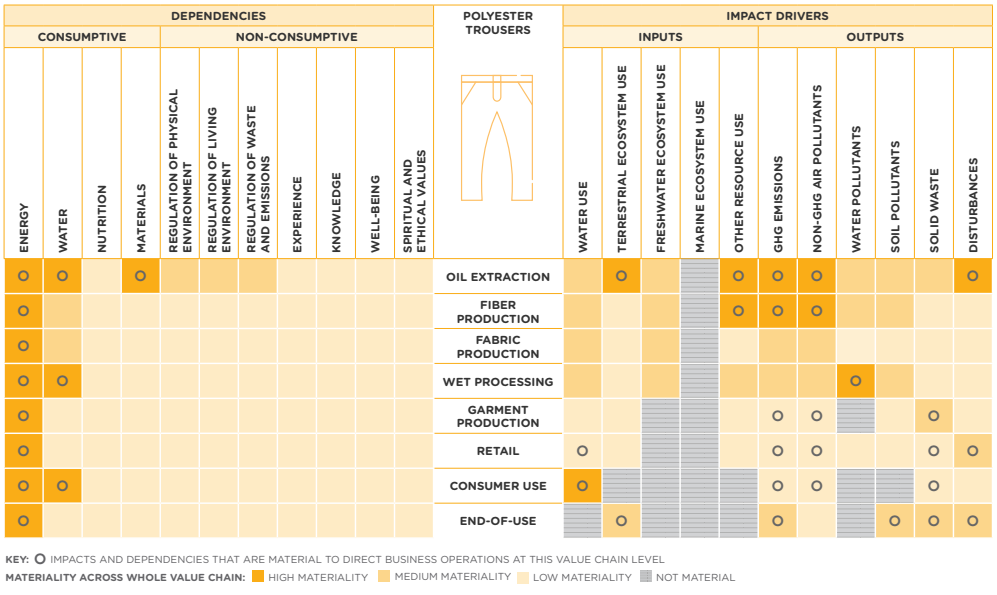

Figure 4.4
Indicative materiality matrix for the value chain of polyester used to produce a pair of trousers

	Description	Examples of material operational impacts and dependencies	Variation in size of impact and dependency
Raw material extraction	Crude oil extraction	Oil extraction (the base component of polyester) requires drilling into the ground, causing significant terrestrial (and other) ecosystem use. In addition to primary site conversion, there is often wider conversion needed such as deforestation for construction of roads through the Amazon to access sites (WWF 2015d).	The source and method of oil extraction can significantly influence the materiality of impacts and dependencies.
Fiber and fabric production	Polymerization, spinning, weaving, knitting	The production and spinning of polyester fiber is energy intensive, with dependency on energy and the associated impacts of GHG emissions and non-GHG air pollutants (NRDC 2012).	Energy-intensive processes are significant at this phase, therefore green technology and other energy efficiency measures can create variation.
Wet processing	Typically highly chemically intensive phases of water-related textile processing, including bleaching, dyeing, and printing.	Wet processing of polyester uses a high temperature dyeing process, but has a shorter processing time than many other fibers (NRDC 2012). The process is dependent on water and energy and associated with water pollutants, GHG emissions, and non-GHG air pollutants.	Country of operation, management of effluent, technology use, type of treatment (for example, batch or continuous dyeing used).
Garment production and retail	Cut and sew, addition of adornments.	GHG emissions and non-GHG air pollutants are operationally material due to the energy requirements of equipment use, distribution vehicle fuel, and lighting/ heating of retail stores (WRAP 2012a).	Efficiency of equipment and level of automation can create variation. This phase also includes distribution, therefore transport mode and distance of travel influence materiality.
Consumer use and end-of-use	Washing, drying, maintenance, disposal or recovery.	Consumers washing, drying, and ironing their garments depend on water and energy, resulting in GHG emissions and non-GHG air pollutants (WRAP 2012a).	Product life time and consumer behavior assumptions can lead to wide variation. Waste management route (including collection for recovery or recycling) is influential.

A woolen sweater

Wool is a natural fiber, although its sustainability is a matter of debate. Critics consider it less environmentally friendly than other fibers due to methane emissions associated with the raising of sheep, the chemical intensity of animal and fiber treatments, and the land area needed for animal management. Conversely, proponents of wool consider it sustainable due to its high recyclability, and argue that land used is often of low value, while sheep grazing can even offer beneficial ecosystem services (Lodge and Whalley 1985). As with most fibers and fabrics, impacts and dependencies are often largely related to the management practices involved.

Wool factsheet	
Commodity value	USD 2.5 billion (UN Statistics Division 2015)
Main countries of production	Australia, China, New Zealand, Iran, Argentina, United Kingdom (FAOSTAT 2014)
Main countries of consumption	China, United States, Japan, United Kingdom (FAO 2013, 2010 data)
Typical product use	Apparel, soft furnishings, carpet
Additional notes	Impacts reported within the literature vary widely. The materiality matrix is based on the conventional production of wool.

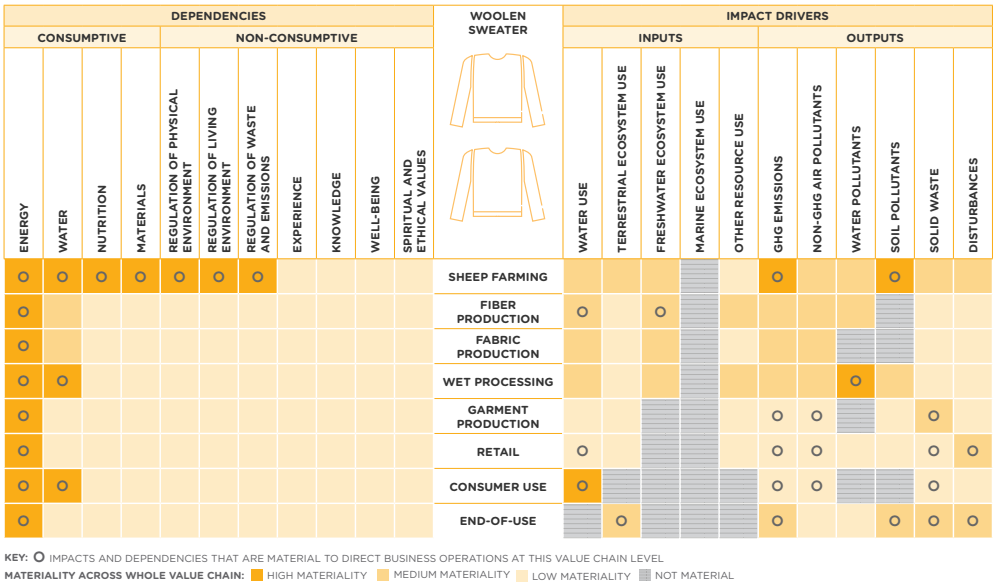

Figure 4.5
Indicative materiality matrix for the value chain of wool used to produce a woolen sweater

	Description	Examples of material operational impacts and dependencies	Variation in size of impact and dependency
Sheep farming	Breeding, rearing, shearing	Sheep farming has a dependency on all consumptive and regulating non-consumptive ecosystem services to maintain terrestrial ecosystems on which the animals are reared. One of the most material impacts is the GHG emissions associated with enteric fermentation, a natural process of all ruminant animals (FAO 2005).	Farming impacts and dependencies are highly varied depending on region and farming practices such intensive versus extensive, or organic, practice (though intensive is a small proportion globally).
Fiber and fabric production	Carding, combing, spinning, knitting, weaving	This value chain stage is dependent upon energy to run equipment and machinery. In turn, energy used is associated with both GHG emissions and non-GHG air pollutants (WRAP 2012b).	Efficiency of equipment used within gins and mills, country of operation.
Wet processing	Typically highly chemically intensive phases of water-related textile processing, including scouring, bleaching, dyeing and printing.	Scouring and treating of fiber to remove lanolin and achieve washability is a chemically intensive process (NRDC 2012). If not managed appropriately, this can lead to water pollutants released into local water systems.	Country of operation, management of effluent, technology use, type of treatment (for example, batch or continuous dyeing used).
Garment production and retail	Cut and sew, addition of adornments	GHG emissions and non-GHG air pollutants are operationally material due to the energy requirements of equipment use, distribution vehicle fuel, and lighting/ heating of retail stores (WRAP 2012a).	Efficiency of equipment and level of automation can create variation. This phase also includes distribution, therefore transport mode and distance of travel influence materiality.
Consumer use and end-of-use	Washing, drying, maintenance, disposal or recovery	Consumers washing, drying, and ironing their garments depend on water and energy, resulting in GHG emissions and non-GHG air pollutants (WRAP 2012a).	Product life time and consumer behavior assumptions can lead to wide variation.

A leather jacket

Though the volume of leather used in apparel per year is small compared to other materials used, it is an important material, and particularly popular for jackets and coats (UN, 2015). Leather can be sourced from several animals, though this materiality matrix focuses on bovine (cow) leather specifically. Other leather types include goat and sheep, but these are produced in significantly lower volumes (FAO, 2014b).

Leather factsheet	
Commodity value	US$2.7 billion (UN, 2015)
Main countries of production	India, Brazil, China, United States (FAO, 2014 relating to bovine hide and skin production) Russia and Italy also significant for leather production
Main countries of consumption	China, North America and other Asian countries (FAO, 2014)
Typical product use	Footwear, garments, automobile, furniture, gloves.
Additional notes	Leather is often considered a by-product of the meat industry, but it is a significant financial contributor to cattle ranching itself. Vegan leather is also sold, although this is a generic term for a range of materials including PVC. The materiality matrix is based on the conventional production of bovine (cow) leather.

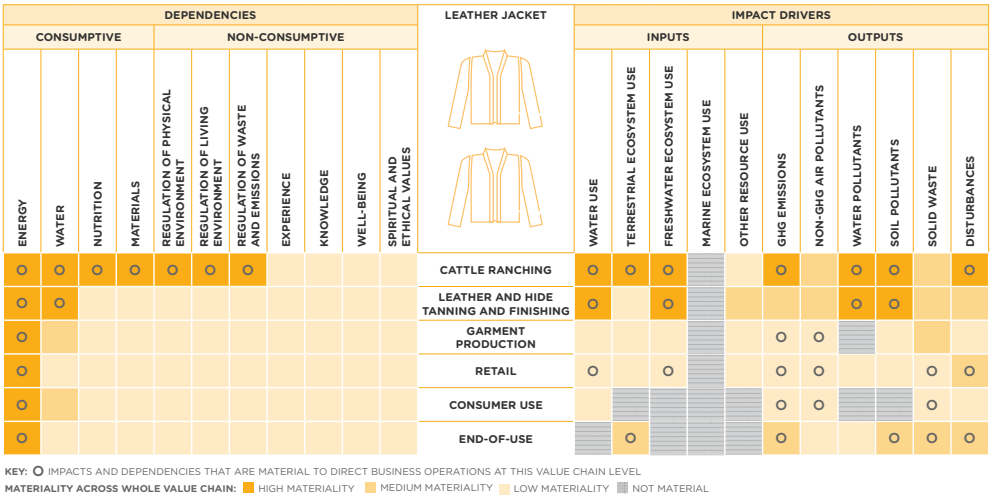

Figure 4.6
Indicative materiality matrix for the value chain of bovine (cow) leather used to produce a leather jacket

	Description	Examples of material operational impacts and dependencies	Variation in size of impact and dependency
Cattle ranching	Breeding, rearing, slaughtering	Terrestrial ecosystem use is significant for cattle ranching and land is often cleared to allow space for the animals. This is most detrimental in areas of high value ecosystem service, such as deforestation of the Amazon rainforest (Veiga et al. 2003).	One of the most significant areas of variation is the use of deforested land, particularly in valuable biomes such as the Amazon rainforest.
Leather and hide tanning	Preparation, tanning, crusting	The use of excessive amounts of sulfide and chromium in tanning processes give rise to high concentration of these chemicals in effluents, which can be discharged to local water systems causing damage to local ecosystems and people consuming the water (Khwaja 2000).	Chemicals and treatments used in the tanning process differ in impact. Efficiency of re-capture of chemicals in effluent also adds significant variation.
Garment production and retail	Measure, cut, and sew	GHG emissions and non-GHG air pollutants are operationally material due to the energy requirements of equipment use, distribution vehicle fuel, and lighting/ heating of retail stores (WRAP 2012a).	Efficiency of equipment, mode and distance of transportation for distribution, and type of retail all add variation to associated impacts and dependencies.
Consumer use and end-of-use	Cleaning, drying, maintenance, disposal or recovery	Leather jackets do not require frequent washing and therefore do not have the same water use impact as other garments. Landfill of clothing is associated with solid waste and disturbance impacts (WRAP 2012a).	Consumer behavior is highly varied. Leather jackets are long lasting, and therefore assumption on life of a garment can bring significant variation.

Step 04 of the apparel sector guide has provided additional guidance to help you identify material natural capital impacts and dependencies relevant to the sector. Table 4.1 illustrates the completion of this Step for each of the sector-specific hypothetical examples, including the completion of all actions required in the Protocol for this Step.

Table 4.1
Sector-specific hypothetical examples – Step 04

	Allsortsofwear Plc.	Color World	Cotton Fields Ltd.
Context	A large apparel retailer sells multiple brands as well as its own brand, and has never reviewed its environmental performance.	A company operates ten dye-houses across four different countries in Asia. A key customer is pressuring the company to report good environmental performance, and the company needs to expand its processing capacity with new equipment.	A medium-sized cotton farm is receiving financial assistance to develop improved farming systems which are less detrimental to local ecosystems. To encourage a further round of investment, it would like to assess and report to its funders on the significant natural capital benefits delivered as a result of their funding.
Summarize the key decisions on the materiality process, including who was involved	**What stakeholder engagement was carried out?** No external consultation was undertaken, though internal CSR executives were interviewed owing to their significant expertise. **What criteria were used to compare relative materiality?** Financial, though future projected materiality was also considered to understand the extent to which the impacts and dependencies may become more significant over time. **What data were gathered?** Further review of sector guidance (such as the SAC Higg Index criteria) and publicly available reports carried out by similar companies.	**What stakeholder engagement was carried out?** The customer was questioned to understand concerns regarding environmental impacts. **What criteria were used to compare relative materiality?** Both operational and societal materiality were incorporated to understand direct implications and those on the wider community. **What data were gathered?** Operational utility data (such as water use and energy use), alongside effluent readings to review significant impact drivers.	**What stakeholder engagement was carried out?** Internal experts were consulted to advise on practices to significantly reduce the amount of nitrogen, phosphorous, herbicide, and other pollutants flowing into fragile soil and water ecosystems such as the Great Barrier Reef. **What criteria were used to compare relative materiality?** Societal materiality to best incorporate wider implications of natural capital costs and benefits. **What data were gathered?** Operational input data were received from staff and associated LCAs of inputs were gathered from an online database.
List the material impact drivers and/or dependencies that will be brought forward to the Measure and Value Stage	The dependency on water was found to be significant, alongside GHG emissions, water use, and water pollutants.	Water pollutants were determined to be the most material impact, based on customer interest and current operations.	Agrochemical use (chemical herbicides, pesticides, and fertilizers) leading to water and soil pollution.

MEASURE AND VALUE STAGE
How?

What is the Measure and Value Stage?

The Measure and Value Stage of the Protocol introduces guidance on how impacts and/or dependencies can be measured and valued.

How does the sector guide map to the Protocol?

Table MV.1 provides an overview of the questions and actions of the Measure and Value Stage in the Protocol and an outline of the actions for which the sector guide provides additional guidance.

Table MV.1:
Mapping between the Protocol and the sector guide

Step	Questions each Step will answer	Actions	Additional guidance included in the sector guide?
05 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	**Yes**
		5.2.2 Define which impact drivers and/or dependencies you will measure	**No**
		5.2.3 Identify how you will measure impact drivers and/or dependencies	**Yes**
		5.2.4 Collect data	**No**
06 Measure changes in the state of natural capital	**What are the changes in the state and trends of natural capital related to your business impacts and/or dependencies?**	6.2.1 Identify changes in natural capital associated with your business activities and impact drivers	**Yes**
		6.2.2 Identify changes in natural capital associated with external factors	**Yes**
		6.2.3 Assess trends affecting the state of natural capital	**No**
		6.2.4 Select methods for measuring changes	**No**
		6.2.5 Undertake or commission measurement	**No**
07 Value impacts and/or dependencies	**What is the value of your natural capital impacts and/or dependencies?**	7.2.1 Define the consequences of impacts and/or dependencies	**Yes**
		7.2.2 Determine the relative significance of associated costs and/or benefits	**No**
		7.2.3 Select appropriate valuation technique(s)	**No**
		7.2.4 Undertake or commission valuation	**No**

Additional notes
All businesses operating in the apparel sector should address all of the actions associated with each Step in the Measure and Value Stage. The sector guide provides additional guidance for some of the actions where it is most appropriate. For a detailed appraisal of the suitability and potential accuracy of different methods of measurement and valuation please refer to the Protocol.

Before you get started with the Measure and Value Stage

Before you get started with the measurement and valuation steps of your assessment, it is important to consider any planning requirements. The Protocol, for example, identifies some of the resource needs that should be considered for each Component of the assessment. For impacts on your business, fewer external resources are typically needed, as some data may be available in your company or in published literature. However, for your impacts on society and your business dependencies, more resources are typically needed and they may require specialist environmental/natural resource modeling expertise.

The availability of existing data and the ability to leverage existing sector-specific published literature are important planning considerations not only for measurement and valuation but also in scoping your natural capital assessment. In the apparel sector, there are a number of important examples of published literature including sector-specific frameworks, initiatives, and datasets. Table MV.2 summarizes some of these and illustrates how they may be useful for your assessment. Once again, the list is not exhaustive.

Table MV.2:
Examples of sector-specific published literature

Author	Name	Type	Description	How could it be used in natural capital assessments conducted using the Protocol?	Relevant steps
Sustainable Apparel Coalition	Higg Index: Materials Sustainability Index (MSI)	Dataset	A cradle-to-gate index of fabrics informed by life cycle assessment (LCA) data.	The MSI data could be used to identify material natural capital impacts associated with certain products.	03,04,05
	Higg Index: Modules	Assessment framework and benchmark tool	A suite of self-assessment tools for product, brand, and facility.	An apparel company seeking to complete a natural capital assessment using the Protocol can also seek to complete a Higg Index assessment at the same time in order to leverage data collection efforts. Businesses who have already conducted a Higg Index may be able to leverage some of the data where appropriate.	05
MADE-BY	MODE Tracker and Environmental Benchmark for Fibers	Assessment framework and benchmark tool and dataset	Tracking tool across a range of modules. Benchmark scores for fibers based on LCA data.	The benchmark and accompanying report could be used by an apparel company to identify material natural capital impacts and fibers that may be more impactful within their own product portfolio.	03,04,05
Various: well recognized in public domain is Kering	Environmental Profit and Loss Account (EP&L)	Assessment framework	A tool/accounting approach to present natural capital impacts in monetary terms.	EP&L quantification and valuation techniques conducted by apparel companies that are available in the public domain may be used by other apparel companies depending on the business application of their assessment.	04,05,06,07
Zero Discharge of Hazardous Chemicals (ZDHC)	Joint Roadmap	Commitment/ Roadmap	An industry commitment, supported by research, data and tools, to improve wastewater impacts.	An apparel company conducting an audit for ZDHC purposes may leverage data collected to use in a natural capital assessment. Furthermore, guidance documents and benchmarking reports available on the ZDHC website may provide useful context, data options, and guidance to scope an assessment and identify material impacts.	03,04,05
Accreditation/ certification schemes	Varied – includes Better Cotton Initiative, Oeko-tex, Bluesign, Textile Exchange, Cradle to Cradle Certified	Varied	Varied	The quantitative data collected by companies to achieve accreditation and certification to these types of schemes could be leveraged in natural capital assessments using the Protocol.	05
Sustainability Accounting Standards Board (SASB)	Apparel, accessories & footwear Sustainability Accounting Standard	Standard	Disclosure guidance and accounting standard.	While the Protocol is not a reporting framework, natural capital assessments can be informed by these types of reporting standards on areas such as materiality, sector relevant issues and scoping.	03,04

05 Measure impact drivers and/or dependencies

This section of the sector guide provides additional guidance for answering the following question:
How can your impact drivers and/or dependencies be measured?

In particular, the sector guide will help you undertake the following actions:

5.2.1 Map your activities against impact drivers and/or dependencies

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

Map your activities against impact drivers and/or dependencies

In order to complete this action in the Protocol, you will need to identify all of the relevant activities associated with your assessment and map these against material natural capital impacts drivers and/or dependencies. The materiality matrices presented in Step 04 of the sector guide can assist you with this process as they identify relevant business activities across the apparel value chain and the material natural capital impacts and dependencies associated with them. Table 5.1 revisits the materiality matrices to provide some simplified examples of how you might start to map business activities to material impacts and dependencies for your assessment.

Table 5.1
Examples of sector-specific activity mapping

Company undertaking assessment	Organizational focus	Value chain element	Material natural capital impacts and dependencies
Cotton farmer	**Product**	Operational (Seeding, irrigation, insect and weed management and harvesting)	**Impact drivers:** Water use, terrestrial ecosystem use, GHG emissions, non-GHG air pollutants, water pollutants, soil pollutants **Dependencies:** Consumptive (energy, water, materials), Non-consumptive (regulation of physical environment, regulation of living environment, regulation of waste and emissions); Biodiversity
Polyester wet processor	**Corporate**	Upstream (Raw material extraction, fiber and fabric production)	**Impact drivers:** Other resource use, terrestrial ecosystem use, GHG emissions, non-GHG air pollutants **Dependencies:** Consumptive (energy, water, materials)
		Operational (Bleaching, dyeing and printing)	**Impact drivers:** Water pollutants **Dependencies:** Consumptive (energy and water)
Woolen sweater retailer	**Product**	Upstream (Sheep farming, fiber and fabric production, wet processing, garment production)	**Impact drivers:** GHG emissions, water pollutants, soil pollutants **Dependencies:** Consumptive (energy, water, nutrition, materials), Non-consumptive (regulation of physical environment, regulation of living environment, regulation of waste and emissions)
		Operational (Retail)	**Impacts:** No material impacts comparative to life cycle, though water use, GHG emissions, and solid waste relevant at an operational level. **Dependencies:** Consumptive (energy)
		Downstream (Consumer use and end-of-use)	**Impacts:** Water use **Dependencies:** Consumptive (energy and water)
Leather tanner	**Project**	Operational (Tanning)	**Impact drivers:** Water pollutants **Dependencies:** Consumptive (energy and water)

Identify how you will measure impact drivers and/or dependencies

To complete this action in the Protocol, you need to determine how you will obtain the data needed to quantitatively or qualitatively measure your impact drivers and/or dependencies. There are many potential sources of available data (for further detail on primary and secondary data options, please see the Protocol), including:

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 (for example, life-cycle impact assessment (LCIA) databases; industry, government, or internal reports)
- Past assessments
- Estimates derived using modeling techniques (for example, EEIO models, productivity models, mass balance)

Table 5.2 provides some sector-specific considerations for the use of primary and secondary data. Once again, for a detailed appraisal of the suitability and potential accuracy of different methods of measurement please refer to the Protocol.

Table 5.2
Sector-specific considerations for primary and secondary data approaches

Type of data	Sector-specific considerations
Primary data	A 2014 survey of clothing companies identified that the primary data disclosure of environmental metrics such as water use, energy use, and emissions to air and water was common, but often at the operational level only (SFA 2014). The report also found the valuation of impacts in reporting to be rare, as was reporting on more complex issues such as biodiversity. Primary data disclosure on natural capital dependencies by apparel companies was also uncommon. The use of primary data within the apparel sector tends to be limited to the aforementioned direct operational metrics, although some forward-thinking companies are collecting primary data from their first-tier suppliers and other important stakeholders. Primary data (for example, customer surveys) can be used for consumer use and end-of-use stages in the value chain. However, as consumer behavior with apparel varies widely (DEFRA 2008), a large survey size would be required to capture a reflective sample.
Secondary data	Natural capital assessments in the apparel sector often incorporate supply chain impacts and dependencies. However, due to the complex nature of apparel supply chains (WRAP 2012a), engagement with suppliers can be costly, challenging, and time consuming. Secondary data sources are often used in these instances and these are discussed within the Protocol. Secondary data are often used in the consumer use and end-of-use stages for similar reasons. Some useful examples of sector-specific secondary data sources are presented in table MV.2.

Step 05 of the apparel sector guide has provided additional guidance to help you map your activities against impact drivers and/or dependencies and identify how you will measure them. Tables 5.3, 5.4. and 5.5 illustrate the completion of this Step for each of the sector-specific hypothetical examples, including the completion of all actions required in the Protocol for the Step. All values provided in the tables are for illustrative purposes only.

Glossary

Primary data
Data collected specifically for the assessment being undertaken.

Secondary data
Data that were originally collected and published for another purpose or a different assessment.

Table 5.3
Sector-specific hypothetical examples
Step 05 – Allsortsofwear Plc.

Intended business application: Assess risks and opportunities
Organizational focus: Product
Value-chain boundary: Whole value chain (upstream, operational, and downstream)
Impacts or dependencies: Both
Value perspective: Business
Type of value: Quantitative

	Specific impact/ dependency	Quantitative/ qualitative indicator	Data sources	Data gaps
Dependencies	Consumptive: Water	Cubic meters of water (m3)	EEIO model supplemented with primary data collected from first-tier suppliers	None
Impacts	GHG emissions	Metric tons of GHGs		No downstream data available
	Water use	Cubic meters of water (m3)		No downstream data available
	Water pollutants	Freshwater ecotoxicity in kg1,4 dichlorobenzene equivalent		No downstream data available

Table 5.4
Sector-specific hypothetical examples
Step 05 – Color World

Intended business application: Compare options
Organizational focus: Corporate
Value-chain boundary: Operational
Impacts or dependencies: Impacts
Value perspective: Society
Type of value: Monetary

	Specific impact/ dependency	Quantitative/ qualitative indicator	Data sources	Data gaps
Impacts	Water pollutants	Freshwater ecotoxicity in kg 1,4 dichlorobenzene equivalent	LCIA database for each technology	Direct data unavailable, therefore proxies needed

Table 5.5
Sector-specific hypothetical examples
Step 05 – Cotton Fields Ltd.

Intended business application: Estimate total value and/or net impact
Organizational focus: Project
Value-chain boundary: Operational at farm level
Impacts or dependencies: Impacts
Value perspective: Society
Type of value: Monetary

	Specific impact/ dependency	Quantitative/ qualitative indicator	Data sources	Data gaps
Impacts	Water pollutants	Kilograms of N,P,K fertilizer input and other chemical inputs to water	Internal agrochemical use data combined with LCIA database/ secondary academic literature	Regionally specific data on distribution pathways unavailable
	Soil pollutants	Kilograms of N,P,K input and other chemical inputs to soil		

06 Measure changes in the state of natural capital

This section of the sector guide provides additional guidance for answering the following question:
What are the changes in the state and trends of natural capital related to your business impacts and/or dependencies?

In particular, the sector guide will help you undertake the following actions:

6.2.1 Identify changes in natural capital associated with your business activities and impact drivers

6.2.2 Identify changes in natural capital associated with external factors

Identify changes in natural capital associated with your business activities and impact drivers

This action considers the changes in natural capital that are likely to result from the impact drivers measured or estimated in Step 05. The Protocol presents some generic examples of changes in natural capital for a range of impact drivers. Table 6.1 presents some sector-specific examples for the impact drivers that were introduced in Step 01 of the sector guide. In addition to providing examples of changes in natural capital, the table also presents some examples of how the changes may vary according to location-specific factors.

Table 6.1
Sector-specific examples of relevant changes in natural capital for different impact drivers

	GHG emissions	Water pollutants	Terrestrial ecosystem use
Example indicator	Metric tons of GHGs	Kilograms of N,P,K fertilizer input and other chemical inputs to water	Hectares of land
Example changes in natural capital	GHG emissions are a global impact driver that cause an increase in global GHG concentrations, resulting in climate change.	Nutrients entering waterways through the process of leaching lead to a change in eutrophication levels and affect ecosystems through the reduction in species (for example, fish).	Natural capital change can occur in biodiversity and the availability of ecosystem services (provisioning services such as stocks of timber and non-timber forest products and regulating services such as flood protection, pollination, erosion control, and carbon sequestration).
Examples of variation in changes in natural capital	Climate change leads to many natural capital changes around the world—in the atmosphere, on land, and in the oceans. Quantifying these requires an understanding of atmospheric chemistry, meteorology, and forecasting the consequences of climate change on rainfall patterns, ocean acidity, storm frequency and intensity, and sea level amongst others. The impacts of these changes is geographically specific, with some regions of crop production, for example, more vulnerable to effects such as the variability of rainfall and shifts in temperatures (IPCC 2014).	Water pollution is primarily a local impact driver because it has a direct and traceable impact on local ecosystems and the quality of the water into which it is discharged. As such, understanding the change in natural capital from the emission of water pollutants requires a consideration of location-specific factors such as the type of water body they are discharged into and the background concentrations of the pollutants. For example, China has a large textile wet processing sector, which is identified as a significant polluter of local water systems (Jun et al. 2012). This is more significant when considered alongside claims that up to 40% of China's rivers are "seriously polluted", 90% of groundwater is contaminated, and up to 200 million rural Chinese have no access to clean drinking water (Guardian 2013).	Terrestrial ecosystem use is an impact driver with local, regional, and global implications (for example, through the emission of GHGs). The greater the difference between the values of ecosystem services lost due to the conversion of land from its natural ecosystem and the ecosystem services "gained" from the converted land, the bigger the change in natural capital. For example, the conversion of natural ecosystems to pastureland for cattle production in Brazil, one of the most biodiverse countries in the world, results in a natural capital cost of over USD 473 million per year (FAO 2015).

Identify changes in natural capital associated with external factors

You should also identify any external factors that could result in major changes in the state of natural capital, as these may directly or indirectly affect the significance of impacts on your business, your impacts on society, and/or your business dependencies. External factors potentially leading to changes in natural capital include both natural changes and human-induced changes. The Protocol provides a definition of these and some examples of changes in natural capital influencing dependencies. Table 6.2 presents some sector-specific examples of changes in natural capital influencing the dependencies that were introduced in Step 01. Once again, the table also presents some examples of how the change in natural capital may vary according to location-specific external factors.

Table 6.2
Sector-specific examples of relevant changes in natural capital for different dependencies

	Consumptive: Water	Consumptive: Materials	Non-consumptive: Regulation of living environment
Example indicator	Cubic meters of water (m^3)	Metric tons of raw materials supplies	Pollinator density
Example changes in natural capital	Diversion or desiccation of a freshwater body that provided a source of process water.	Loss of timber stock (for pulp based fibers).	Loss of pollinators such as bees resulting in decreased crop yields.
Examples of variation in changes in natural capital	External factors that could impact the state and trends of fresh water provision include economic and population growth driving the demand for resources, as well as background environmental change such as climate change. A well-reported example of human-induced change is the Aral Sea, an inland sea that provided irrigation water to many cotton farms in surrounding countries. Over-abstraction resulted in significant decline in water volume, and increased salinity further decreasing available fresh water. Glazovsky (1990) estimated the on-farm cost to cotton farmers due to lost crops alone at USD 1.4 billion per year.	Location-specific external factors such as propensity to drought or flooding, and soil quality, and human-induced factors such as legal and illegal deforestation, all create pressures on the ability of an ecosystem to provide materials. Pulp from timber is used in a number of fibers including rayon, viscose, and lyocell. Some regions of production are facing external pressure due to deforestation, while pulp production is also causing deforestation and exacerbating the pressure, particularly on threatened and ancient forests (Guardian 2014).	External pressure on pollinators, a key regulating service, is accelerating in many regions of the globe. Many apparel fibers have a dependence on pollination, whether directly (such as cotton) or indirectly (such as leather which depends on some insect-pollinated cereals and grains to provide feed to the livestock). Research on Brazilian cotton production identified that bee pollination on organic farms increased cotton production by 12%, reflecting the economic significance of this service (Pires et al. 2014)

Step 06 of the apparel sector guide has provided additional guidance to help you identify changes in natural capital associated with your business activities, impact drivers and external factors. Tables 6.3, 6.4, and 6.5 illustrate the completion of this Step for each of the sector-specific hypothetical examples, including the completion of all actions required in the Protocol for the Step. All values provided in the tables are for illustrative purposes only.

Table 6.3
Sector-specific hypothetical examples
Step 06 – Allsortsofwear Plc.

Intended business application: Assess risks and opportunities

	Specific impact/ dependency	Quantitative/ qualitative indicator	Approach for estimating natural capital change
Dependencies	Provision of water	Change in available water source	Published hydrological models used to estimate availability of water
Impacts	GHG emissions	Concentration of CO_2e in atmosphere	Published climate models used to estimate change in atmospheric concentration
	Water use	Change in available water source	As above for provision of water
	Water pollutants	Chemical concentration in water systems	Published water pollution fate models used to estimate changes in chemical concentration

Table 6.4
Sector-specific hypothetical examples
Step 06 – Color World

Intended business application: Compare options

		Quantitative/ qualitative indicator	Approach for estimating natural capital change
Impacts	Technology 1: Water pollutants	Change in chemical concentration of local water basin and increase in ecotoxicity	Direct measurement of baseline concentrations coupled with intervention scenarios modelled according to the technology specification and minimum and maximum performance.
	Technology 2: Water pollutants		
	Technology 3: Water pollutants		
	Technology 4: Water pollutants		

Table 6.5
Sector-specific hypothetical examples
Step 06 – Cotton Fields Ltd.

Intended business application: Estimate total value and/or net impact

		Quantitative/ qualitative indicator	Approach for estimating natural capital change
Impacts	Water pollutants	Chemical concentration in water systems and increase in ecotoxicity	LCIA used provided characterization factors which account for the change in natural capital
	Soil pollutants		

07 Value impacts and/or dependencies

This section of the sector guide provides additional guidance for answering the following question:
What is the value of your natural capital impacts and/or dependencies?

In particular, the sector guide will help you undertake the following action:
7.2.1 Define the consequences of impacts and/or dependencies

Define the consequences of impacts and/or dependencies

Based on the impact drivers and dependencies, and associated changes in natural capital identified in Step 04 and (as appropriate) measured in Steps 05 and 06, you should now be able to identify the consequences—or the types of business and societal costs and benefits—that may arise under one or more relevant scenarios. The Protocol provides some useful examples of the consequences of natural capital impacts on business and society as well as the consequences of natural capital dependencies. In this section, the sector guide provides some examples for the apparel sector specifically.

Consequences of natural capital impacts on your business

Apparel businesses may be impacted directly by the natural capital impacts of their activities. These business impacts include any financial costs or benefits that directly affect your bottom line. Some of these were introduced in Step 01 of the sector guide in the discussion of business performance metrics influenced by different risks and opportunities relating to natural capital. They also include less tangible impacts that may affect the bottom line indirectly, such as reputational damages (or benefits), delays in permitting, and employee attraction and retention. Business impacts may relate to the cost of production inputs (for example, the purchase costs of raw materials, water, or energy), as well as the costs or benefits of outputs (for example, increased compliance costs as water regulations become more stringent, or increased revenue from waste recovery and recycling initiatives).

Environmental market mechanisms are being introduced in many jurisdictions, whereby companies increasingly need to pay for their use of or impacts on natural capital, or get paid for environmental enhancements they provide. While a global carbon market remains elusive, a report published by the World Bank (2015) showed that 40 nations and over 20 cities, states, and regions now have a price on CO_2 emissions, covering around 12% of annual global GHG emissions, or the equivalent of nearly 7 billion tons of CO_2. The proliferation of environmental mechanisms such as these may create new costs and/or benefits for apparel companies and these are often scaled according to the amount of emissions generated or resources used.

Conversely, fines or legal claims for environmental damages (or revenues from payments for ecosystem services) may be linked to measured changes in natural capital. In payments for ecosystem services (PES) schemes, people managing and using natural resources, typically forest owners or farmers, are paid to manage their resources to protect watersheds, conserve biodiversity, or capture CO_2 (carbon sequestration) through, for example, replanting trees or keeping living trees standing, or by 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. While assessing your company's impacts on society is more demanding than assessing impacts on your business, it is more likely to capture the risk and opportunity associated with your impacts being internalized at some point in the future.

Consequences of natural capital impacts on society

The natural capital impacts of your business may 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 natural capital resulting from the impact drivers of your business. Again, some of these were introduced in Step 01 in the discussion of risks and opportunities and how they may indirectly influence business performance metrics. Societal impacts will vary depending on the "receptors" that are affected (for example, people, buildings, agriculture).

Consumption of apparel products is dominated by developed nations, while production of these garments (and as such, implications of impacts and dependencies) is more widely associated with developing nations (DEFRA 2010). For example, in the UK, 90% of clothing is imported through a complex, global clothing supply chain characterized by sub-contractors in the developing world and the use of migrant workers (DEFRA 2010). China is associated with a significant proportion of all textile wet processing and already has serious air and water pollution problems, yet adherence to regulation and environmental control measures is low (Jun et al. 2012). NGO research has found toxic chemicals such as the hormone disruptor nonylphenol (NP), chlorinated anilines, and antimony in the wastewater discharged into China's waterways believed to be from textile wet processors (Greenpeace 2014). These chemicals are known to be toxic to local animal life, as well as humans who use or consume the water (Greenpeace 2014).

Agricultural practices are also impactful to local communities and ecosystems. Cotton farming can have significant agrochemical input, more exaggerated in countries where education on appropriate use and environmental regulation is limited. Of all the communities adversely affected by hazardous cotton pesticides, a substantial proportion are located in India (EJF 2007). An assessment of cotton farmers in India in 2005 found 323 reports of ill health across three villages, with 84% of the symptoms associated with mild to severe poisoning (Mancini et al. 2005). As workers are often low-income earners and have limited access to healthcare, these symptoms often go unreported, including the 6% of workers displaying extremely serious neurotoxic effects (Mancini et al. 2005).

Consequences of natural capital dependencies

The dependence of your business on natural capital primarily affects the business itself. 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 provides that are often unseen and unpriced (for example, natural flood and erosion control). Once again, some of these costs and benefits were introduced in Step 01 in the discussion of risks and opportunities.

Table 7.1 presents some sector-specific examples of the consequences associated with the natural capital impacts that were introduced in Step 01 and Step 06. These natural 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 natural capital dependencies. These dependencies are presented in terms of their consequences for business.

Table 7.1
Examples of the consequences of natural capital impacts

	GHG emissions	Water pollutants	Terrestrial ecosystem use
Example changes in natural capital	GHG emissions are a global impact driver that cause an increase in global GHG concentration, resulting in climate change.	Nutrients entering waterways through the process of leaching lead to a change in eutrophication levels and affect ecosystems through the reduction in species (for example, fish).	Natural capital change can occur in biodiversity and the availability of ecosystem services (provisioning services such as stocks of timber and non-timber forest products and regulating services such as flood protection, pollination, erosion control, and carbon sequestration).
Consequence of impact to business	Operating cost increases due to carbon tax levied by national environmental market mechanisms.	Potential legal costs depending on local environmental regulations. Operational cost of clean-up, or treatment of water for use in operations.	Cost of land conversion. If deforestation is illegal, there could be an associated risk of legal costs, and implications for brand reputation.
Consequence of impact to society	Global implications of climate change including the impact of climate change on agricultural productivity, forestry, water resources, energy consumption, property damages from increased flood risk, and human health.	Water pollution from the excessive use of fertilizer creates a cost for communities that then have to pay to treat the water so they can safely use it, alongside finding an alternative source of food if fish stocks have been depleted.	Loss of culturally and economically important lands will negatively impact local populations.

Table 7.2
Examples of the consequences of natural capital dependencies

	Consumptive: Water	Consumptive: Materials	Non-consumptive: Regulation of living environment
Example changes in natural capital	Diversion or desiccation of a freshwater body that provided a source of process water.	Loss of timber stock (for pulp based fibers).	Loss of pollinators such as bees resulting in decreased crop yields.
Consequence of dependency to business	Increased operational costs associated with securing alternative fresh water. Loss of revenue from crop failure.	Increased operating costs associated with alternative sourcing of raw materials for fiber.	Increased operational costs from mechanical pollination and reduced revenue from low yields.

Step 07 of the apparel sector guide has provided additional guidance to help you define the consequences of natural capital impacts and dependencies. Tables 7.3, 7.4, and 7.5 illustrate the completion of this Step for each of the sector-specific hypothetical examples, including the completion of all actions required in the Protocol for the Step. All values provided in the tables are for illustrative purposes only.

Table 7.3
Sector-specific hypothetical examples
Step 07 – Allsortsofwear Plc.

Intended business application: Assess risks and opportunities

	Specific impact/ dependency	Valuation approach	Value (per product)
Dependencies	Provision of water	No additional valuation required as the quantitative data collected in Step 05 is sufficient	3,000 m^3
Impacts	GHG emissions		1.8 metric tons CO_2e
	Water use		2,100 m^3
	Water pollutants		Ecotoxicity equivalent of 2.7 kg 1,4 dichlorobenzene

Table 7.4
Sector-specific hypothetical examples
Step 07 – Color World

Intended business application: Compare options

	Specific impact/ dependency	Valuation approach	Value (per technology)
Impacts	Technology 1: Water pollutants	Value transfer approach adjusted for regional water body.	US$450
	Technology 2: Water pollutants		US$200
	Technology 3: Water pollutants		US$75
	Technology 4: Water pollutants		US$380

Table 7.5
Sector-specific hypothetical examples
Step 07 – Cotton Fields Ltd.

Intended business application: Estimate total value and/or net impact

	Specific impact/ dependency	Valuation approach	Value (per technology)
Impacts	Water pollutants	Value transfer approach adjusted for regional water body.	USD 8
	Soil pollutants	Value transfer approach adjusted for ecosystem type	USD 4.5

APPLY STAGE
What next?

What is the Apply Stage?

The Apply Stage of the Protocol summarizes the natural capital assessment process by helping you interpret, apply, and act upon your results in your business. It also encourages you to consider how to optimize the value from this and future assessments.

How does the sector guide map to the Protocol?

Table A.1 provides an overview of the questions and actions of the Apply Stage in the Protocol and an outline of the actions for which the sector guide provides additional guidance.

Table A.1:
Mapping between the Protocol and the sector guide

Step	Questions each Step will answer	Actions	Additional guidance included in the sector guide?
08 Interpret and test the results	**How can you interpret, validate, and verify your assessment process and results?**	8.2.1 Test key assumptions	**Yes**
		8.2.2 Identify who is affected	**No**
		8.2.3 Collate results	**No**
		8.2.4 Validate and verify the assessment process and results	**No**
		8.2.5 Review the strengths and weaknesses of the assessment	**No**
09 Take action	**How will you apply your results and integrate natural capital into existing processes?**	9.2.1 Apply and act upon the results	**Yes**
		9.2.2 Communicate internally and externally	**No**
		9.2.3 Make natural capital assessments part of how you do business	**Yes**

Additional notes
Businesses operating in the apparel sector should address all of the actions associated with each Step in the Apply Stage. The sector guide provides additional guidance for some of the actions where it is most appropriate.

08 Interpret and test the results

This section of the sector guide provides additional guidance for answering the following question:
How can you interpret, validate, and verify your assessment process and results?

In particular, the sector guide will help you undertake the following action:
8.2.1 Test key assumptions

Test key assumptions

There will always be some estimation or approximation involved in a natural capital assessment. You should therefore avoid spurious 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. The Protocol provides an outline of some of the different methods of carrying out a sensitivity analysis as well as some generic assumptions that you can test.

Any natural capital assessment in the apparel sector will involve some estimation and it is important to understand the significance of any assumptions made, especially as the sector is known to be complex, varied, and often lacking in transparency particularly in the supply chain (WRAP 2012a). Natural capital assessments that involve upstream or downstream boundaries are often more challenging because of the potential lack of data availability in areas where businesses have less direct operational control or influence. In these situations, testing the sensitivity of key assumptions is even more important.

Some examples of sector-specific assumptions that you can test as part of a sensitivity analysis are listed in Table 8.1.

Table 8.1
Sector-specific examples of assumptions that can be tested in a sensitivity analysis

Assumptions you can test:	How do my results change if...
Quantity of fibers used within a product	The quantity of polyester used to produce a pair of trousers increased by 10%.
Sourcing location of key raw materials	The sourcing location changed from one country to another.
Magnitude of change in natural capital	Water availability at the sourcing location for cotton is halved.
Processing techniques	The processing technique for the dyeing of fabrics used in my products switched from batch to continuous dyeing.
Changes in prices	The price of water used by a leather tannery increased from USD 1 to USD 5 per m^3.

Step 08 of the apparel sector guide has provided additional guidance to help you test the key assumptions of your natural capital assessment. Table 8.2 illustrates the completion of this Step for each of the sector-specific hypothetical examples, including the completion of all actions required in the Protocol for this Step.

Table 8.2
Sector-specific hypothetical examples – Step 08

	Allsortsofwear Plc.	Color World	Cotton Fields Ltd.
Context	A large apparel retailer sells multiple brands as well as its own brand, and has never reviewed its environmental performance.	A company operates ten dye-houses across four different countries in Asia. A key customer is pressuring the company to report good environmental performance, and the company needs to expand its processing capacity with new equipment.	A medium-sized cotton farm is receiving financial assistance to develop improved farming systems which are less detrimental to local ecosystems. To encourage a further round of investment, it would like to assess and report to its funders on the significant natural capital benefits delivered as a result of their funding.
Natural capital assessment undertaken *(Business application)*	The company conducted a quantitative assessment to identify the material natural capital impacts and dependencies across the entire value chain of its own-brand products. *(Assess risks and opportunities)*	A natural capital impact valuation was undertaken on a range of different technologies. This was used to conduct an option appraisal that considered both natural and financial capital to help inform the purchase of the new equipment. *(Compare options)*	The cotton farm conducted a monetary assessment to report back to its funders the net impact delivered by their investments from the reduction of agrochemical use polluting soil and water ecosystems. *(Estimate total value and/or net impact)*
What key assumptions were tested?	Fibers used within the analysis were modeled based on global sourcing locations. Sensitivity analysis was undertaken for different sourcing countries. Water availability was also tested, based on the best case and the worst case scenario for different countries.	The equipment manufacturers provide expected equipment efficiency metrics. Sensitivity analysis was carried out to assess the implications on results with the individual technologies performing at maximum and minimum manufacturer specifications.	Sensitivity analysis was carried out on the model used to calculate the dispersion of toxic runoff from soil to water ecosystems.
Who is affected by the results of the assessment?	The assessment is designed to inform internal stakeholders to help strengthen the company sustainability agenda. In addition, findings are to be used to target specific "hotspot" areas of high impact and dependency, to engage with suppliers for targeted improvement.	Neighboring communities and businesses are affected by the decision on technology procured, due to implications on water quality varying with the technology selected. Furthermore, potential suppliers of technology are also affected.	The assessment is designed to inform current and potential funders on the impact of their investment. Furthermore, potential cotton buyers are also affected.
Validation/ Verification	Internal: The review identified that sources of data, methodology, and assumptions made were "fit for purpose".	External: The review identified that sources of data, methodology, and assumptions made were "fit for purpose".	Internal: The review identified that sources of data, methodology, and assumptions made were "fit for purpose".
Strengths and weaknesses of assessment	Due to the wide scope across its product range, the majority of the data used within the assessment were taken from secondary sources and modeling, and the work could be strengthened using more primary data. However, the strength lies in the wide scope, giving Allsortsofwear an understanding of risk and implications across the whole own-brand product range.	The strength of the assessment is through its usefulness in decision making and value in enhancing reputation through communicating the environmental performance improvement to external stakeholders. While undertaking the review, it became apparent that expanding the scope of the analysis to include upstream impacts of each technology would have strengthened the results.	The assessment's ability to demonstrate net impact of investment is highly valued by investors, who can in turn report on these metrics to their fiduciaries. However, some co-benefits delivered by the investment were left outside the scope of this pioneering assessment and should be included in future iterations.

09 Take action

This section of the sector guide provides additional guidance for answering the following question:
How will you apply your results and integrate natural capital into existing processes?

In particular, the sector guide will help you undertake the following actions:

9.2.1 Apply and act upon the results

9.2.3 Make natural capital assessments part of how you do business

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 natural capital 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 in the Protocol Framework.

This section of the sector guide provides some practical examples of how the results of a natural capital assessment could be applied by businesses operating in the apparel sector. In each example, the sector guide refers back to the relevant business applications (explained in Step 02) that would help your business achieve each outcome.

Practical example 1: Shadow pricing

Shadow pricing is one way to account for risk and the cost of natural capital impacts. A shadow price is an estimated monetary value that is used internally to account for risk or profitability. A natural capital shadow price or valuation might be factored into actual operational costs in a profit and loss statement, included in a discounted cash flow statement for a capital investment, or considered alongside a capital asset on a balance sheet.

In 2015, more than one thousand companies across the globe disclosed to their key stakeholders that they currently price their CO2 emissions—or intend to in the next two years—to try to manage their climate change risks (CDP 2015). Companies across many sectors, including consumer discretionary and consumer staples, are using internal carbon pricing to offset the costs and risks of GHG production, and to finance the transition to secure sources of low-carbon energy. This demonstrates the ongoing mainstreaming of carbon pricing as a high priority for business and an essential component of the corporate strategy toolkit (CDP 2015).

Relevant business applications: Compare options, Estimate total value and/or net impact

Practical example 2: Sourcing, procurement, and supply chain management

For many businesses operating in the apparel sector, a significant proportion of their natural capital risks and opportunities reside in their supply chains rather than in their direct operations. This is evidenced in the materiality matrices introduced in Step 04 for a number of important fibers and products across the apparel value chain.

Practical ways to apply natural capital assessments include supply chain risk assessments, strategic sourcing or hedging of commodities, supplier relationship management, and sustainable procurement strategies and guidelines for buyers and suppliers.

The starting point for any company is a supply chain risk assessment that identifies which natural capital impacts and dependencies are material to the business and where they occur. This could involve measuring impacts and dependencies in physical terms or applying monetary valuations so that they can be compared in a common metric and prioritized.

Armed with this information, apparel companies can begin to build a more risk-resilient supply chain and identify opportunities for increased competitive advantage. On water scarcity risks in particular, Ceres (2015) concludes that as water supplies are increasingly depleted and polluted in major agricultural regions across the world, traditional risk management approaches such as hedging and geographic diversification are becoming less effective. Companies can achieve more by engaging directly with their supply chain to strengthen farmer practices and protect watersheds. Key strategies could include setting sustainable agriculture policies and time-bound sourcing goals, purchasing certified sustainable commodities where relevant, and collecting data from farmers on their practices while providing assistance and incentives for improvement.

Relevant business applications: Assess risks and opportunities, Compare options, Assess impacts on stakeholders

Practical example 3: Product design

Another way to operationalize natural capital assessments is in the product development and design process. Many forward-thinking companies already use life-cycle impact assessments (LCIAs) to quantify and reduce impacts associated with sourcing, manufacturing, use, and disposal of products.

Natural capital valuation can enhance LCIAs by converting physical impacts into monetary values, which are more readily understood by a business audience. A business also can understand the impact in relation to the amount of the resource actually available, as its value reflects its scarcity. Water, for instance, will be more valuable in an arid region of the world compared to a region which is water abundant.

There are many opportunities for businesses to transition to a more circular business model; one which is less dependent on primary energy and material inputs. Sustainable product design can play an important role in unlocking new revenue streams, particularly in the fast-moving consumer goods sector. In the UK, for example, each ton of clothing that is collected and sorted can generate revenues of USD 1,975, or a gross profit of USD 1,295 from reuse opportunities. This is the aggregate impact of clothes being worn again, reused by cascading down to other industries to make insulation or upholstery stuffing, or simply recycled into yarn to make fabrics that save virgin fiber (Ellen MacArthur Foundation 2015).

Relevant business applications: Compare options, Estimate total value and/or net impact, Assess risks and opportunities

Practical example 4: Scenario planning

Businesses in the apparel sector can use natural capital assessments to inform decisions such as where to grow and invest capital, or withdraw and divest assets, or how to weigh environmental constraints for new or different business models.

A large apparel manufacturer, for example, may want to expand production in cities where it already has a number of factories and where population growth is increasing rapidly, but where water scarcity is an increasing problem. By assessing the future natural capital value of water, the company may gain insight into where best to expand, and can feed valuation data into other calculations such as site-development costs. Another business might value natural capital to consider the feasibility of vertically integrating operations as a way to source alternative agro-materials or fibers, or to compare the costs of different technologies.

When using scenario planning to manage natural capital risks, companies should use forward-looking models or scenarios to identify the likelihood and severity of future risks, and use robust datasets to support this analysis (Ceres 2015).

Relevant business applications: Compare options, Estimate total value and/or net impact, Assess risks and opportunities

Practical example 5: Disclosure

Although the Protocol is not a reporting framework, businesses may choose to report the findings of their natural capital assessments. Sustainability reporting, on the whole, can provide investors with an insight into the stewardship of natural resources, and into which companies are most transparent about performance. For companies, better disclosure can lead to better stewardship, which in turn can help increase efficiency and operational performance, and mitigate risks that might have material financial impacts on their business (KPMG 2014).

Relevant business applications: Communicate internally and/or externally

What future natural capital assessments are worthwhile?

Natural capital assessment can and should lead to new ways of thinking about how your business relates to the natural environment. For example, it may flag significant dependencies on ecosystem services that you were not aware of, or reveal previously unrecognized risks or opportunities associated with the indirect impacts of your business on society. In extreme cases, a natural capital assessment may fundamentally challenge or support your existing business model. In general, as you begin to include natural capital more systematically in your decisions, more and more of your business will be affected.

Applying the results of your assessment for one specific business application may have already generated ideas about additional business decisions that could be improved by a natural capital assessment. These ideas could be based upon what is most material (as identified in Step 04) or it might focus on new and unexpected natural capital impacts and dependencies that were revealed in your first assessment. Table 9.1 provides some ideas for undertaking further assessments in the apparel sector, including exploring new business opportunities, expanding the scope of your assessment, or broadening your assessment to include different types of value.

Table 9.1
Examples of future assessments in the apparel sector

If you've already considered...	Could you now consider...?
Your direct operations	Upstream (such as the supply chain of your products) or downstream (any further processing stages to complete the garments, consumer use phase and disposal) impacts and dependencies.
A qualitative assessment	Quantifying impacts and dependencies, and/or applying monetization.
A particular fiber	All fibers included within your product portfolio.
Business impacts	Considering the wider social implications, such as health impacts to neighboring communities at site of impact.
One environmental indicator	Expanding the assessment to incorporate all the material impacts and dependencies of your assessment scope.
An impact assessment	Inclusion of dependency assessment, such as raw material provision, or regulating services required.

Make natural capital assessments part of how you do business

Any measure of success in the uptake of a protocol would be evidenced in improved risk management, increased competitive advantage, and enhanced corporate reporting (Natural Capital Coalition 2015). Step 01 to Step 09 of the sector guide thus help demonstrate how these outcomes can be achieved through applications of the Protocol in the apparel sector. However, in order to truly unlock the value associated with more informed decision making, it is important that your natural capital assessment is not a one-off exercise, and that the results become embedded in the way you do business.

This poses a challenge as a radical shift in mind-set is needed if businesses are to adapt to the risks and opportunities that natural capital presents. In 2010, for example, a United Nations Principles of Responsible Investment (UNPRI) report revealed that the annual economic costs of natural resource depletion and pollution impacts linked to business activity equated to USD 6.6 trillion or 11% of global GDP. In addition, the research calculated that more than 50% of company earnings were at risk from environmental costs in an equity portfolio weighted according to the MSCI All Country World Index (UNPRI 2010). Economy-wide, these risks are sufficiently large that the World Economic Forum's Global Risks report (2015) cites water crises, failure of climate-change adaptation, energy price shocks, biodiversity loss, and ecosystem collapse within its top ten global risks over the next ten years as measured by likelihood and scale of global impact.

However, where there is risk, there is opportunity. Businesses using traditional decision-making processes to cope with the uncertainty posed by these economic, social, and environmental issues may find themselves playing catch-up with more forward-thinking competitors in the future (Bain & Company 2015).

Ultimately, we need new corporate thinking that:

- Identifies the material impacts and dependencies that businesses have on nature and society;
- Makes the connection between financial capital, natural capital, commercial opportunities, and business risk; and
- Integrates this information into decision making, strategies, business models, and reporting.

This section of the sector guide concludes with some key recommendations on how apparel companies can ensure natural capital becomes embedded in business decision making so that they can respond to the opportunities and risks that it may present.

Continue to strengthen the business case for natural capital

- Corporate board members have a fiduciary duty for risk management oversight. As such, board charters should be strengthened to explicitly mention natural capital to increase board oversight and understanding of material natural capital risks (Ceres 2015).
- Traditional approaches to strategy (analyzing trends, making forecasts, and committing to an appropriate course of action) are not calibrated to the uncertainty of a resource-constrained world (Bain & Company 2015). Engage board members by facilitating debate about how natural capital relates to your strategy, business model, performance, and social license to operate.

Continue to measure and value

- Continue to explore the most appropriate methodologies and help shape evolving standards for measuring and valuing your natural capital impacts and dependencies.
- Engage with suppliers, customers, and other important stakeholders to better understand how your business is impacting on critical natural resources and continue to identify risk "hotspots" across the value chain.
- Ensure that you continue to identify ways to expand your measurement and understanding of material natural capital impacts and dependencies and associated risks and opportunities.

Explore linkages with new and existing business processes

- Ensure that information on natural capital is integrated with other business management systems, including financial and management accounting, to help prioritize where natural capital will drive management action.
- Consider how material natural capital issues could be integrated into reporting to external stakeholders including investors.

Continue to develop knowledge and strengthen collaboration

- Develop the relevant skills internally to enable natural capital assessments to be conducted and communicated with the same rigor as for financial and business accounts.
- Collaborate with stakeholders, relevant experts, and specialists in the sector to increase your awareness of natural capital impacts and dependencies and their relationship with your business.
- Influence the global debate through links with international and professional organizations.

Step 09 of the apparel sector guide has provided additional guidance and recommendations to help you take action and embed the results of your natural capital assessment in business decision making. Tables 9.2 illustrates the completion of this Step for each of the sector-specific hypothetical examples, including the completion of all actions required in the Protocol for the Step.

Table 9.2
Sector-specific hypothetical examples – Step 09

	Allsortsofwear Plc.	Color World	Cotton Fields Ltd.
Context	A large apparel retailer sells multiple brands as well as its own brand, and has never reviewed its environmental performance.	A company operates ten dye-houses across four different countries in Asia. A key customer is pressuring the company to report good environmental performance, and the company needs to expand its processing capacity with new equipment.	A medium-sized cotton farm is receiving financial assistance to develop improved farming systems which are less detrimental to local ecosystems. To encourage a further round of investment, it would like to assess and report to its funders on the significant natural capital benefits delivered as a result of their funding.
Natural capital assessment undertaken *(Business application)*	The company conducted a quantitative assessment to identify the material natural capital impacts and dependencies across the entire value chain of its own-brand products. *(Assess risks and opportunities)*	A natural capital impact valuation was undertaken on a range of different technologies. This was used to conduct an option appraisal that considered both natural and financial capital to help inform the purchase of the new equipment. *(Compare options)*	The cotton farm conducted a monetary assessment to report back to its funders the net impact delivered by their investments from the reduction of agrochemical use polluting soil and water ecosystems. *(Estimate total value and/or net impact)*
Business benefit	The assessment identified significant risk areas across the value chain that may be linked to reputational or future legislative risk.	Previous purchasing decisions had been primarily informed by cost. By incorporating natural capital into traditional return on investment (ROI) calculations, Color World reduced the likelihood of being subjected to environmental fines or clean-up costs should regulations become more stringent in the future.	Cotton Field Ltd.'s effective communication with its funders on the net benefit returned on their investment allowed the farm to receive a further round of funding and diversify its investor base.
Business decision	Allsortsofwear engaged suppliers to improve efficiency and reduce negative impacts associated with production of its products.	Color World used the information to select and purchase the technology with the highest natural capital benefit.	Following the success it had with its funders, Cotton Fields Ltd. used the results of the monetary assessment to differentiate itself to buyers and secure longer-term purchase agreements.

Potential future assessments	**Deep dive into specific product lines with high impact and dependency** The product lines with the most significant natural capital "cost" could be targeted for primary data collection from suppliers to refine results. **Compare options for improvement** Now that the impacts and dependencies are understood, potential improvement activities (such as improved technologies, different material selection, energy efficiency measures) can be assessed to determine the optimal approach to improve performance.	**Incorporate use for other capital investments** The analysis could be replicated for other purchasing decisions. If this were to be undertaken, Color World would consider widening the scope to include upstream impacts. **Other environmental impacts** The assessment could be expanded to include other environmental impacts	**Other environmental impacts** With the help of this assessment, funding can be effectively sought to reduce and communicate the reduction of other environmental impacts. **Certification** Eventually the assessment can feed into a formal certification of the plantation.
Further embedding opportunities	Natural capital impact and dependency metrics could be incorporated into a materials library to support the design team in the selection of sustainable materials.	The new technology could be implemented more widely across multiple locations. The associated natural capital savings could then be publicly reported upon to improve company reputation, customer loyalty, and potential market share gain.	Natural capital impact metrics could be incorporated into a structured framework for prioritizing further areas for improvement and investment.

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About The Natural Capital Coalition

The Natural Capital Coalition brings together the different initiatives and organizations working in natural capital to find solutions and create opportunities through collaboration. Its membership is global and includes research, science, academia, business, advisory, membership, accountancy, reporting, standard setting, finance, investment, policy and governments, conservation bodies, and civil society. Its strength comes from this diversity, which is brought together through a common vision of a world where business conserves and enhances natural capital to create thriving societies and prosperous economies.

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