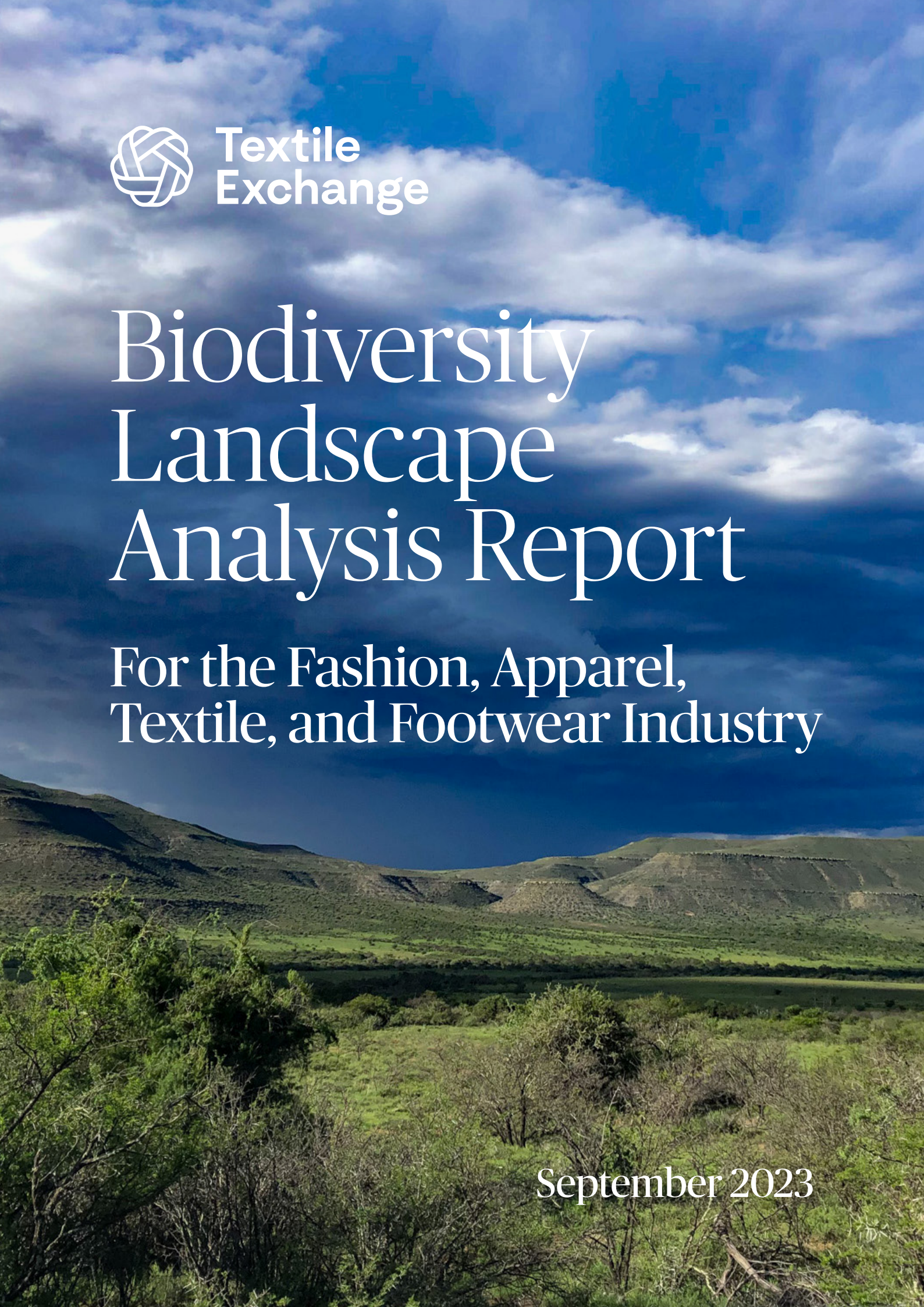
Textile
Exchange
Biodiversity
Landscape
Analysis Report
For the Fashion, Apparel,
Textile, and Footwear Industry
September 2023

Textile Exchange

Textile Exchange is a global non-profit driving positive action on climate change across the fashion, textile, and apparel industry. Textile Exchange guides and supports a growing community of brands, retailers, manufacturers, farmers, and others who are committed to climate action, to accelerate the adoption of preferred materials through clear and actionable guidance. We aim to convene the fashion, textile, and apparel industry to collectively achieve climate reduction goals and holistic positive impacts across fiber and raw material production.

The Fashion Pact

The Fashion Pact is a global initiative of companies in the fashion and textile industry (ready-to-wear, sport, lifestyle, and luxury) that have all committed to a common core of key environmental goals in three areas: mitigating climate change, restoring biodiversity, and protecting the oceans.

Launched by French President Emmanuel Macron, The Fashion Pact was presented to heads of state at the G7 Summit in Biarritz in 2019 by François-Henri Pinault, Chairman & CEO of Kering. Uniquely, the Fashion Pact is CEO-led, action-oriented, and focuses on building upon and going beyond existing efforts.

Today, the pact represents over 1/3 of the fashion industry, with each member eager to leverage collective action to scale and achieve impact.

In collaboration with

Conservation International

Expert insight provided by Conservation International.

Conservation International protects nature for the benefit of humanity. Through science, policy, fieldwork, and finance, we spotlight and secure the most important places in nature for the climate, for biodiversity, and for people. With offices in 30 countries and projects in more than 100 countries, Conservation International partners with governments, companies, civil society, Indigenous peoples, and local communities to help people and nature thrive together.

In partnership with

Biodiversify

Biodiversify is a conservation consultancy which advises a range of private, public, and third-sector clients who want to act for nature. We work at the cutting edge of scientific research to employ creative and disruptive techniques to challenge the status quo of how biodiversity is managed in practice. Our focus on social research and processes puts decision-making at the heart of everything we do; this ensures that we can use evidence to effect change and work towards tangible benefits for biodiversity. Through our experience studying the negotiations and psychological biases that underpin governance processes, we are able to improve the use of evidence in collaborative decision-making processes. This enables people to make better decisions, supported by the social capital essential to delivering meaningful, long-term change.

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Acknowledgements:

This report would not have been possible without the advice and support of interviewees across the fashion, textile, and apparel industry. The content throughout has been inspired by the insights and experiences of people working within the industry, including farmers, supplier groups, large brands, small brands, and NGOs. Interviewees were invited to share their detailed knowledge of the fashion, apparel, and textile industry and offer insights on how to take action on biodiversity from a range of perspectives across the supply chain. A full list of the interviewees is provided in Appendix D.

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1. Introduction

1.1 Executive summary

The world is currently experiencing a severe "biodiversity crisis." This is primarily caused by human activity, leading to what scientists refer to as the "sixth mass extinction." In 2023, biodiversity loss was recognized as the fourth-biggest long-term global risk by the World Economic Forum.

This loss is tied to consumerism, unsustainable resource extraction, greenhouse gas emissions, and the pursuit of limitless economic growth. Growing awareness of the global biodiversity, climate, and social crises—as well as their interconnectedness—has intensified calls for change.

The fashion, textile, apparel, and footwear industry has a huge opportunity to help protect and restore natural ecosystems, not least because so many of the fibers and raw materials it uses come from the land. But to get there, it needs to transform its approach.

The Biodiversity Landscape Analysis synthesizes the broad state of play of action on biodiversity in the industry. It aims to spur companies forward with methods and actions relevant to their biodiversity and nature journey, whether they're just getting started or have a full strategy in place, and point them to key guidance, resources, and tools.

To fully understand the challenges and opportunities that companies face in taking action to protect and restore biodiversity, this report draws on interviews with a range of people across the industry. These include farmers, suppliers, supplier groups, brands, certification organizations, consultants, and more.

The insights shared are intended to guide the reader on how to approach biodiversity within an organization and inspire the wider industry to take rapid action on the matter.

1.2 Key takeaways

- Biodiversity refers to our planet's vast variety of lifeforms—including animals, plants, fungi, and microorganisms—and how they interact within habitats and ecosystems.
- Nature is a broader term, encompassing all the world's biodiversity as well as non-living elements like mountains, water, and weather. When thinking about environmental impacts, "climate" and "nature" go hand-in-hand.
- Fashion, textile, apparel, and footwear companies are intrinsically responsible for protecting biodiversity. That's because over a third of the materials they use come from land-based ecosystems, produced through cropping, grazing, or forestry. Without healthy ecosystems, we can't produce materials like cotton, wool, mohair, leather, viscose, and many more.
- Fashion depends on nature. While sourcing decisions directly impact biodiversity, companies have an opportunity to protect, restore, and regenerate it too. Doing so is vital to securing a more resilient future—not just for the sake of the industry and the fibers and raw materials it sources, but for Earth's ecosystems too.
- Companies need to come together and take a holistic approach for improved biodiversity outcomes and healthy, resilient ecosystems. This means not only aiming to reduce harm and mitigate risk, but also actively working to protect, restore, and regenerate the lands and waters that support our planet, our people, and our businesses.

1.3 Goal and scope of this report

Goal

The Biodiversity Landscape Analysis report aims to clarify the process of taking action to protect and restore biodiversity and align companies on their biodiversity journeys. It does this by consolidating and condensing the wealth of tools, methods, frameworks, and standards that are out there.

The key objectives of this report are to:

- Prevent duplication of the research and fact-finding efforts currently underway within individual companies, enabling a clearer understanding of how to meaningfully address the topic of biodiversity. This includes selecting appropriate partners and scaling projects to achieve meaningful positive impacts on nature.
- Provide a central, nuanced reference point to answer the key questions that fashion brands and other stakeholders are asking as they seek to develop and implement biodiversity strategies. This means enabling readers to better navigate and make sense of the many biodiversity- and nature-related definitions, frameworks, and other forms of topical guidance already in existence.
- Distill and synthesize key concepts and information, rather than reproduce and repeat it (meaning additional reading may be needed). This report is intended to complement the initial and forthcoming technical guidance on setting biodiversity targets and strategies currently under development within the Science Based Targets Network (SBTN). It also builds on the outcomes and findings of the "Transforming the Fashion Sector with Nature" project, which is supported by the Global Environment Facility (GEF) and led by The Fashion Pact and Conservation International.

Scope

The Biodiversity Landscape Analysis report focuses specifically on biodiversity impacts at the raw material extraction and initial production stages of the industry's supply chains. However, it also recognizes that material processing, production, and finished product assembly stages are also responsible for biodiversity impacts.

While noting that fossil fuel-derived raw materials also have impacts on biodiversity, the core focus of this report is raw materials produced in agricultural systems. This is in part due to the significant biodiversity footprint of these materials, as well as the opportunity they present to not only avoid and reduce risk but also restore and regenerate ecosystems.

While the primary audience of this report is brands of all sizes and maturity in their biodiversity journey, it is also intended to be useful to farmers and growers, suppliers, retailers, investors, policymakers, and other stakeholders who wish to understand the space and improve collaboration.

1.4 Navigating the report

This report consists of two parts. Part 1 provides background information and context related to biodiversity and its relevance to the industry. Part 2 focuses on guidance to support companies to take action to protect and restore biodiversity.

Part 1

Section 1 provides an introduction to the report.

Section 2 looks at what biodiversity is, what it means for the textile industry, the current state of play in this space, and what is driving action.

Part 2

Section 3 focuses on the actions that a company can take on biodiversity, whether it is just getting started on its journey or has a fully-fledged strategy.

Section 4 contains recommendations and next steps.

Section 5 looks at case studies with real-life examples of action for biodiversity.

Section 6 is a Biodiversity Program Matrix.

2. Introduction to biodiversity and why it matters

The global fashion, apparel, textile, and footwear industry relies heavily on the continued existence of healthy ecosystems and the resources that nature provides.

At the same time, the industry has contributed significantly to the loss of global biodiversity. This is in part due to its demand for land-based raw materials sourced from around the globe, which relies heavily on agricultural production and the native ecosystem loss and deforestation associated with it.

Climate action has historically been a primary focus of the industry's sustainability efforts, but there is now a rising understanding of the interdependence between climate and nature. Consequently, organizations are increasingly addressing these issues as two sides of the same coin, part of a holistic sustainability agenda.

Now, with the rise of new regulations, policies, and expectations, support for biodiversity action has never been greater. However, despite growing scientific consensus on the major drivers and actions required, the industry is still missing a clear direction of travel to outline what exactly it needs to do, and many brands in the industry face challenges in developing suitable goals and implementing initiatives for biodiversity.

To start understanding what best practice looks like, the industry must first address key obstacles, including:

- Lengthy and intricate supply chains
- Limited understanding of the topic within the industry
- A lack of alignment on how to measure biodiversity impacts

Since so many fibers and raw materials come from the land, the fashion, textile, and apparel industry has a huge opportunity to help restore and regenerate natural ecosystems. To get there, however, it needs to transform its approach.

To secure a resilient future for our industry, reversing biodiversity loss needs to be a top priority.

2.1 Defining terms

The definition of "biodiversity" has shifted to become more fluid in the corporate and business sector, compared to traditional scientific definitions and applied ecology. Terms such as "nature" have broadened the discussion and made it more approachable and relatable to a wider audience. However, this may cause confusion, as the terms are not synonymous.

Textile Exchange recommends use of key terms as follows:

- **"Biodiversity"** is the total variety of all Earth's species, their genetic information, and the ecosystems they form.[1]
- **"Nature"** is a broader term, encompassing all non-human living entities and their interactions with other living or non-living physical entities and processes.[2] This definition recognizes that interactions between humans, nature, and its subcomponents (such as species, soils, rivers, and nutrients) bind them to one another. It also recognizes that air pollution, climate regulation, and carbon are part of "nature" more broadly—thus, when we talk about acting for nature, we are talking about acting on issues related to climate change as well. However, "impacts on nature" is often used as the umbrella term for all environmental impact areas beyond climate.
- **"Climate and nature"** is a helpful overarching term for environmental impacts. Textile Exchange agrees with leading scientists, who believe that these concepts are intrinsically linked.

Other key definitions:

- **Ecosystems:** geographic areas where plants, animals, other organisms, weather, and landscape interact to form a localized system of life[3]
- **Ecoregion:** areas where ecosystems are generically similar in terms of the type, quantity, and quality of environmental resources[4]
- **Ecosystem function:** functions that support the physicochemical and biological processes that maintain life within an ecosystem[5]
- **Ecosystem processes:** the physical, chemical, and biological processes that connect organisms and their environment. These include nutrient cycling, water cycling, energy flow, and food web dynamics[6]
- **Ecosystem services:** the set of services, provided by nature, that are directly linked to the benefit human well-being, including provisioning, supporting, regulating, and cultural services[7]
- **Habitat:** the area that a plant or animal exists in and depends upon for its survival[8]
- **Species:** a set of animals or plants, the members of which have similar characteristics and can breed with each other to create fertile offspring[9]

This report aligns with the definitions of biodiversity and nature outlined above. It focuses specifically on biodiversity, while recognizing its relevance to the broader topic of nature.

More recently, the term 'nature-positive' has been gaining traction in the biodiversity space. 'Nature-positive' is sometimes presented as the 'global goal for nature', but, as it's a new term, there are still ongoing debates as to whether it represents an aspirational rallying cry or a technical concept—like 'net-zero' in the climate space.

While there is no single globally accepted definition for 'nature-positive', there are several working definitions:

- The Global Goal for Nature Group has defined the term as 'halting and reversing nature loss by 2030, measured from a baseline of 2020'.[10]
- The International Union of Concerned Scientists defines it as 'halting and reversing the loss of nature measured from its current status, reducing future negative impacts alongside restoring and renewing nature, to put both living and non-living nature measurably on the path to recovery'.[11]
- The term is defined by the Science Based Targets Network as 'a high-level goal and concept describing a future state of nature (e.g., biodiversity, nature's contributions to people) that is greater than the current state'.[12]

2.2 Biodiversity in the context of the textile industry

Many apparel companies have difficulty defining what biodiversity means to their businesses, with several interviewees noting the lack of a clear definition of biodiversity as a barrier to action. Biodiversity can be particularly challenging to understand due to its interdependence on other environmental impact areas.

> "Something that I thought was simple became so complex. How am I going to get this into the whole organization?"

— Veronique Rochet, PUMA

The species-specific component of biodiversity has a uniquely emotive power. Historically, companies have approached the issue of biodiversity through the lens of specific species—both in terms of understanding their impact and how they communicated or campaigned on the issue with consumers and other stakeholders. Humans connect emotionally with plants, animals, and other life forms, providing the potential to inspire transformative change through the lens of species biodiversity.

Take, for example, how the polar bear became the symbol for otherwise invisible climate change, how orangutans became the ambassador for the destruction caused by palm oil, or how koala bears illustrated the plight of the victims of wildfires.[13] [14] [15] These examples demonstrate how people connect with one emotionally charged aspect of biodiversity and are motivated to care about the issue. While it is important to move beyond one charismatic species, the everyday relatability of diverse lifeforms can move people to come together and act.[16] [17]

> "It is not just about nature, but also our relationship with nature—we need to understand this. Everyone's relationship is going to be different."

— Dr. Mirjam Hazenbosch, Biodiversify

While focusing on species can be a good place to start, companies should also consider a more complete view of biodiversity, with a holistic focus on ecosystem intactness and function. Since intact habitats and healthy ecosystems support biodiversity, they are inextricably linked, and ultimately cannot be considered in isolation from the other.

Companies should consider the largest drivers of biodiversity decline globally, the current impacts they may have on biodiversity, the landscapes within which their fibers and raw materials are produced, and how those landscapes can be protected, restored and/or regenerated to create a space for all living things to thrive. This requires a shift from solely focusing on individual species conservation to establishing a broader focus on impacts and habitat/landscape management. **As a first step, that means avoiding further losses of intact natural ecosystems, then promoting management of land towards improved ecosystem function—all with the end goal of supporting positive outcomes for biodiversity.**

2.3 The global movement for biodiversity: goals and targets

The drive to act on biodiversity issues is not unique to the textile industry, but rather part of a recognized global movement. To ensure that industry efforts can contribute meaningfully towards these global ambitions, it is important to understand what the targets aim for and how they can be achieved within the textile industry's sphere of influence.

Global Biodiversity Framework (2022)

The 15th Conference of Parties to the UN Convention on Biological Diversity (COP15) in December 2022 adopted the "Kunming-Montreal Global Biodiversity Framework" (GBF), which includes four goals (Table 1) and 23 targets (Figure 1) for achievement by 2030.[18]

Table 1: The four overarching goals of the GBF to protect nature

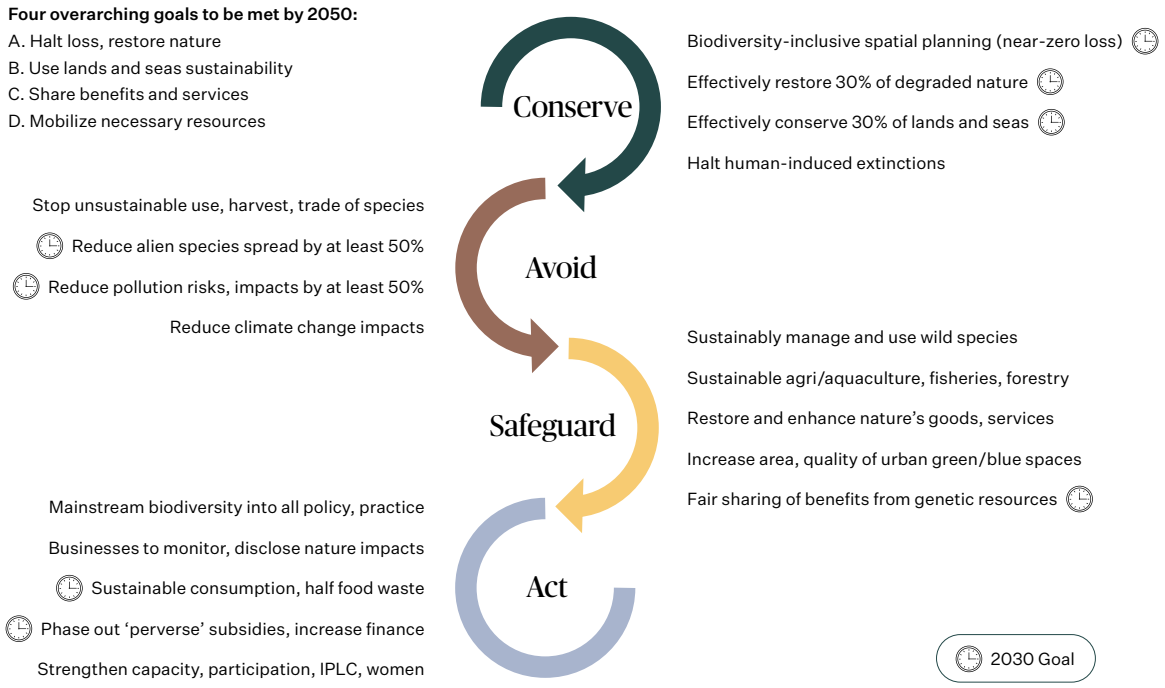
Goal	Description
Goal A	The integrity, connectivity, and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels; and the genetic diversity within populations of wild and domesticated species is maintained, safeguarding their adaptive potential.
Goal B	Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.
Goal C	The monetary and non-monetary benefits from the utilization of genetic resources and digital sequence information on genetic resources, and of traditional knowledge associated with genetic resources, as applicable, are shared fairly and equitably, including, as appropriate with Indigenous peoples and local communities, and substantially increased by 2050, while ensuring traditional knowledge associated with genetic resources is appropriately protected, thereby contributing to the conservation and sustainable use of biodiversity, in accordance with internationally agreed access and benefit-sharing instruments.
Goal D	Adequate means of implementation, including financial resources, capacity-building, technical and scientific cooperation, and access to and transfer of technology, to fully implement the Kunming-Montreal Global Biodiversity Framework are secured and equitably accessible to all Parties, especially developing country Parties, in particular the least developed countries and small island developing States, as well as countries with economies in transition, progressively closing the biodiversity finance gap of $700 billion per year, and aligning financial flows with the Kunming-Montreal Global Biodiversity Framework and the 2050 Vision for biodiversity.

While the GBF guides the discussion of biodiversity targets in this analysis, it is generally recognized that there are numerous other conventions and organizations with their own biodiversity and/or ecosystem strategies that are connected to the different aspects of the GBF goals and targets. Examples include:

- International Union for the Conservation of Nature (IUCN)
- United Nations Convention to Combat Desertification (UNCCD)
- Convention on the Conservation of Migratory Species of Wild Animals (CMS)

Further to the 23 targets (Figure 1), the GBF has 10 'milestones' proposed for 2030 to achieve the longer-term goal of 'living in harmony with nature' by 2050.

Figure 1: Kunming-Montreal Global Biodiversity Framework.



Some of the key targets of the GBF specifically relevant to raw material production in the textile industry include:

Target 2:

Ensure that by 2030 at least 30% of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity.

Target 3:

Ensure and enable that by 2030 at least 30% of terrestrial and inland water areas, and of marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing Indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of Indigenous peoples and local communities, including over their traditional territories.

Target 4:

Ensure urgent management actions to **halt human induced extinction** of known threatened species and for the recovery and conservation of species, in particular threatened species, to significantly reduce extinction risk, as well as to maintain and restore the genetic diversity within and between populations of native, wild and domesticated species to maintain their adaptive potential, including through in situ and ex situ conservation and sustainable management practices, and effectively manage human-wildlife interactions to minimize human-wildlife conflict for coexistence.

Target 7:

Reduce pollution risks and the negative impact of pollution from all sources by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including: (a) by reducing excess nutrients lost to the environment by at least half, including through more efficient nutrient cycling and use; (b) by reducing the overall risk from pesticides and highly hazardous chemicals by at least half, including through integrated pest management, based on science, taking into account food security and livelihoods; and (c) by preventing, reducing, and working towards eliminating plastic pollution.

Target 10:

Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity friendly practices, such as sustainable intensification, agroecological and other innovative approaches, contributing to the resilience and long-term efficiency and productivity of these production systems, and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services.

The GBF theory of change encourages parties and stakeholders to deploy solutions that reduce threats to biodiversity and ensure that where biodiversity is used to meet people's needs, it is done in a sustainable manner. It aims to ensure that progress against the GBF targets is monitored in a transparent and accountable manner so that, by 2030, the world is on a path to reach the 2050 Vision for Biodiversity. The theory of change goes hand-in-hand with the 2030 Agenda for

Sustainable Development and recognizes the long-term strategies and targets of other multilateral environment agreements, including the biodiversity-related Rio Conventions.

Another set of targets aligned to the GBF is the Science Based Targets for Nature, currently being developed by the Science Based Targets Network (SBTN). Building on the successful model employed by the Science Based Targets initiative (SBTi), SBTs for Nature was established to develop consistent targets and target-setting methods for companies in the areas of freshwater, land, biodiversity, and oceans.

As of the publication of this report in September 2023, the first release of SBTs for Nature includes the following targets:

Land:

- **No Conversion of Natural Ecosystems,** which limits further loss of biodiversity due to conversion of natural ecosystems attributed to a company's activities or sourcing. (Contributing to GBF Targets 1, 2, 3, 10, 11, 15, 16, 19, 20, and 21.)
- **Land Footprint Reduction,** which aims to liberate agricultural land from production, relieving the pressures induced by the leading driver of biodiversity loss, and, through the Landscape Engagement, explore ecosystem restoration of these liberated areas. (Contributing to GBF Targets 2, 3, 10, 15, 19, 20, and 21.)
- **Landscape Engagement,** which encompasses a variety of potential actions that companies can implement to help achieve holistic environmental and social outcomes within collaborative landscape initiatives to increase ecological integrity within priority landscapes for production and sourcing of high-impact commodities. Additionally, this target promotes company engagement in the transformational processes necessary to realize landscape objectives. (Contributing to GBF Targets 2, 3, 10, 11, 15, 16, 19, 20, 21, 22, and 23 of the GBF.)

Freshwater:

- **Quantity:** Basin-level and company-specific reduction of freshwater withdrawal rate from surface water and groundwater
- **Quality:** Maximum allowable basin-wide nutrient load (nitrogen and phosphorous) and company-specific pollution load reduction

These pressures are the first to be addressed by SBTN because of their relevance to most companies (freshwater use), as well as their significance to specific sectors and environmental issues (freshwater pollution and land use change are two of the key pressures that are driving the nature loss in ecosystems around the world).[19]

As it stands, the aim of addressing the global biodiversity crisis is supported through the Land and Freshwater target-setting process and the SBTN AR3T action framework (more details on this can be found later in the report). Biodiversity is specifically considered in the first release of the SBTs for Nature, particularly in Step 1 (assess) and Step 2 (prioritize), which recommend a suite of biodiversity datasets to bring into the target-setting process. The Biodiversity Hub within SBTN, in collaboration with the other realm-based hubs, is engaging in analysis to determine if and where additional biodiversity-specific targets may be needed to prevent undesired outcomes if a company faithfully follows existing guidance. The results of that effort will be published in a research paper in summer/fall of 2023.

The GBF and SBTs for Nature provide a clear direction of travel for the global biodiversity movement. They reinforce the importance of taking an ecosystem approach to biodiversity and recognize the key impact and role of land management and agriculture in achieving these global targets.

Within the textile industry, aligning with the global goals and targets for land and biodiversity requires a focus on two key high-level interventions within key raw material production regions:

- First, halt the conversion of intact portions of natural ecosystems; and,
- Second, improve ecosystem integrity through better land use management.

To achieve this, it is important to first understand the risks that different fiber and raw material production systems pose to ecosystem function (including biodiversity).

This report aligns with the definitions of conversion and natural ecosystems from the Accountability Framework Initiative, which is utilized by SBTN and much of the sector:

- **Conversion:** A change of a *natural ecosystem* to another land use or profound change in a natural ecosystem's species composition, structure, or function. Deforestation is one form of conversion (conversion of natural forests). Conversion includes severe degradation or the introduction of management practices that result in substantial and sustained change in the ecosystem's former species composition, structure, or function. Change to natural ecosystems that meets this definition is considered to be conversion regardless of whether or not it is legal.

- **Natural ecosystem:** An ecosystem (including natural forest) that substantially resembles—in terms of species composition, structure, and ecological function — one that is or would be found in a given area in the absence of major human impacts. This includes human-managed ecosystems where much of the natural composition, structure, and ecological function are present.

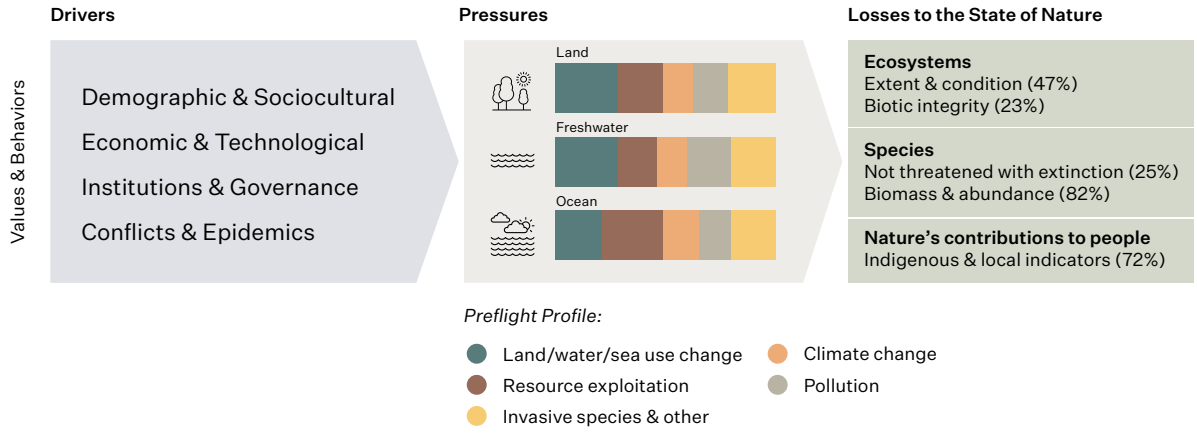
2.4 The textile industry's impacts and dependencies on biodiversity

The textile industry is dependent on biodiversity and the goods and services it provides, primarily in the raw material extraction and initial processing stages of the supply chain. In 2022, more than a third of fibers and raw materials used by the textile industry were sourced from agriculture and forests.[20] [21] To begin to assess the textile industry's impact on biodiversity, it is important to understand the drivers and pressures of biodiversity loss.

Evidence of nature's decline—and the role that human activities have played in this decline was presented in the 50-year review of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) in 2019.[22] IPBES found that these declines in the state of nature's contributions to people were the result of five key pressures: land and sea use, direct exploitation of natural resources, climate change, pollution, and alien invasive species.[23] (Figure 2)

These pressures are the result of several socioeconomic drivers, including production and consumption patterns (e.g., fast fashion and food waste), population growth, trade relationships (e.g., outsourcing environmentally harmful production processes), technological innovations (e.g., the rise of e-commerce), and systems of governance/social institutions (which govern access to and ownership of natural resources).

Figure 2: Drivers, pressures, and states of nature loss, SBTN.[24]

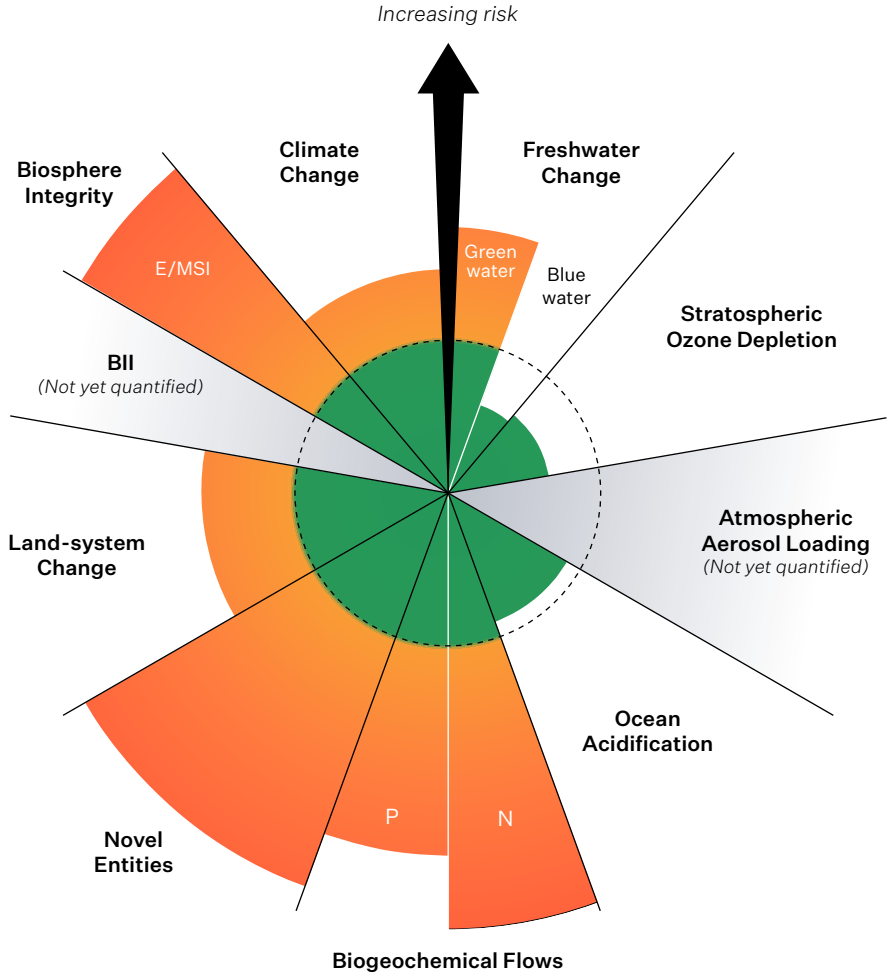


The "drivers" feed into "pressures", which influence the degradation and loss of nature within the terrestrial, freshwater, and ocean realms. The percentages on the bars represent the approximate global importance of each pressure in different realms. The right-hand side highlights some of the key "states" of nature loss related to ecosystems, species, and nature's contributions to people.[25]

Another framework for assessing the textile industry's impact on the environment—and therefore biodiversity—is the nine planetary boundaries (Figure 3).[26] Introduced in 2009, this approach defined the environmental limits within which humanity can safely operate and has since proven influential in global sustainability policy development. The planetary boundary framework provides a science-based analysis of the risk that human activity will destabilize the Earth system on a planetary scale. As such, the idea of planetary boundaries highlights the urgent need for a new paradigm that balances the continued development of human societies with the maintenance of the Earth system, to create a resilient state for the planet.

A study published in May 2023 built and further expanded on this concept to establish the eight Earth system boundaries, which include the global commons that underpin human wellbeing on Earth. Each boundary was assessed for a combination of safety (planetary) and justice (humanity) considerations, with the alarming conclusion that seven of the eight boundaries had already been exceeded.[27]

Figure 3: The nine planetary boundaries and estimates of how the different control variables for seven planetary boundaries have changed from 1950 till present. The green shaded polygon represents the safe operating space. Updated image (2022) by J Lokrantz/Azote based on Steffen et al. 2015.[28] These assessments are not static and are updated based on new research, and adjusted as human impacts continue to influence the boundary limits.



Bringing these concepts together, one can begin to investigate how production activities could be influencing either the pressures of biodiversity loss or the shifts in the planetary boundaries. Table 2 links these concepts to some of the general risks associated with fiber and material production.

Table 2: The nine planetary boundaries and the five pressures of global biodiversity loss, and their relevance to the textile industry. The Science Based Target Network and the International Union for the Conservation of Nature recognize "drivers" as external forces that induce pressures on biodiversity.[29] [30] Other organizations recognize these as "drivers" of biodiversity loss.

Planetary boundary	Pressures (or drivers) of biodiversity loss	Risk/threat
Land System Change Refers to the conversion of natural ecosystems.	Habitat loss and degradation, and overexploitation of biological resources	Conversion of natural ecosystems (including deforestation) is relevant to the textile industry where land is converted for fiber crop production and pastures for livestock species. Conversion also has added impacts on habitat fragmentation and wildlife corridor function.
Biosphere Integrity: Biodiversity Loss Refers to the loss of ecosystem integrity, loss of biodiversity, and the need to protect the integrity of living systems (the biosphere), enhancing habitat and improving connectivity between ecosystems while maintaining agricultural productivity that humanity relies on.	Habitat loss and degradation, overexploitation of biological resources, and invasive alien species	The loss of ecosystem integrity due to poor land management in the production of raw fibers remains a risk to biodiversity, on account of its impact on ecosystem function and healthy habitats. There is also a risk of impact on species extinction as a result of unsustainable harvesting of biological resources. Human-wildlife conflict further contributes to stress on natural species and can be seen in both the cropping and extensive grazing systems used for raw fiber production.
Freshwater Use and Pollution Refers to human-induced modifications to water bodies, as well as water usage pressures and the associated shifts these induce on hydrological systems.	Habitat loss and degradation	Functioning hydrological systems are critical for sustaining life. All species rely on healthy water systems to survive. The textile industry relies on varying levels of water abstraction throughout the supply chain, from raw fiber production through to final garment manufacturing, that can result in excessive water withdrawals that negatively impact watersheds. Runoff from improperly managed wastewater or agricultural inputs can also lead to pollution of waterways and bodies of water, with detrimental effects on biodiversity in those watersheds and downstream.
Atmospheric Aerosol Loading: Particle Pollution Refers to the release of aerosols and their effect on the Earth's climate system, namely the impact on water cycles and how much solar radiation is reflected or absorbed in the atmosphere.	Pollution	From rainfall patterns to extreme weather intensities, air pollution can significantly affect the water cycle. Particulate matter can interfere with the amount of solar radiation that reaches the Earth's surface, in turn affecting the rate of evaporation. Additionally, these particles can affect the formation and water-carrying capacity of clouds.[31] All of these impacts could have a direct effect on species survival by influencing their basic environmental and biological needs.
Biochemical Flows: Nitrogen and Phosphorus Refers to humans' management and application of fertilizer production (N and P) and the risk of these to pollute.	Pollution	The misuse or overuse of fertilizers for fiber crop production, and the management of feed crops for animal fiber and material production, can lead to reductions in soil biodiversity. The nutrients in fertilizers can find their way into water systems if not

Planetary boundary	Pressures (or drivers) of biodiversity loss	Risk/threat
		managed correctly, which can have a wider impact on the species that rely on those water sources, and even result in hypoxic "dead zones" where aquatic life cannot be sustained.
Novel Entities: Chemical Pollution Refers to the emissions of toxic and long-lived substances, such as synthetic organic pollutants, heavy metal compounds, and radioactive materials, and the effects they can have on living organisms and the physical environment.	Pollution	The production of some fibers may involve the use of pesticides and herbicides for pest and weed management, which carry varying levels of risk if not applied correctly. Other chemicals may be used in fiber processing further along the supply chain. If mismanaged, these chemicals can become pollutants that are both directly and indirectly toxic to living organisms and the physical environment.
Ocean Acidification Refers to the CO_2 that humans emit into the atmosphere that is ultimately dissolved in the oceans, where it forms carbonic acid. This alters the ocean's chemistry and decreases the pH of the surface water.	Climate change, habitat loss, and degradation	Acidification of the oceans will impact species that are sensitive to pH levels and affect their tolerance for fluctuation of these levels.
Climate Change Refers to the impact that humans have had on the climate, both in terms of increasing carbon emissions and the loss of carbon sequestration potential through desertification. This planetary boundary has already been crossed and we face irreversible adverse effects if this is not immediately addressed.	Climate change, habitat loss, and degradation	Changes in climate can influence the environmental conditions that species rely on to exist in their habitat. These changes could impact where a species can be found and how well it is thriving under the new conditions. The textile industry has been highlighted as a significant contributor to carbon emissions, with raw material production accounting for a quarter of the sector's emissions.[32]
Ozone Depletion Refers to the impact humans have on the stratospheric ozone layer and its ability to filter out ultraviolet radiation from the sun.	Climate change, habitat loss, and degradation	Depletion of the ozone layer causes damage to terrestrial and marine systems and the species that rely on them.

From fossil fuel-derived synthetics to natural fibers produced through cropping, grazing, and forestry, the textile industry's fiber and raw material production systems are varied, with differing areas of impact and opportunity. For the purposes of this report, the focus is on the industry's key land-based fiber and raw material categories: plant-based (i.e. cotton, rubber); animal-based (i.e. wool, leather, cashmere, mohair, alpaca); manmade cellulosic fibers (i.e. viscose)—and their impacts at the raw material production stage.

2.4.1 The impacts of extensive grazing systems on biodiversity

Most animal fiber and material production relies on extensive natural rangelands for grazing (including browsing). Without proper land management, extensive grazing can potentially have significant negative impacts on biodiversity. For example:

- Conversion (including deforestation) where areas with a lower production value for grazing could be turned into higher-value production areas, such as planted pastures.
- Habitat fragmentation as a result of land conversion or the erection of barriers such as roads, fences, and dams can negatively affect ecosystem function and the movement of species.[33] Land degradation caused by poor land management practices results in reduced ecosystem function, which in turn creates a less suitable habitat for native species.
- Overgrazing can lead to bare unprotected soil with higher erodibility, higher temperatures, and reduced soil microbes and organic matter, causing structural changes that affect the soil's ability to infiltrate water.[34]
- The introduction and/or spread of exotic invasive species can be a consequence of human activity and, if not managed, poses a direct threat to biodiversity through competition with native species. If left unchecked, some exotic species can fully transform landscapes. Unstable soils can provide further opportunity for invasive species to thrive.[35]
- Unstable soils deprive environments of healthy oxygen levels. Studies show that numerous disease-causing microorganisms thrive in these conditions, while the opposite is true for organisms that are beneficial to the environment.[36] Poor soil management can also contribute to accelerated soil erosion and compaction issues.[37]
- Direct competition between livestock and wildlife for food, habitat, and water can pose a risk to biodiversity. The disruption to natural community dynamics caused by the removal of target conflict species (such as predators and disease-risking or damage-causing wildlife species), and the impacts of certain methods used to control these species, can have even wider environmental impacts.[38]

It is important to note that the risks above relate to fibers and materials produced within extensive natural rangelands. There are also animal fibers and materials, such as leather, that are produced on converted and improved pastures and feedlots, which carry additional significant risks to biodiversity.

2.4.2 The impacts of crop production systems on biodiversity

Generally speaking, crop production systems that are relevant to the textile industry are those that produce fiber crops such as cotton and hemp. However, it is important to note that biodiversity considerations are also relevant to the crops that are grown to support the production of animal materials such as leather, which typically involve pasture creation or cropping for livestock feed. Examples of negative impacts on biodiversity that can be caused by crop production practices include:

- Conversion of natural ecosystems (forests, savannas, grasslands, and wetlands) into vast expanses of croplands. This loss of habitat has been recognized as one of the principal causes of global biodiversity loss and continues to pose the risk of extinction for numerous species.[39]
- Habitat fragmentation, which can take place when land conversion creates a matrix of natural and converted habitat patches. Habitat fragmentation can also be caused by the erection of barriers such as roads, fences, and dams, which can negatively affect ecosystem function and the movement of species.[40]
- The soil's reduced ability to store and filter water as a result of poor management, which makes growing crops harder.[41] Fields are tilled to destroy weeds and apply fertilizers, water evaporates from the freshly turned soil, and the soil, in turn, becomes brittle. When exposed, these soils are prone to being blown or washed away, and the carbon stored within them is released into the atmosphere.[42]
- A change in biological complexity (diversity and its interactions) within soil systems, which is important for numerous processes including nutrient cycling, soil structure formulation, regulating pest cycles, and influencing decomposition rates. It is impossible today to fully understand the implications of disruptions to this biological complexity, so protecting soil diversity is of paramount importance.[43]
- The negative effects of fertilizer and pesticide pollution in cropping systems, which have been widely documented. Nitrogen-, phosphate-, and potassium-based synthetic fertilizers can leach into groundwater, polluting waterways and disrupting aquatic ecosystems in a way that is harmful to organisms.[44] Nutrient pollution can also lead to oxygen depletion in aquatic ecosystems; the acidification of soils and waters; reductions in bird, insect, amphibian, and soil biological diversity; and risks of exposure for workers or populations in areas where pesticides are applied.[45]
- Genetic modification technologies, which can bring about potential risks to biodiversity if not appropriately managed. For example, genetically modified crops could harm biodiversity by reducing the number of insects that are eaten by other kinds of wildlife, like birds.[46] As there is still a lot of conflicting information about the effects of genetically modified organisms (GMO) on biodiversity, further study on the topic is still needed. In the meantime, these technologies should be used carefully and in a way that is informed by continued research.
- Depleted aquifers (underground water reserves) caused by intensive groundwater pumping for irrigation, which pose a threat to biodiversity. Agriculture poses a further risk to water quality when runoff includes fertilizers, pesticides, and livestock effluents that pollute waterways and groundwater.[47]

2.4.3 The impacts of managed forest systems on biodiversity

Manmade cellulosics are regenerated fibers made from the dissolved wood pulp ("cellulose") of trees. Viscose, lyocell, acetate, and modal are all examples of manmade cellulosics. Common threats to forests and forest fibers include deforestation, forest degradation, and illegal activities in forestry, such as violations of logging regulations and rights.[48] Management practices, such as clear-felling, pesticide application, and fire clearing can have further negative environmental effects.[49] There are several negative impacts on biodiversity caused by forestry practices. For example:

- Deforestation and the conversion of natural forests to plantations directly cause losses in biodiversity.
- Some studies carried out on plantations show negative impacts on native biodiversity through competition for light, caused by dense thickets of trees affecting available growing space, changes in nutrient availability, soil acidification, and chemical interference from planted species (allelopathy).[50]
- Plantation forestry often leads to habitat fragmentation of pristine ecosystems.[51] Planting exotic species can also negatively affect natural water resources, especially in countries with higher water scarcity.[52]
- Forest degradation is when natural forests become damaged, either through unsustainable logging that removes trees in an unselective or concentrated way and inhibits the forest's ability to recover its original canopy, or through competing land uses such as mining, infrastructure, agriculture, and population resettlement. These often occur simultaneously.[53] When a forest is degraded, it still exists, but it can no longer function well. A forest degraded by illegal and unsustainable logging will result in bare clearings, multiple road networks, damaged vegetation and undergrowth, and forest floor trenches.[54]

2.4.4 Manufacturing impacts

While most of the textile industry's material impacts and pressures on biodiversity relate to tier 4—the raw material production and primary processing stage of the value chain, and the focus of this report—it is also important to acknowledge the impacts on biodiversity caused by onward supply chain and life cycle stages. Key biodiversity impacts from material preparation, processing, and product manufacturing (tiers 3-1) relate to pollution from processes such as textile dyeing and treatment, or leather tanning, as well as energy use throughout manufacturing.[55] The consumer-use phase of a textile also has impacts on biodiversity, through microfiber shedding, waterway pollution, and water and energy use from laundry, for example.

Figure 4: A representative depiction of a generic textile's circular life cycle. Sourced from Textile Exchange (2022) 'Creating Material Change for Nature Biodiversity Benchmark Companion Guide.'

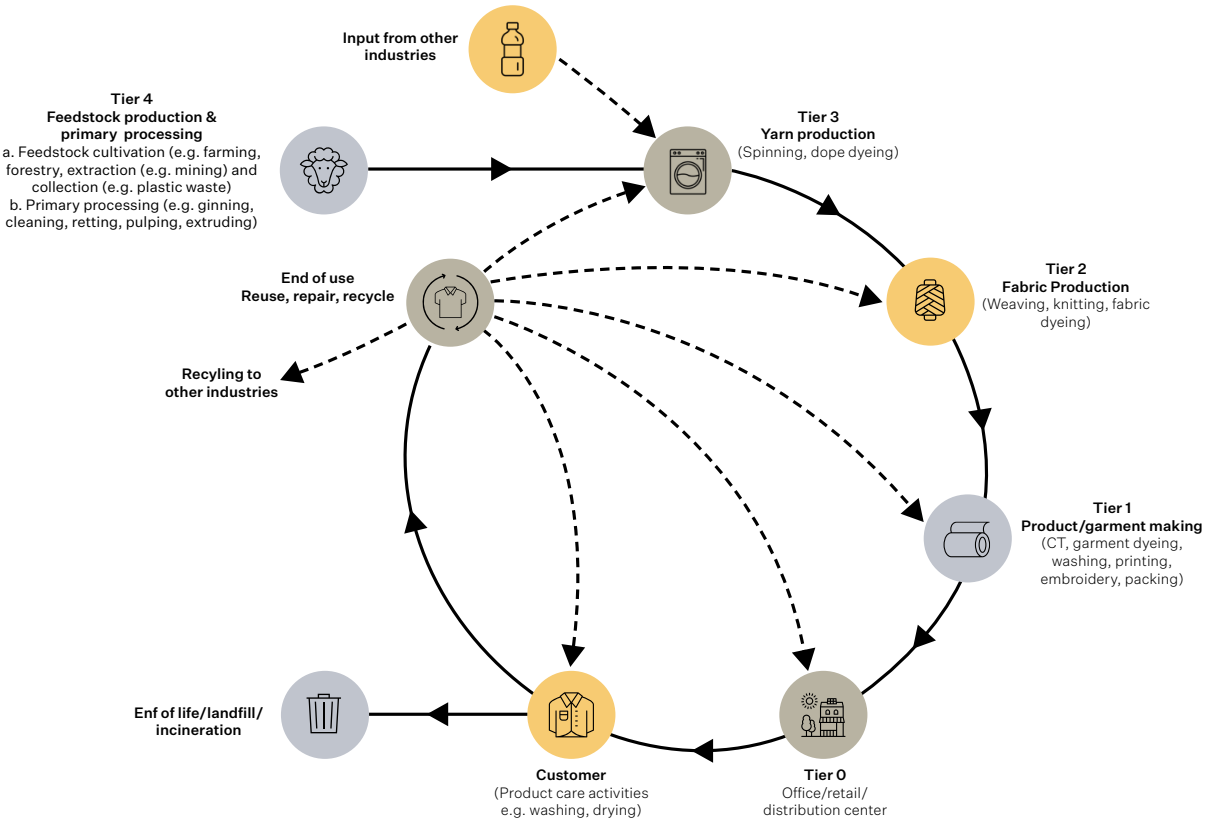


Figure 4 shows the hypothetical lifecycle of raw material along a standard supply chain. Circular supply chains reduce the overall volume of new fibers and raw materials extracted and manufactured, as well as reducing the quantity of products and materials sent to landfills, which have impacts on biodiversity. For all raw material and fiber categories, working towards a fully circular supply chain is another critical step to reduce impacts, dependencies, and risks of biodiversity loss. Substantially reducing waste generation by 2030 forms part of Target 16 in the Kunming-Montreal Global Biodiversity Framework.

2.4.5 Opportunities to mitigate risk and improve biodiversity

Understanding the environmental and biodiversity effects of raw material production in turn highlights some of the key opportunities to mitigate these impacts and **halt further habitat loss, restore degraded areas**, **and improve biodiversity intactness and ecosystem integrity over time**. Using the Avoid Reduce, Restore, Regenerate, Transform (AR3T) approach, the following actions can be taken.

Supporting **biodiversity intactness** requires implementing actions to stop further conversion and deforestation (AR3T Avoid) and lessen negative environmental impacts where these occur (AR3T Reduce). Areas of intact biodiversity, especially those that have been deemed irreplaceable, should be protected from conversion and deforestation. Protection needs to be prioritized in areas where intactness is high, while restoration and regeneration can be implemented over time in areas with lower intactness.

Improving **ecosystem integrity** requires agricultural systems to adopt practices that improve ecosystem function. Agroecological and regenerative agriculture practices are relevant to all natural fibers, whether produced by cropping, grazing, or forestry (AR3T Restore or Regenerate). Restoration and regeneration is a priority for all areas of fiber production, regardless of existing levels of ecosystem integrity, to ensure that ecosystem integrity is maintained where high and improved where lower.

Definitions:

- **Biodiversity intactness:** how intact an ecosystem is in terms of its relative abundance of originally present species or level of human pressures[56]
- **Ecosystem integrity:** an ecosystem's functional capacity to contribute to ecosystem processes in order to produce ecosystem services[57]

There are some opportunities to mitigate the risks outlined above and improve biodiversity through the principles and management practices of regenerative agriculture. These include:

- Avoiding deforestation and conversion of natural ecosystems, such as grasslands and tropical forests.
- A crop production system that uses cover crops, crop rotation, and minimal tilling to produce annual crops. This protects soil, avoids emissions, and sequesters carbon, resulting in healthier systems that will be beneficial to above- and below-ground biodiversity.[58]
- Production management practices that encourage efficient and/or reduced use of synthetic pesticides and fertilizers.
- Water management practices and technologies that improve the efficiency of water resource use, such as irrigation scheduling, crop selection, drip irrigation, sprinklers, using natural water runoff, and sensors that monitor soil moisture and control irrigation systems automatically.[59]
- Adoption of sound grazing practices to encourage ecosystem function and to avoid overgrazing. Several studies have found that grazing within historic native grassland areas with grazing ungulates can have a positive effect on wildlife.[60] These include numerous grassland studies which show that an intermediate level of grazing often results in the highest species diversity, while excessive grazing reduces biodiversity by denuding habitat.[61]
- Livestock management can be used to stimulate soil through hoof action, grazing action, and natural manure application. Studies show that the action of animals walking and grazing on the land benefits the soil by increasing microbial bioactivity and biomass, improving functional diversity, and promoting richer microarthropods and macrofauna communities, compared with study baselines.[62]
- Sustainable forestry practices, which can support forest biodiversity, include avoiding the conversion of native forest ecosystems into plantations, selectively logging within native forests, pruning within plantations, and allowing for natural forest ecosystem processes to occur within plantations.[63]
- For manmade cellulosic fibers (MMCF), solutions include supporting deforestation-free production and systems that preserve all native forests. Supporting recycled MMCF production is also important. This is expected to rise significantly in the coming years thanks to increased investment in research and development.[64]

2.5 Understanding the textile industry's biodiversity footprint

This section builds upon the impacts and dependencies covered in the previous section, to prioritize interventions and resourcing related to biodiversity and understand where fiber and raw material production locations may overlap with priority conservation areas and areas with potential for ecosystem integrity improvement. It provides an overview of some of the different kinds of spatial data that could help inform the development of biodiversity strategies, as well as the later stages of prioritizing action.

> "Around the world we have agricultural operations in unique and complicated landscapes. The challenge is to identify how production can co-exist with nature and biodiversity and bring knowledge areas together so that we can protect what we have and rehabilitate what is needed."

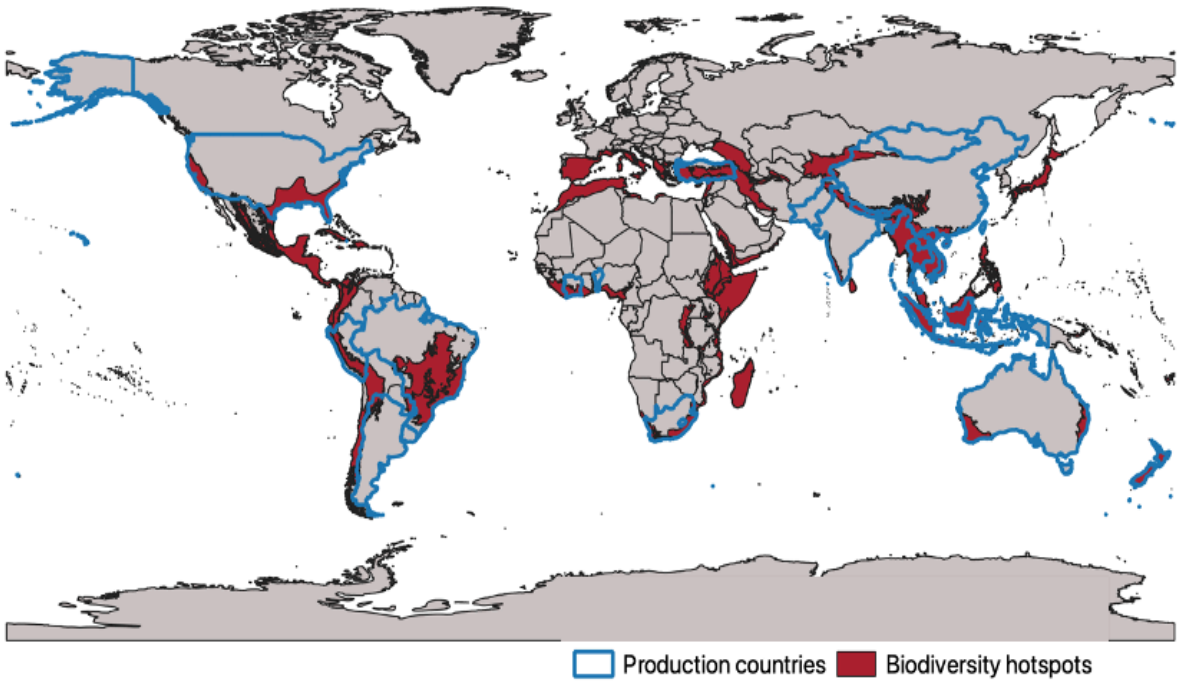
— Colette Glazik - Lewisham Farm

2.5.1 Biodiversity hotspots

There are 36 areas around the world that currently qualify as biodiversity hotpots. These areas are highly threatened, with only a portion of their original ecosystem left. While they only cover about 2.5% of the Earth's terrestrial surface, they are home to more than half the world's plant species and nearly 43% of the world's bird, mammal, reptile, and amphibian species that are endemic, meaning they are found nowhere else on the planet. Conservation International pioneered the definition and the promotion of biodiversity hotspots as a concept, and has since considered the protection of these hotspots as the guiding principle for its investments.[65]

Figure 5 illustrates the overlap between key raw material production countries and biodiversity hotspots around the globe, highlighting priority risk mitigation areas as well as areas of opportunity for implementing regenerative, organic, or other sustainable management practices. When linking these biodiversity hotspots to the indicators of biodiversity intactness and ecosystem integrity, it becomes clear that layers of biodiversity data, like the Conservation International Biodiversity Areas, can help prioritize interventions.

Figure 5: Key sourcing countries (blue boundaries) for a range of materials used within the textile industry, overlaid with biodiversity hotspot areas (red). Cotton, cow leather, and silk data sourced from Textile Exchange (2022) 'Preferred Fiber & Materials Market Report'. Key regions for sheep wool sourced from IWTO (2022) 'Market Information'. Please note that the production countries are crude representations and are used for illustrative purposes only.

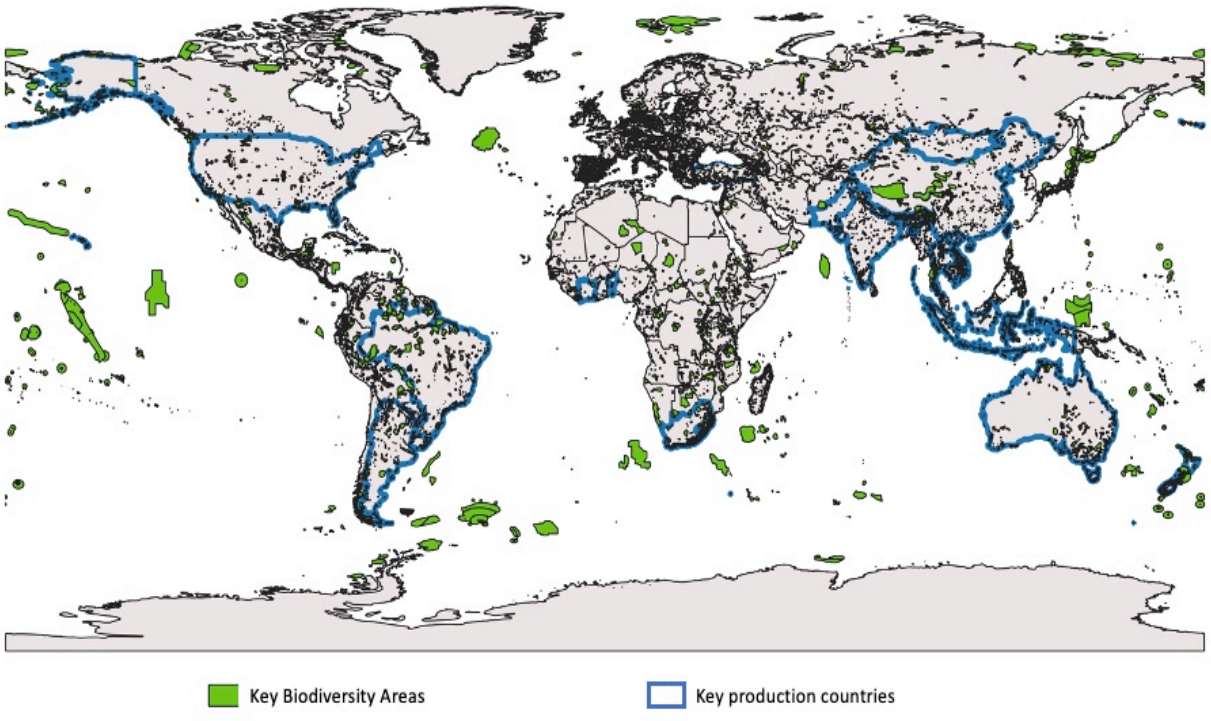


www.cepf.net/our-work/biodiversity-hotspots

2.5.2 Key Biodiversity Areas

Key Biodiversity Areas (KBAs) map the known important places in the world for species and their habitats (Figure 6). The KBA Programme supports the identification, mapping, monitoring, and conservation of KBAs to support the conservation of the most critical sites for nature on the planet.[66] The KBA website includes an interactive map to analyze KBA layers globally.

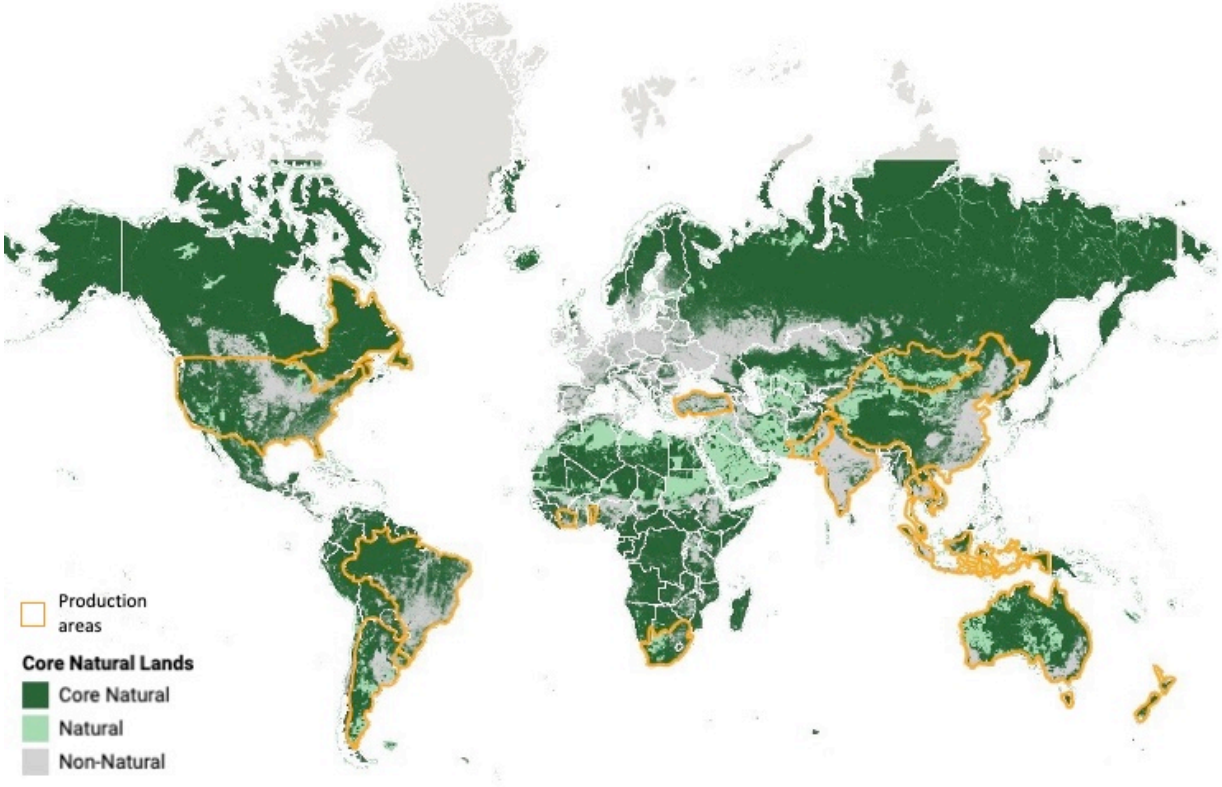
Figure 6: Key Biodiversity Areas and their overlap with key producing countries.



2.5.3 Natural lands

Using the Accountability Framework definition of natural ecosystems, the SBTN Land Hub, in collaboration with World Resources Institute's Land and Carbon Lab, has produced the Natural Lands Map (Figure 7). This map combines the best available global spatial data on land cover/land use and can be used to help companies set their targets for landscape engagement.[67]

Figure 7: The SBTN Natural Lands Map, modified to display the overlap with some of the textile industry's largest production countries (yellow boundary lines). Please note that the production areas are crude representations and are used for illustrative purposes only.



2.5.4 Biodiversity intactness and ecosystem integrity

Many of the industry's production countries overlap with areas of intact biodiversity. Biodiversity intactness, as defined by the Earth Commission, is "the state of an ecosystem being largely unimpaired by post-industrial human alteration."[68] About 49.6% of global ice-free land is considered intact by De Clerck et al., with non-arable lands making up about 38% of intact terrestrial land surface. While these numbers may seem promising, intactness is distributed unequally across ecoregions, and the De Clerck's report emphasizes that protecting this existing intactness is absolutely critical to maintaining ecosystem functions and Earth systems.[69]

Ecosystem integrity refers to the completeness and functionality of an ecosystem and its ecological processes, particularly in relation to its natural state.[70] Analysis of ecosystem integrity is still in its infancy. DeClerck et al. defined lands as having integrity if they have "at least 10% natural or semi-natural habitat per 1 square kilometre". Ecoregions with the lowest levels of integrity are concentrated in areas of the world with the highest populations.[71]

This map created by DeClerck et al. (Figure 8) joins both national and ecoregion boundaries to create 1745 unique country ecoregions for which ecosystem intactness and integrity status measures can be provided against nationally determined contributions, to help set evidence-based targets for nature. This map was proposed to serve as a baseline for the 2020 condition for GBF Goals A and B (see section 2.3).

Figure 8: Key production countries and their overlap with areas of biodiversity intactness and ecosystem integrity. Modified from DeClerck[72] Please note that the production countries are crude representations and are used for illustrative purposes only.

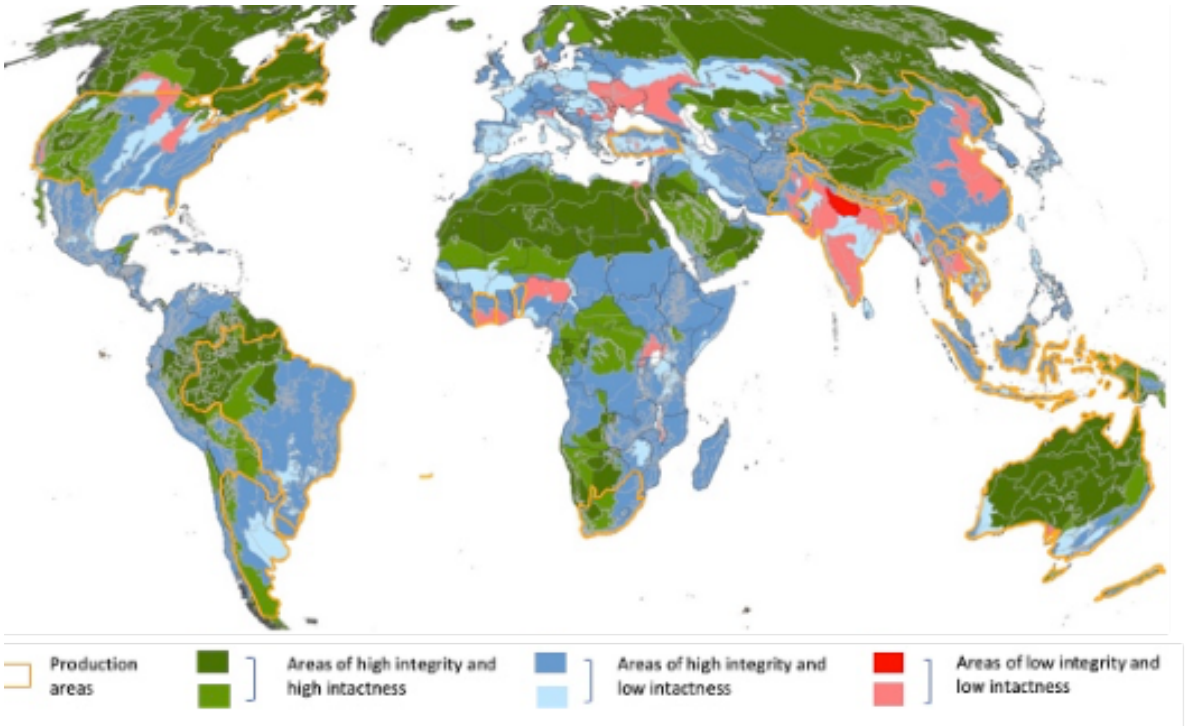


Figure 8 shows that many production countries overlap with areas of high ecosystem integrity and biodiversity intactness represented in this study, as indicated by the dark green areas. While this map does not illustrate detailed areas of production or local ecoregion status, it does show that there are geographies with potential opportunities to avoid negatively impacting areas of high integrity and intactness and promote activities that could generate increased ecosystem integrity. This in turn would have positive implications for biodiversity in places that are of critical importance. However, as with any high-level data, understanding the specific sourcing locations and the local context of textile raw material production will lead to more accurate interventions and optimal outcomes for both agricultural producers and nature.

Ultimately, De Clerck's study on biodiversity intactness and ecosystem integrity highlight the importance of setting bold targets to protect current biodiversity intact lands. It also shows that continuing the current loss of intactness and integrity will compromise the resilience of our biosphere. Avoiding loss of currently intact lands should be the first step, followed by restoring intactness and regenerating integrity through practices such as agroecology, regenerative practices, and/or integrated landscape management approaches.[73]

2.6 Drivers of biodiversity action: risks and opportunities

2.6.1 Risks

Section 2.4 of this report provided an overview of the biodiversity impacts, dependencies, and risks related to raw material extraction and initial production stages.

The following section provides an overview of the key risks that are driving action on biodiversity in the textile industry. Further details are available in Appendix A.

Material risk is typically understood to be the risks that management recognizes as having potential or real impacts on the company's business performance. Several types of biodiversity risks are important for textile companies to consider, including:

- **Physical risk** (e.g., reduced productivity, resource scarcity, operational and supply chain disruptions)
- **Market risk** (e.g., consumer preferences, buyer requirements)
- **Reputational risk** (e.g., association with damaging activities, maintaining 'social license to operate')
- **Regulatory/legal risk** (e.g., restricted access, litigation, market rules)

These risks—and motivations for companies to engage with the topic of biodiversity—are further detailed in the report Developing a Corporate Biodiversity Strategy: A primer for the fashion industry, published in January 2020 by Biodiversify and the University of Cambridge Institute for Sustainability Leadership and supported by Kering.

Interviews conducted for this report found the following related to risks and motivations:

- Farmers, according to some interviewees, were taking action for nature because they felt a **sense of responsibility** to do so, with some reporting new expectations among consumers—notably, younger generations—as a driving factor.

- Farmers and suppliers reported being driven by the growing **demands of brands** to meet certain sustainability requirements. Currently, the drive from brands is still specific to climate change, according to farmers, with little focus on issues surrounding biodiversity.

- Although there were some mentions of regional policy movements that are related directly to nature, such as soil conservation laws in Uruguay providing a baseline movement for action among farmers, interviewees reported **little regulatory drive and few policies directly linked to biodiversity** and the fashion industry at the farm level.

- The **environmental drivers for farmers were reported to be unique to each farm** and the local landscape. For example, one farmer may have been negatively impacted by drought and has therefore focused on water management, while another farmer in a different watershed has focused on soil health to address depleted soil nutrients. From those interviewed, the farmer's personal economic situation was also a driving factor in changing management practices.

- Supplier groups (raw material aggregators and brokers) reported that farmers were finding that they would **lose out on market opportunities** if they could not provide sustainable materials. This was driving many of them to change their farming practices. However, it was often found that farmers were changing management styles at a short-term economic loss due to the lack of premiums paid for shifts in practices at the farm level.

- Larger companies are viewing the **increase in biodiversity-related regulations** as a driving factor for taking action.

    - While stakeholders working across textile supply chains generally support regulatory developments for biodiversity, there are concerns about the feasibility of implementation within the proposed time frames. For example, EU Deforestation Regulation requires full traceability of certain complex and historically opaque supply chains, like leather, by 2025. Striking the right balance to ensure that policies remain both aspirational and realistic will be critical for the textile industry.

    - There is also some worry about how new policies mentioned above will impact farmers and growers. While regulation can play a key role by providing a baseline for action and helping to drive change, any new requirements must be coupled with resources to support farmers (especially smallholders and those from marginalized communities) in their efforts to comply.

Deep-dive spotlight: regulatory risks

The issue of regulatory risk merits further discussion, given the rapid and ongoing evolution of biodiversity- and nature-related policy requirements in recent years.[74] [75]

Private-sector action will be pivotal to reversing biodiversity and nature loss, according to numerous reports. For this reason, there is a growing shift to include the private sector in regulatory action to protect and restore biodiversity—as evidenced by the rise of private sector-specific targets that came out of COP15 in 2022.

Within the European Union (EU), several key biodiversity-related policy files are emerging:

- **The EU Corporate Sustainability Reporting Directive (CSRD)** requires all large and listed companies to publish regular reports on their social and environmental risks and impacts. The CSRD will require companies to assess their material impacts and dependencies based on geographic locations and the raw materials they use. This law aims to facilitate investors', consumers', and other stakeholders' understanding of a company's sustainability performance. The first companies will have to apply these new rules in the 2024 financial year, for reports published in 2025. Reporting requirements for environmental, social, and governance topics are set out in the European Sustainability Reporting Standards (ESRS), **which addresses** biodiversity in ESRS4 (currently in draft form).
- **The EU Deforestation Regulation (EUDR)** will ban the import of certain products into the EU if they are linked to deforestation anywhere in the world.[76] Following an anticipated transition period of 18 months, as of 2025, several raw materials important to the textile industry will be included in the scope of the EUDR, including leather and rubber.[77] The aim of this regulation is to halt global deforestation and forest degradation, while reducing greenhouse gas emissions and biodiversity loss.[78] Initially, the law will only apply to large and medium-sized companies but will be extended to smaller companies in the future.
- Several other EU policy initiatives are also relevant to biodiversity, including the Biodiversity and Forests strategies for 2030, the Farm to Fork strategy, and other policy proposals related to nature restoration and pesticide use.

There are also interesting policy and regulatory developments in other jurisdictions, such as the National Agriculture Traceability Grant Program - Sustainability Reporting Uplift Grant Round, which supports Australian farmers in establishing provable sustainable product claims for key export markets.

2.6.2 Targets, reporting, and disclosure requirements

Recent years have seen the accelerated development of several non-regulatory frameworks for biodiversity, including Science Based Targets for Nature (SBTs for Nature) and the Taskforce for Nature-related Financial Disclosures (TNFD).

2.6.2.1 Taskforce for Nature-related Financial Disclosures

TNFD is a voluntary, market-based reporting framework for corporations and financial institutions to disclose and act upon nature-related impacts, dependencies, risks, and opportunities. The aim of TNFD is to support the shift of global financial flows (e.g., investment, lending) away from 'nature-negative outcomes' and towards 'nature positive outcomes'.[79] TNFD provides guidance for corporates and financial institutions to incorporate a nature-related risk and opportunity assessment into company strategy and risk management processes, with the final aim of reporting and disclosure to stakeholders.

As of the writing of this report, TNFD has released draft guidance for four sectors, including agriculture, with guidance for the apparel, accessories, and footwear sector scheduled to be released in September 2023. The latest TNFD guidance draft outlines an approach to disclosure metrics that draws heavily from existing standards and aims to standardize metrics across sectors where possible, while also allowing for sector-specific metrics where needed.

TNFD encourages use of its Locate Evaluate Assess Prepare (LEAP) framework for action on risk management and disclosure. More details about this framework can be found in section 3.3.1 below.

2.6.2.2 Science-Based Targets for Nature (SBTs for Nature)

The SBTs for Nature framework, which is being developed by the Science Based Targets Network (SBTN), builds upon the Science Based Targets initiative (SBTi), which over 2,253 companies have now committed to using to set greenhouse gas (GHG) emissions reduction targets in line with the Paris Agreement. SBTs for Nature will build upon the success of the original Science Based Targets, expanding to four additional nature-related impact areas: land, freshwater, biodiversity, and oceans.

SBTs for Nature aims to provide cross-industry alignment on nature-related target-setting and impact measurement methodologies, in keeping with broader global frameworks such as the Global Biodiversity Framework (GBF).

SBTN has a five-step framework for action on understanding companies' nature-related impacts. More details about this framework can be found in section 3.3.2 below.

Companies and organizations are welcoming efforts to develop clear, science-based guidance for setting biodiversity targets and monitoring progress, with some leading apparel brands already testing and implementing these frameworks. While developing the necessary guidance and methods takes time, and balancing science with supply chain realities and feasibility is challenging, the development of these frameworks signals the increasing importance of setting and achieving biodiversity targets.

Further information and sector-specific guidance on the SBTs for Nature can be found in **Raising the Ambition for Nature: A fashion, textile, and apparel sector primer on the first SBTs for nature** launched in June 2023. The guidance document is a primer for fashion and textile companies to develop targets based on the SBTN framework v1. The guidance provides an overview of SBTN steps for fashion companies and includes a case study for implementing SBTs for Nature within an organization, setting out specific challenges and considerations that are tailored to the fashion and textile industry.

How does SBTN relate to TNFD?[80]

SBTN and TNFD share the same vision: transforming business models for a nature-positive economy, based on the best available science. SBTN is equipping companies with the guidance to set science-based targets for nature. TNFD, meanwhile, is working to create a framework for companies and financial institutions to manage and disclose their nature-related risks. SBTN and TNFD are actively working together (SBTN is one of TNFD's 16 'Knowledge Partners') to ensure alignment on the way nature-related risks are understood, framed, and addressed by companies and financial institutions, so that they can incorporate nature into their decision-making processes in the most impactful and efficient way.

Specifically, the TNFD beta framework has adopted SBTN's definitions of impacts and dependencies on nature, reflecting the foundational and methodological parallels between both initiatives. The critical importance of SBTN's second target-setting step—for companies to prioritize action based on geographic location—is also reflected in the first step of TNFD's framework.

One key output of this collaboration is the joint target-setting guidance developed as part of TNFD's beta release.

Following the first release of SBTs for Nature, SBTN and TNFD will update this guidance to further expand on areas of overlap and difference. The goal is to have an approach that is as integrated as possible, so that companies can set science-based targets through SBTN and manage and disclose nature-related risks through TNFD.

> "Companies shouldn't wait for TNFD and SBTN to be finalized to take action, otherwise they will have a lot to implement".

— Yoann Regent, Kering

2.6.2.3 The Textile Exchange Biodiversity Benchmark

The Textile Exchange Biodiversity Benchmark enables companies to understand their impacts and dependencies on nature in their material sourcing strategies, chart a pathway to delivering positive biodiversity outcomes, and benchmark their progress. First piloted in 2021, the Biodiversity Benchmark has now been integrated into the Material Change Index survey and annual cycle as an optional Impact Module.

A summary of key findings from the Biodiversity Benchmark can be found in section 2.7.3.

2.6.3 Investor pressure

Financial institutions are examining how portfolio companies contribute to biodiversity loss. As financial institutions have begun to recognize the importance of nature in decarbonizing our economy, there has been a notable investment shift into 'Natural Capital' investment.[81] [82] Capital investment is shifting towards more sustainable land management practices used in farming and forestry, which are found to enhance nature's ability to provide natural capital assets and services while also generating a financial return.[83]

> "The investment community are starting to focus on understanding the risk, but also the opportunity for value creation, that is linked to restoring and regenerating biodiversity and nature."

— Dr Helen Crowley, The Pollination Group

2.7 The textile industry is shifting its sustainability focus to nature, including biodiversity

In recent years, the industry has been accelerated along in its biodiversity journey by forward-thinking companies and organizations that recognize the fundamental importance of biodiversity to the supply chains that transform raw materials and fibers into finished products.

> "In the textile and apparel sector, there's actually a fundamental recognition of the issue around scope 3 climate and biodiversity that needs to be dealt with."

— Dr Helen Crowley, Pollination Group

> "We see biodiversity, water, and carbon as interconnected; a joint crisis; one inherently related to the other."

— Gonzalo Pertile, J. Crew / Madewell

2.7.1 Sector collaborations, benchmarking and sector guidance

Building on Textile Exchange's longstanding Materials Benchmark (previously the Corporate Fiber and Materials Benchmark), t**he Biodiversity Benchmark** was developed together with **The Fashion Pact**, a global initiative of companies in the fashion, apparel, and textile industry, under the **Transforming the Fashion Sector with Nature Project**, a two-year project funded by the **Global Environment Facility (GEF)** and co-executed by **Conservation International**, a GEF Agency, and **The Fashion Pact**.

In 2021, informed by the Biodiversity Benchmark and participation of 157 companies, Textile Exchange and The Fashion Pact compiled the **Biodiversity Insights Report** to determine the industry's levels of engagement and effort to tackle biodiversity issues.[84] Over 70% of The Fashion Pact members participated in the first year of the benchmark.

Now, the Biodiversity Benchmark is fully integrated into the **Materials Benchmark** and companies can provide information on their biodiversity-related activities annually as part of the full benchmark program, to understand their impacts and dependencies in material sourcing strategies and benchmark progress on their biodiversity journey.

In collaboration with the Biodiversity Consultancy and United Nations Environment Program-World Conservation Monitoring Centre, and as part of a project co-executed with Conservation International and funded by the GEF, The Fashion Pact released its **Biodiversity Strategy Tool Navigator** to support companies through the stages of developing a biodiversity strategy in alignment with the Science Based Targets Network and provide an overview of the tools that can help them during the process.

As part of the same project, The Fashion Pact and Conservation International have also released **Deep Dive Analyses** that road-test SBTN metrics on real supply chain data from The Fashion Pact members in key geographies, focusing on commodities with high production impacts including cotton in the United States, cattle leather in Argentina, and wood pulp for manmade cellulosic fibers in Austria and Indonesia. These reports support the scientific advancement of metrics and methods and provide insights for companies looking to set science-based targets for nature and identify opportunities to strengthen actions and investments in biodiversity and nature-positive outcomes.

Many organizations in the textile industry are also actively participating in wider collaborative industry initiatives, such as:

- The Circular Bioeconomy Alliance, which aims to accelerate the transition to a circular bioeconomy that is climate-neutral, inclusive, and prospers in harmony with nature.
- Business for Nature, which is a global coalition that brings together businesses, conservation organizations, and forward-thinking companies to demonstrate exemplary business leadership on nature. (More information on the Business for Nature action framework can be found in section 3.)

2.7.3 State of the sector

These tools and their use by companies signal much-needed shifts towards better outcomes for biodiversity in the textile industry. However, the pace of change driving biodiversity action is not fast enough. Many companies are still focused solely on climate, demonstrating 'carbon tunnel vision' (Figure 9), rather than a more holistic approach to strategy-setting and action.

2.7.3.1 Key Findings from the 2022 Materials Benchmark

Benchmarking helps to identify where and how individual companies and the sector as a whole can contribute to sustainability. It can also be an effective tool for engaging companies and encouraging a 'race to the top' mentality. The Benchmark provides a good indication of the sector's progress in relation to biodiversity, but it is important to note that the results reflect participating companies and are therefore not representative of the industry as a whole.

Governance

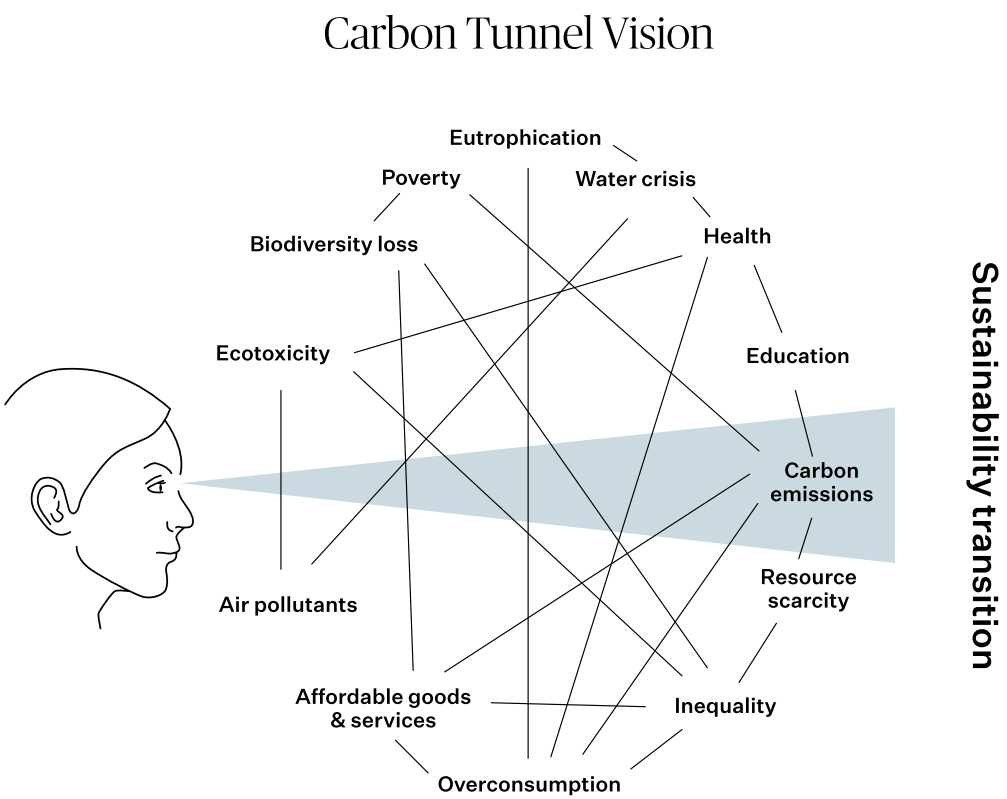


Figure 9: Visual representation of carbon tunnel vision by Jan Konietzko

67% of companies have identified a person or team to hold accountability for the company's biodiversity activities. Encouragingly, 67% are allocating resources to biodiversity and building staff capacity, mostly through awareness-raising and training.

Strategy

The number of companies taking action through strategic development and target-setting has seen a 250% increase in just two years. In 2020, 59% of companies had public commitments (now 67%) but only 8% had biodiversity strategies. Now, that proportion stands at 28%.

Corporate reporting

Disclosure and public reporting are seen by many organizations as important for mobilizing resources towards implementation. In the last two years, the proportion of companies reporting on biodiversity has gone from 10% to 27%. Of the companies already reporting on biodiversity, 15% have their information assured by a third party.

Materiality

For the Materials Benchmark, materiality has focused on companies' assessment of risk, including the incorporation of stakeholder perceptions and input. Approximately one-third (32%) of companies have carried out a biodiversity assessment (qualitative and/or quantitative), and an equal share (32%) have incorporated stakeholder consultations into their biodiversity materiality assessments.

Implementation

The Biodiversity Benchmark uses the AR3T Action Framework from the Science Based Targets Network to assess companies' internal implementation measures. Per the approach taken by the Science Based Targets Network, this framework is not meant to be prescriptive.

Avoid/reduce: 56% of companies are avoiding materials and production techniques that create harm, 88% are reducing impact through, for example, use of recycled and certified materials with sustainability requirements, and 77% are reducing impact through good environmental management of chemicals, water, energy, etc., at the factory level.

Restore/regenerate: 37% of companies have started investing in restorative and/or regenerative activities both within and beyond their own supply networks.

Transformation: 54% of companies are coming together to think and take holistic action on nature-related issues, such as engaging and collaborating with industry initiatives that aim to achieve sector-wide change.

3. Taking action for biodiversity

How can the textile industry take these definitions, concepts, and tools and apply them to achieve positive biodiversity outcomes?

3.1 Getting started: types of action

The Science Based Targets Network has categorized the types of actions that fashion, apparel, and textile companies can take for biodiversity (Figure 10):

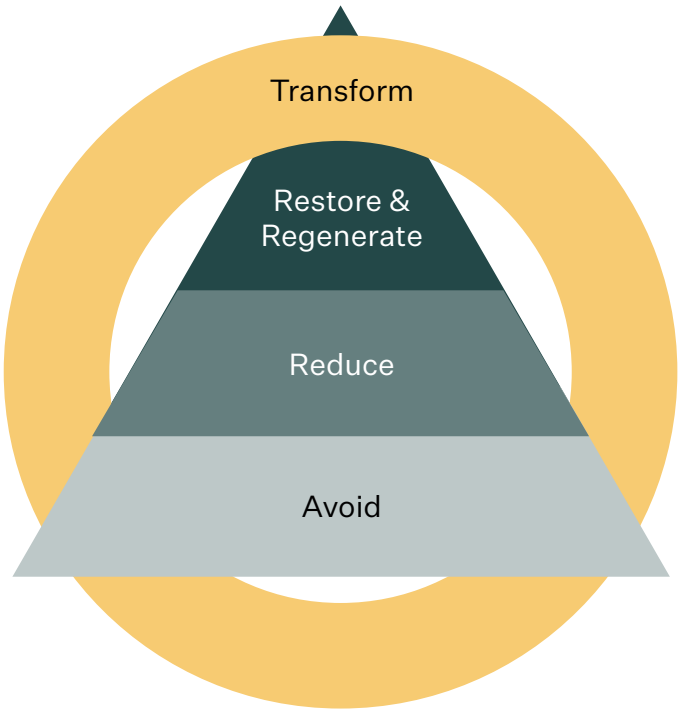
1) **Avoid** and **Reduce** the pressures causing nature loss that would otherwise continue to grow.

2) **Restore** and **Regenerate** so that the state of nature (e.g., the extent and integrity of ecosystems and species extinction risk) can recover.

3) **Transform** underlying systems, at multiple levels, to address the drivers of nature loss.

See step three of the biodiversity journey section below for more detail on the actions companies can take.

Figure 10: SBTN framework for action, also known as AR3T.



3.2 Getting started: guiding principles for action

Guiding principles provide a foundation for how a company will proceed with its biodiversity strategy and implementation. These are rooted in a company's motivations and values. It is important to articulate these principles early on, as they help a company decide how to focus its biodiversity strategy, plan, and actions. How exactly a company translates guiding principles into action will vary, but it is important to consider and align on shared motivations, values, and audiences for biodiversity action. Examples of guiding principles may include:

- Holistic approaches: the synergistic relationship between climate, water, circularity, and biodiversity must be recognized.
- Precautionary Principle: proactively encouraging action, even in the face of uncertainty, complexity, higher cost, or data gaps.
- Prioritization: prioritize action in order to enable rapid and impactful biodiversity interventions.
- Appropriate Resourcing: allocate time and money to take action where it counts for biodiversity—at the local level.
- Collaborative Action: work together, share resources, and learn from others' successes and failures. This is key to moving the fashion industry forward on biodiversity matters.

Spotlight on holistic approaches

Interviewees recognized the synergistic relationship between climate, water, circularity, nature, land, and biodiversity. Taking a holistic approach and understanding that biodiversity is deeply connected to—and influences—healthy ecosystems is vital for driving positive impact.

> "Humans often think we can solve things with technology rather than nature. Nature has had 3 billion years of R&D and offers some well-tested and proven solutions!"

— Dr. Helen Crowley, The Pollination Group

Nature-based Solutions

One holistic approach involves Nature-based Solutions (NbS), a concept popularized 20 years ago by the International Union for Conservation of Nature (IUCN) to address both environmental and human-related challenges at the same time.[85] The precise definition and understanding of NbS differs depending on the field and setting in which it is being used.[86] For example, the term 'nature-based solutions' is often used to describe large-scale tree-planting for carbon offsetting projects as well as grassroots-driven restoration of damaged coastal ecosystems. There is movement to develop an NbS standard that provides clarity and precision around what it entails and the requirements for success (see IUCN, Global Standard for Nature-Based Solutions). Estimates suggest that NbS can provide 37% of the mitigation needed by 2030 to achieve the climate targets of the Paris Agreement.[87]

Examples of companies adopting a holistic nature-based solutions approach include:

- **Burberry:** Recognizing that climate and nature are interconnected and require offsetting projects that do not deliver poor biodiversity outcomes, Burberry has partnered with The Biodiversity Consultancy to develop the Nature Based Solution Principles and Guidelines, which it will apply to projects funded via Burberry's Regeneration Fund.[88]
- **Kering**: **Kering's** work restoring gold mining sites in French Guiana is one example of **its** NbS work.[89] This project sets out to restore 100% of the mines' land, making it the first full reforestation program of a mining site in the Amazon. The project began with planting 90,000 seedlings, with high nitrogen-fixing species prioritized to act as 'pioneer species' in the 116-hectare plot. The company says that the system is currently thriving, with on-the-ground partners frequently monitoring soil and tree health as well as plant diversity. This project is an example of how a brand has prioritized not only carbon sequestration, but also local biodiversity.

Regenerative agriculture

Regenerative agriculture is another holistic approach that addresses both social and environmental challenges together. While there is no standardized definition of regenerative agriculture, Textile Exchange takes the view that the concept includes the following:[90]

- A view of agriculture that aligns with natural systems, recognizing the value and resilience of interconnected and mutually beneficial ecosystems versus. extractive agriculture systems.
- An acknowledgement that this is not a new concept—Indigenous and Native peoples have been employing many of the approaches and practices now referred to as "regenerative agriculture" to grow food and fibers for centuries—and that regenerative agriculture must include a focus on social justice.
- A holistic, place-based, outcome-focused systems approach, not a one-size-fits-all checklist of practices.

Research suggests that common principles and practices associated with regenerative agriculture have the potential to not only reverse biodiversity loss but also encourage biodiversity gains and improve ecosystem integrity.[91] These include:

- The adoption of soil health-building practices, which improve soil biodiversity, structure, function, and water infiltration potential;
- The promotion of vegetative cover and improved vegetative species diversity to not only promote diverse species interactions and services, but also improve the capacity for carbon sequestration;
- A reduction in synthetic/artificial inputs, made possible by farming that aims to improve ecosystem function and biodiversity, which, in turn, can unlock ecosystem services and financially benefit farmers over time; and,
- The integration of livestock to mimic natural herbivory pressures that drive ecosystem function.

There are many examples of companies using regenerative agriculture approaches. The case study section of this report includes one that demonstrates how brands can work with partners and farmers to promote regenerative agriculture in areas that have been identified as important for biodiversity.

The Regenerative Agriculture Landscape Analysis report provides additional case studies demonstrating how brands are supporting the adoption of regenerative agriculture, such as the J.Crew/Madewell partnership with cotton-growers in Texas.

Textile Exchange has also developed a Regenerative Outcome Framework (Launched in July 2023) to harmonize the industry around a set of key outcomes (including biodiversity) to measure improvement within regenerative systems.

3.3 Key biodiversity action frameworks

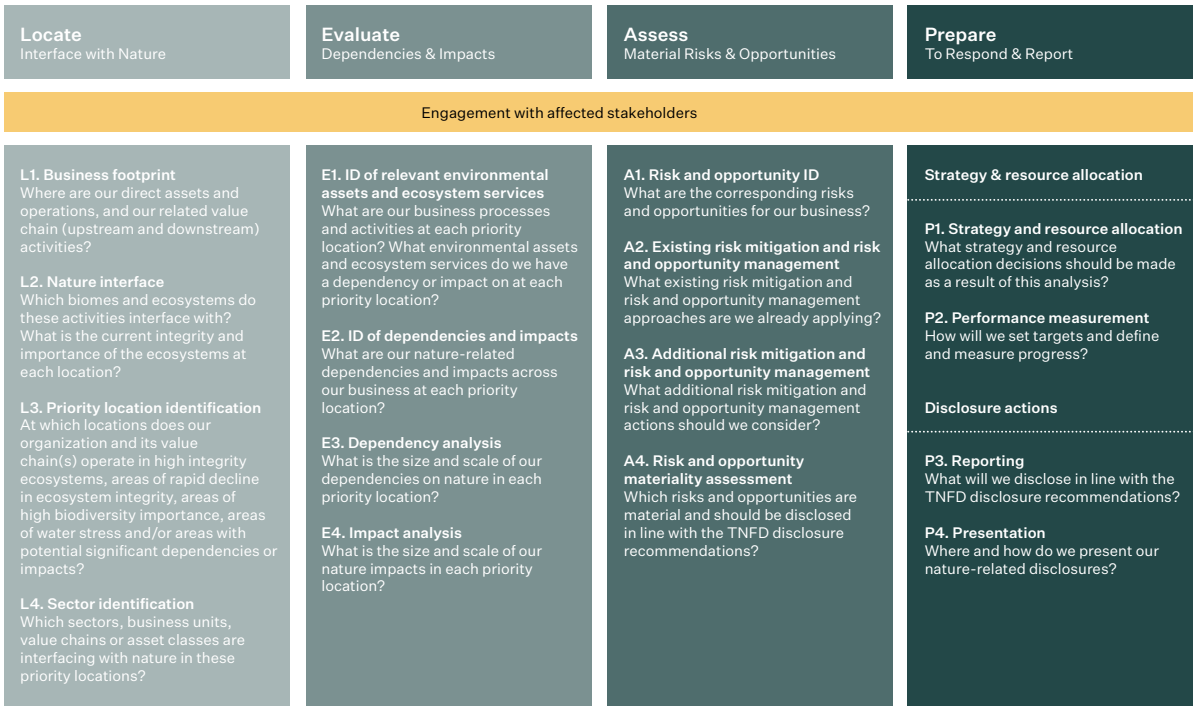
This report focuses on two frameworks for taking action: the TNFD and the SBTN. While TNFD focuses i on disclosure and SBTN on target-setting, both frameworks complement each other and, crucially, provide helpful processes to navigate biodiversity action in a corporate context.

3.3.1 The TNFD LEAP approach for action:

Risk and opportunity management of nature-related issues

TNFD's recommended Locate, Evaluate, Assess, Prepare (LEAP) approach (See Figure 11) is the framework's integrated assessment process for nature-related risk and opportunity management. The final draft was released in March 2023,[92] with a final release planned for September 2023.[93] By aligning with the LEAP approach, some fashion brands are beginning their journey towards understanding their relationship with nature and disclosing nature-related risks.

Figure 11: The Taskforce on Nature-related Financial Disclosure's (TNFD) LEAP approach to assessing nature-related risk and opportunity.

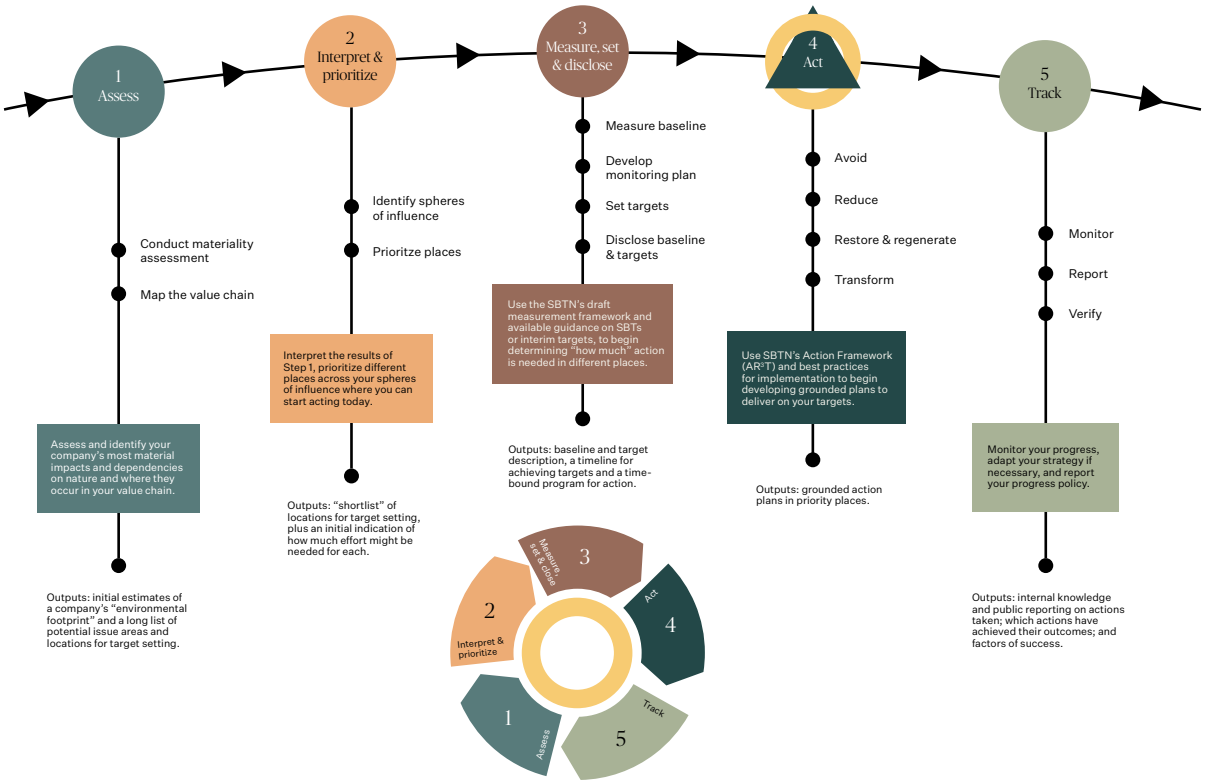


3.3.2 The SBTN five-step approach for action:

Understanding environmental issues to inform setting and tracking nature-related targets

SBTN has determined how companies can act through a five-step process (Figure 12), which is supplemented by detailed technical guidance. All companies can now access guidance documents for Steps 1 and 2, with peer-reviewed versions of the documents published in May 2023. For Step 3, there is peer-reviewed guidance available on target-setting for Freshwater and Land, published in May 2023 (Freshwater V1, Land 0.3 beta version). SBTN is currently working on methods for the remaining focus areas, with Steps 4 and 5 expected in the coming months.

Figure 12: The five-step process of the SBTN Framework



3.4 The biodiversity journey

While it is important to identify co-benefits across sustainability areas, it is also critical to prioritize biodiversity in its own right. Biodiversity is an essential pillar of the sustainability agenda and requires a targeted and customized strategy and framework for action. This section outlines the general steps that organizations in the textile industry can take to get started or deepen their action on biodiversity.

There are many robust biodiversity frameworks and pathways for taking action, such as those mentioned in the previous section. Table 3 seeks to highlight common steps among the frameworks in a company's biodiversity journey. Each step includes a description, important considerations, barriers and enablers, and resources for seeking additional information.

Important notes:

- The biodiversity journey outlined in Table 3 is **not** a new framework. The intent of this table is to provide clarity on the commonalities among existing frameworks.
- There is more than one way to approach biodiversity, and not all steps of the biodiversity journey may be completed in succession.
- In many cases, a company may already be taking certain steps in the biodiversity journey.

Figure 13: Important steps in a company's biodiversity journey

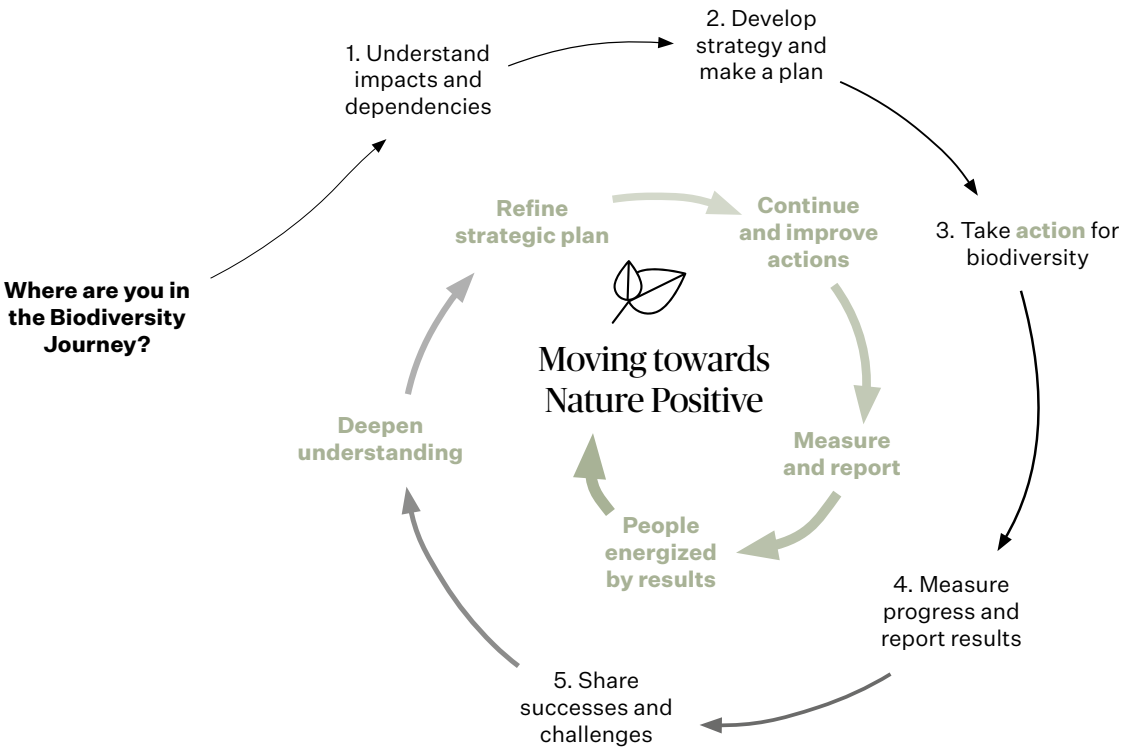


Table 3: Comparative table of features in the general biodiversity journey articulated in this report and several global biodiversity frameworks

Step on the biodiversity journey	Science-based Targets for Nature	Taskforce on Nature-related Financial Disclosures	Business for Nature
	Initial Guidance for Business	Nature-related Risk and Opportunity Management and Disclosure Framework (Beta v0.3 Summary)	High-level Business Actions on Nature
 Understand impacts and dependencies	**Step 1: Assess** • Conduct Materiality Assessment • Map the Value Chain	**Locate: Interface with Nature** • L1 Business footprint • L2 Nature interface • L3 Priority location identification • L4 Sector identification **Evaluate: Dependencies & Impacts** • E1 ID of relevant environmental assets and ecosystem services • E2 ID of dependencies and impacts • E3 Dependency analysis • E4 Impact analysis **Assess: Material Risks & Opportunities** • A1 Risk and opportunity ID • A2 Existing risk mitigation and risk and opportunity management	**Assess** • Conduct an initial materiality assessment to prioritize efforts • Measure and value impacts and dependencies on nature • Evaluate business risks and opportunities • Expand your assessment to include nature, climate, and people
 Develop strategy and make a plan	**Step 2: Interpret & Prioritize** • Identify Spheres of Influence • Prioritize Places	**Assess: Material Risks & Opportunities** • A3 Additional risk mitigation and risk and opportunity management • A4 Risk and opportunity materiality assessment **Prepare: To Respond and Report** • P1 Strategy and resource allocation	**Assess** • Conduct an initial materiality assessment to prioritize efforts • Measure and value impacts and dependencies on nature • Evaluate business risks and opportunities • Expand your assessment to include nature, climate, and people
 Take action for biodiversity	**Step 4: Act** • Avoid • Reduce • Restore & Regenerate • Transform		**Transform** • Avoid and reduce • Regenerate and restore • Shift business strategy and models • Collaborate with your value chains at the landscape-level • Advocate for ambitious government policies that will scale and speed up further positive business action
 Measure progress and report results	**Step 3: Measure, Set & Disclose** • Measure baseline • Develop Monitoring Plan • Set Targets • Disclose Baseline & Target	**Prepare: To Respond and Report** • P2 Performance measurement • P3 Reporting • P4 Presentation	**Disclose** • Monitor your progress regularly • Report progress made towards nature positive goals and communicate findings with key stakeholders throughout the process • Seek out independent validation of processes and verification to enhance credibility of actions • Align reporting with major reporting standards
 Share successes and challenges	**Step 5: Track** • Monitor • Report • Verify	• Stakeholder, including rights-holder, engagement (in line with TNFD Disclosure Recommendations	**Commit** • Make commitments • Set targets

3.4.1 Step one: Understand your impacts and dependencies on biodiversity

Step on the biodiversity journey	Science-based Targets for Nature	Taskforce on Nature-related Financial Disclosures	Business for Nature
 Understand impacts and dependencies	**Step 1: Assess** • Conduct Materiality Assessment • Map the Value Chain	**Locate: Interface with Nature** • L1 Business footprint • L2 Nature interface • L3 Priority location identification • L4 Sector identification **Evaluate: Dependencies & Impacts** • E1 ID of relevant environmental assets and ecosystem services • E2 ID of dependencies and impacts • E3 Dependency analysis • E4 Impact analysis **Assess: Material Risks & Opportunities** • A1 Risk and opportunity ID • A2 Existing risk mitigation and risk and opportunity management	**Assess** • Conduct an initial materiality assessment to prioritize efforts • Measure and value impacts and dependencies on nature • Evaluate business risks and opportunities • Expand your assessment to include nature, climate, and people

A useful first step is to understand how an organization impacts and depends on biodiversity. This may include a biodiversity risk assessment, an impact assessment, or a materiality assessment. Completing these assessments also helps an organization benchmark its current status and communicate internally about biodiversity. Without understanding how a company's business relates to biodiversity, it is difficult to prioritize action or measure progress. Many organizations take a phased approach to this step. The proportion of participants in Textile Exchange's Biodiversity Benchmark that have conducted a qualitative and/or quantitative biodiversity risk assessment has remained at 34% for both reporting years, with LCA data commonly used to inform the assessment.

Key questions to consider at this stage are:

- What are the main materials used by the organization?
- Where and how are these materials grown or produced?
- What regions or ecosystems does production rely on for materials?
- Is there a relevant certification standard, and how does it address relevant biodiversity risks? Does this align with brand expectations/sourcing policies?

Risk assessment tools and resources

An initial, broad assessment of impacts and dependencies is a great step to help a company understand and communicate about biodiversity.

Section 2.4 of this report provides an overview of general direct and indirect biodiversity impacts, dependencies, and risks for land-based raw material production in the textile sector. Further detail on the full textile fiber and material portfolio can be found in Textile Exchange's Biodiversity Benchmark Companion Guide.

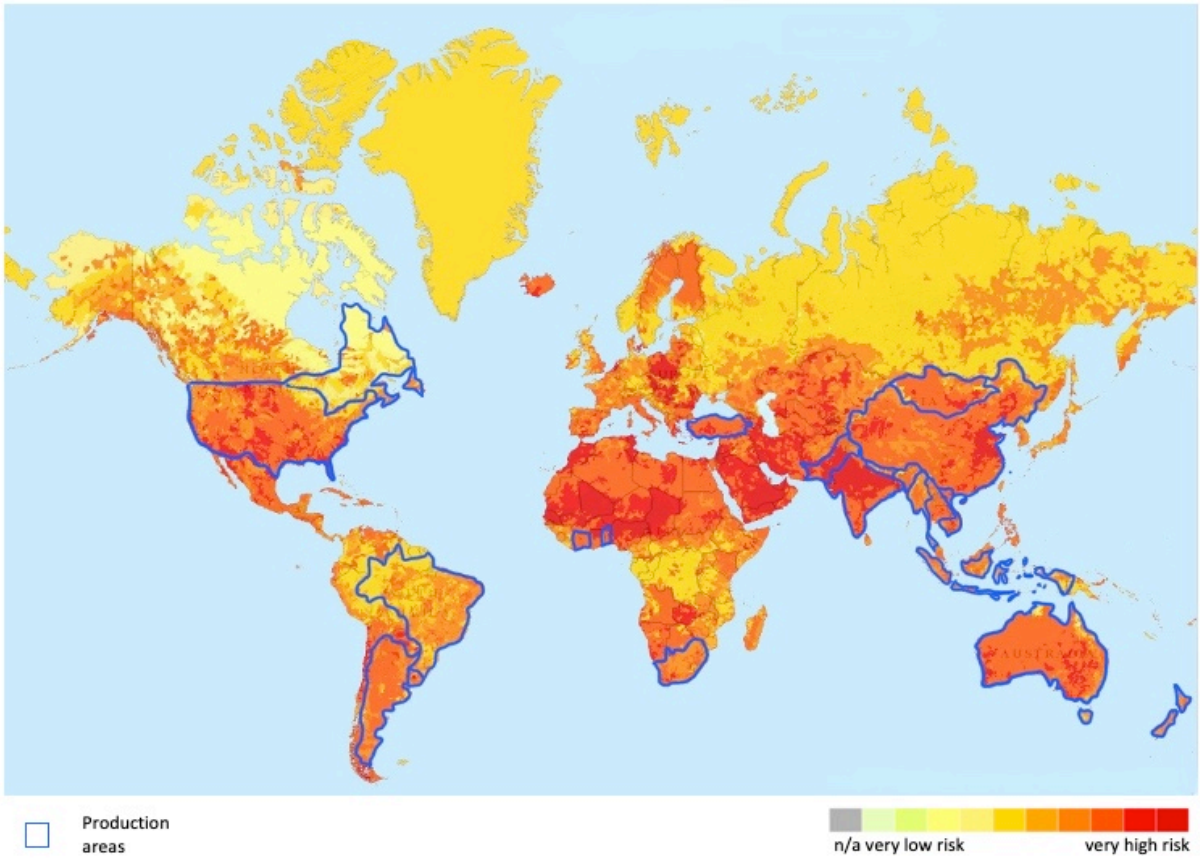
There are a number of tools and resources that can help companies with this step. Below is a non-exhaustive list:

- Textile Exchange's Materials Impact Explorer, which includes risk ratings and suggestions for recommended actions (launching fall 2023)
- Fashion Nature Risk Lens
- WWF Biodiversity Risk Filter
- WWF Water Risk Filter
- Global Forest Watch
- IBAT - Integrated Biodiversity Assessment Tool
- ENCORE - Exploring Natural Capital Opportunities, Risks and Exposure

Depending on the specific tool, they include: impacts on and risks to ecosystem conversion (including deforestation), areas of global biodiversity significance (like biodiversity hotspots and/or key biodiversity areas), biodiversity intactness indices, water conservation priority areas (including quality and quantity), high-priority ecosystems, and ecosystem integrity.

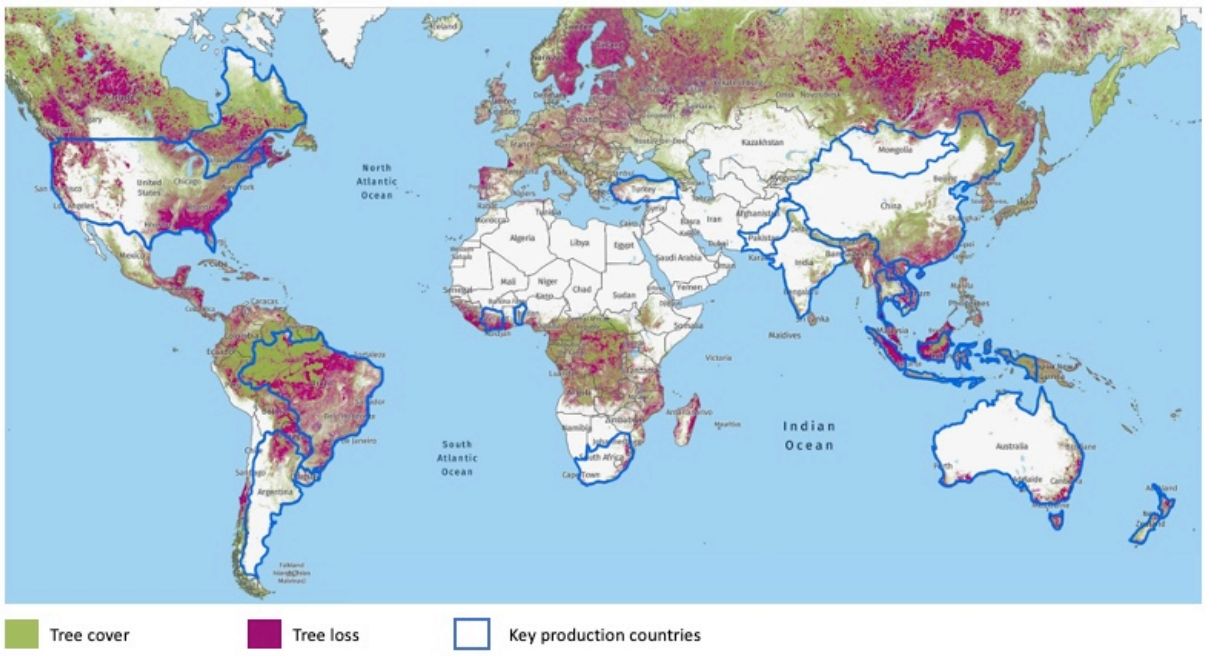
Organizations can use the Textile Exchange Materials Impact Explorer for more detailed insights into the environmental, reputational, and regulatory risks of materials and fibers in their own portfolios across five categories: air pollution, forest, climate, water usage, and biodiversity. The tool utilizes location-specific contexts and environmental risk data to provide users with a risk score for materials and fibers. The Materials Impact Explorer is designed specifically for the textile industry and can be used by brands for a macro analysis of the risks associated with raw material sourcing at the national level. Alongside this, brands can use WWF's Risk Filter Suite for a deeper sub-national analysis of biodiversity and water risks in their supply chains (Figure 14).

Figure 14: Production countries overlaid on the WWF Risk Filter map for biodiversity. Please note that the production areas are crude representations and are used for illustrative purposes only.



Global Forest Watch is a platform that offers up-to-date data, technologies, and tools aimed at empowering people to contribute to forest protection. This includes an interactive map (Figure 15) that has more than 100 global and local datasets (deforestation and biodiversity being two such examples) to assist in identifying risk areas and prioritizing interventions.[94]

Figure 15: Modified from the Global Forest Watch interactive map showing key producing countries in relation to areas of tree cover and tree loss.[95]



Additionally, The Fashion Pact's Biodiversity Strategy Tool Navigator includes a 'Tool Catalogue' of many more resources that can prove helpful at each stage of the biodiversity journey.

Using risk mapping responsibly

Interviewees who had engaged with risk assessment tools lamented the fact that most supply chain processes are rated as high-risk, resulting in an overwhelming 'sea of red'. Most processes employed by the textile industry are resource-intensive, and therefore carry significant risk.

Specifically, from a risk perspective, interviewees commented on the trade-off between continuing work in high-risk zones and shifting to materials sourced from low-risk geographies. In most cases, Textile Exchange encourages brands to work to improve production systems and geographic regions identified as high or very high risk, rather than shifting away from them. The interviews conducted for this report indicated that brands and suppliers want to continue to work in high-risk areas and help improve social and environmental conditions but need the appropriate tools and support to navigate complexities.

> "There's always the risk-benefit issue that you raise awareness and some people will just say, 'the simplest thing to do is to not source from this region,' and that doesn't always give you the right result."

— Anna Heaton, Textile Exchange

> "The fashion industry has two options: we either avoid sourcing from high-risk areas and shift towards low-risk areas completely, or continue sourcing from high-risk areas, but help [with] scaling better practices on the ground and enable a positive impact. To do so, the industry needs tools that help companies [ensure] that we are not contributing to any deforestation, while supporting and incentivizing farmers to adapt to more responsible practices. This will be key to end deforestation and important for legal frameworks to cover."

— Jennie Granström, H&M Group

There is an opportunity for the textile industry to collaborate throughout the supply chain and work together in higher-risk regions. For example, as part of Conservation International's Regenerative Fund for Nature, Conservation South Africa, with support from Kering, is working in the biodiversity hotspot of the Maloti Drakenberg Mountains over 11,000 hectares of land to enable nine communal grazing associations to implement regenerative agricultural practices.[96] The aim is to simultaneously protect critical biodiversity, improve ecosystem function, enhance livelihood opportunities, and empower women in sheep farming.[97]

A note on life cycle assessments

Many organizations use life cycle assessment methodology (LCA) to evaluate the environmental impacts of their product design and sourcing decisions. While the integration of biodiversity into LCAs has progressed over the last two decades, LCA methodology still lacks the ability to capture most biodiversity impacts.[98] [99] [100]

Ultimately, LCAs are a useful first step to support assessing biodiversity impacts and risks and identifying priorities for further investigation, but should be supplemented with additional, context-specific impact assessments (see the Measure progress and report results step below).

Traceability and supply chain mapping

Understanding biodiversity risk and impact requires supply chain traceability. While full traceability back to the farm level would be ideal, achieving this can be challenging due to data limitations and the complexity of supply chains. Where this is not possible, a good place to start instead would be identifying key sourcing regions and utilizing supply shed and supply chain aggregator models to take on-the-ground action where it matters most for the company.

- **Supply sheds** are defined by the Value Chain Interventions Guidance as "a group of suppliers in a specifically defined geography and/or market (e.g., at a national or sub-national level) providing similar goods and services that can be demonstrated to be associated with the company's value chain."[101]
- **Supply chain aggregators** such as traders, brokers, farm groups, and co-operatives can also play a key role as partners in biodiversity action and facilitate supply shed or landscape-level traceability in situations where full traceability to the farm level is challenging, like in the context of small-scale producers.

Identifying a raw material's country of origin is a good first step towards identifying the relevant supply shed. The Biodiversity Benchmark found that there were varying degrees of traceability back to country of origin across the different materials covered.

The percentage of respondents with traceability to country of origin were as follows:

- Leather 61%
- Wool 45%
- Manmade cellulosic fibers (MMCF) 35%
- Cotton 35%

The survey also found varying degrees of traceability back to some or all sourcing regions or site locations.

The percentage of respondents with traceability to a particular region or site within a country were as follows:

- Cotton 23%
- Leather 19%
- MMCF 15%
- Wool 14%

Country of origin, coupled with available information on biodiversity risks and dependencies in key production geographies, provides a great starting point for brands to take meaningful action whilst working on mapping their supply chains in more detail. An example of an initiative that allows for a supply shed approach is the Deforestation-Free Call to Action for Leather, where brands can set leather sourcing requirements and supply chain targets whilst also making investments and implementing traceability systems.

Finding a good partner for a brand to take action in its supply shed depends on the material and the geography. Textile Exchange's material specific round tables are a good starting point for finding a potential partner, as they bring together a diverse range of stakeholders from different regions and parts of the supply chains. Global associations for different materials, such as the International Cotton Advisory Council or the , are also well-positioned to signpost to relevant national bodies and member organizations (like Cotton Australia for cotton grown in Australia or the Uruguayan Wool Secretariat for wool from Uruguay).

Conservation organizations with extensive networks across many regions, such as Conservation International and the WWF, are also well-positioned to signpost to existing projects that a brand interested in supporting positive action in a particular region could support. Both organizations also partner with companies to assist with risk assessment, target-setting, and on-the-ground implementation of new investments that have material benefits for business and biodiversity. Along with supply chain aggregators, these organizations can be good partners for brands starting to take action in a region whilst they establish a traceable supply chain. Section 3.2.3. provides more details on the role of supply chain aggregators in driving action beyond certification.

It is important to note that, without traceability, there will be limitations to the types of product claims that can be made. However, it is still possible to communicate the action a company is taking, separate from products it sells. See Step five for more information on claims and communication.

Lastly, it is important to consider the benefits of investing and taking action regardless of the level of traceability, as achieving farm-level traceability is going to be a challenge in the case of

aggregated commodities (like cotton and wool). Climate change is also going to shift production, so investing in solutions for positive outcomes now ensures better opportunities for future sourcing.

Place- and context-specific data

Developing a deeper understanding of risk requires place- and context-specific biodiversity data. There are more advanced tools that can help with more detailed assessment (see The Biodiversity Program Matrix). This process often involves developing new data collection processes and bespoke indicators tailored to contextually specific biodiversity. Step four of the biodiversity journey and Appendix C provide more information on collecting biodiversity metrics at tier 4 of the supply chain.

> "Every country has its own characteristics; you cannot write a booklet to apply around the world. Even inside the country, they are all in different situations."

— Pedro Otegui, Lanas Trinidad

> "Success will be location-specific; a blanket approach does not work for agricultural environments. Explore your supply chains, meet the farmers on their land and get your hands on the raw materials. Understand the challenges and decisions farmers need to make to have a real impact in protecting and improving biodiversity in their landscape and support them in making those decisions."

— Colette Glazik, Lewisham Farm

3.4.2 Step two: Develop a strategy and plan

Step on the biodiversity journey	Science-based Targets for Nature	Taskforce on Nature-related Financial Disclosures	Business for Nature
 Develop strategy and make a plan	**Step 2: Interpret & Prioritize** • Identify Spheres of Influence • Prioritize Places	**Assess: Material Risks & Opportunities** • A3 Additional risk mitigation and risk and opportunity management • A4 Risk and opportunity materiality assessment **Prepare: To Respond and Report** • P1 Strategy and resource allocation	**Assess** • Conduct an initial materiality assessment to prioritize efforts • Measure and value impacts and dependencies on nature • Evaluate business risks and opportunities • Expand your assessment to include nature, climate, and people

Developing a strategy and plan for biodiversity is another early stage of the biodiversity journey. A strategy helps to establish and solidify an organization's vision for biodiversity and identify goals and action areas. It helps anchor everyone in the business by ensuring that different departments and individuals are working toward the same vision and goals. This, along with prioritization of action and an iterative approach, are the key elements of a biodiversity strategy.

Elements of a typical strategic framework include:

1. An overarching vision that unites the entire strategy
2. Work pillars to support the vision and organize work across an organization
3. Specific goals to support each work pillar and link with strategic action areas

4. Action areas with detailed plans, key performance indicators, and a delivery roadmap

A biodiversity strategy should be paired with an action plan, which supports the strategy by translating the vision, goals, and objectives into actionable steps that are customized for different areas of a business.

Biodiversify and the University of Cambridge Institute for Sustainability Leadership, with support from Kering, published the report Developing a Corporate Biodiversity Strategy: A primer for the fashion industry in January 2020, to provide guidance for companies.

It covers the following topics:

- How to engage key decision-makers within a company to develop and deliver a biodiversity strategy
- The tools that are available to help facilitate conversations about biodiversity and deliver and develop a biodiversity strategy
- How to structure decision-making processes
- What types of data are required
- How to reach decisions about biodiversity using available data

See also: The Fashion Pact's Biodiversity Strategy Tool Navigator, which includes a 'Tool Catalogue' of many more resources that can be helpful at each stage of the biodiversity journey.

What does this mean for my organization?

Questions to Consider:

- What are your organization's **motivating factors** for taking action on biodiversity?
- How do your **company values** align with biodiversity and sustainability?
- Who are the **key stakeholders** to engage?
- How can you get **internal buy-in** for taking biodiversity action?

Prioritization

Companies can assess their supply chains to see which sourced materials have the largest impact on biodiversity, and subsequently prioritize which actions to take within their supply chains. Interventions can be done simultaneously, and it may be worth splitting actions to reduce or avoid risks as well as further promoting activities that have already been proven to drive positive impact.

Working with biodiversity specialists and experts can help a company link business and materiality risks and build a strategy for taking action. There are also a number of resources designed specifically for this process. For example, SBTN provides detailed step-by-step guidance to support the interpretation and prioritization of biodiversity risks and dependencies as part of the target-setting process, which can be helpful even for companies that are not yet in a position to set SBTs specifically.[102] The network also provides a Referral Program, with contact details for service providers that are members of SBTN's Corporate Engagement Program and can communicate the latest on SBTN's technical developments.

Additional sector-specific guidance on SBTs for Nature can be found in **Raising the Ambition for Nature: A fashion, textile, and apparel sector primer on the first SBTs for nature** launched in June 2023.

> "For us, as a forward-moving company, it is important to understand the importance of biodiversity and the impact it has on our business, so that we can prioritize and focus on those issues that matter most."

— Anneke Keuning, BESTSELLER

Mitigation and Conservation Hierarchy

Many companies have used the Mitigation and Conservation Hierarchy (MCH) as a way to prioritize biodiversity action. The MCH guides users in how to limit their negative impacts on biodiversity and prioritize actions that reduce impacts over those that mitigate or offset risk. The idea is to first avoid and reduce negative impacts on biodiversity, then mitigate and offset the rest. The Science Based Targets Network has built on the MCH and raises the ambition to inspire companies to embrace system-level change.

In 2020, Kering, a luxury fashion and apparel company, released its prioritize actions and focus on its largest environmental impacts. Importantly, Kering keeps this strategy as a 'living document' so that it remains relevant and ambitious. This commitment is clearly demonstrated by the release of the second edition, which reinforced the Deforestation and Conversion-Free Policy.[103]

Internal buy-in

Another crucial step is to actively communicate with the key stakeholders and decision-makers within an organization, to educate them about the importance of biodiversity and ensure buy-in for the strategy. As it begins to understand its biodiversity impacts and dependencies, a company may start with smaller, more tangible projects, enabling employees to see material change and generating support for further, more impactful action. SBTN provides guidance for engaging both internal and external stakeholders.[104]

> "Engage your internal stakeholders once you've identified the key priorities."

— Yoann Regent, Kering

> "It's hard. And it's time-consuming. In a context where we're talking about urgency, there is a trade-off between bringing people along and just getting things done."

— Anonymous insight

Act and adapt

Understanding a company's impacts and dependencies on biodiversity and developing a biodiversity strategy and action plan are both important steps to clarify and prioritize actions across an organization. Being organized and strategic can help keep an organization focused on the most beneficial actions. That said, many organizations get started by simply taking action, learning as they go. This approach can jumpstart an organization's biodiversity journey. As their needs and motivations mature and change, organizations will often circle back on these plans to understand impacts and dependencies and develop a strategy. There are pros and cons to both approaches, but the key point is to get started with what works and build on successes. Some companies will do both in parallel, investing in relevant action while doing the work of understanding the detailed impacts and dependencies, and adapting their approaches iteratively.

> "We can waste a lot of energy and time on 'we haven't thought through this exact detail'."

— Alexandra Perschau, Aid by Trade Foundation

3.4.3 Step three: Take action for biodiversity

Step on the biodiversity journey	Science-based Targets for Nature	Taskforce on Nature-related Financial Disclosures	Business for Nature
Take action for biodiversity	**Step 4: Act** • Avoid • Reduce • Restore & Regenerate • Transform		**Transform** • Avoid and reduce • Regenerate and restore • Shift business strategy and models • Collaborate with your value chains at the landscape-level • Advocate for ambitious government policies that will scale and speed up further positive business action

> "Start somewhere. It won't be perfect, but it will be something. We don't have the luxury of time for climate change or biodiversity, so we need to act now."

— Yoann Regent, Kering

There is little time to delay taking action, however big or small. Companies do not need to have a highly detailed plan, nor do they need to measure every impact. Interviewees from across the industry agree: the time to take action is now.

Figure 16: Interviewee quotes about taking action for biodiversity

"At the end of the day, you have to take action."
— Veronique Rochet

"Not taking action is not an alternative."
— Jennie Granstrom

"Change isn't going to happen overnight."
— Yoann Regent

Taking Action for Biodiversity

"Collaboration is key."
— Aude Vergne

"To take care of the asset is to take care of the family."
— Pedro Otegui

"We don't have to be perfect, let's get started."
— Alexandra Perschau

There are a few broad categories of action that stakeholders in the textile industry can take to benefit biodiversity. The following section will explore a range of actions, from avoiding and reducing negative impacts on biodiversity to regeneration and transformation, followed by general guidance and key considerations for implementing action projects in supply chains.[105]

What does this mean for my organization?

Are you already indirectly acting for biodiversity?

- What sustainability initiatives is your company or organization already doing that benefits biodiversity or reduces negative impacts?
- Although these actions are not the be-all and end-all of action for biodiversity, it is good place to begin to recognize where your organization may already be addressing their impacts on biodiversity.
- The AR3T framework provides a useful structure for mapping existing activity.

For example:

- Setting no conversion of natural ecosystems and no deforestation policies has biodiversity benefits because loss of habitat is the biggest driver of biodiversity impact.
- Improving water quality by restoring local wetlands around wet-processing facilities also benefits biodiversity in aquatic ecosystems.
- Shifting to recycled materials reduces wastes and decreases associated biodiversity risks from raw material sourcing.
- Sourcing certified materials that reduce pollution intensity of production processes are likely to reduce negative impacts on biodiversity on land and in water.

SBTN AR3T Framework: potential textile industry actions

Avoid

One approach is to prevent negative impacts from happening in the first place, therefore eliminating the impact entirely. Avoidance applies to new or potential impacts and can involve categorically excluding particular materials, geographic areas, or ecosystems, or excluding specific impacts by avoiding specific technologies, land management practices or processes. Avoiding certain impacts to biodiversity is critical for several reasons:

- Some impacts are irreversible;
- Some impacts are poorly understood, requiring a precautionary approach;
- In some locations, biodiversity loss must be completely avoided to prevent unacceptable outcomes.

For the textile industry, actions may include avoiding sourcing and/or using the following:

- Fibers and materials from farms associated with deforestation and conversion;
- Animal fibers and materials produced using intensive farming or herding practices and inputs that degrade soils and landscapes;
- Fibers and materials from farms that use lethal wildlife management practices;
- Cotton cultivated using intensive tilling/ploughing and high levels of synthetic inputs, such as broad-spectrum insecticides and nitrogen-based artificial fertilizer;
- Fibers and materials with opaque origins that do not allow for due diligence.

Reduce

This action applies to minimizing—but not necessarily eliminating—existing or known negative impacts. Good practice involves reducing impact to 'As Low as Reasonably Practicable' (ALARP), recognizing that there may be trade-offs between the costs and benefits. Examples of reduction actions include:

- Reducing negative impacts and unsustainable dependencies on land, ecosystems, and natural resources by adopting business models that reduce consumption and/or displace a share of virgin materials sourcing with recycled materials;
- Sourcing fibers and materials from farms certified by standards with biodiversity-beneficial criteria and land management practices;
- Working with suppliers to implement practice changes, such as reducing the number of detrimental inputs or reducing negative impacts on biodiversity, ecosystem function, and habitat connectivity through best-practice land management.

Restore

Restorative actions involve bringing a degraded natural system (like a watershed or grassland) back to a near-original natural permanent condition, or improving its state of integrity. This can include initiating or accelerating recovery, with a focus on permanent changes in state. Restorative actions may include:

- Supporting individual species recovery plans;
- Rehabilitating degraded lands or ecosystems;
- Investing in programs or projects with criteria for (or a focus on) restoring degraded ecosystems on both productive and, where relevant, surrounding "non-productive" (natural) areas;
- Working with local and wider relevant stakeholders to approach activities from a regional or landscape-based perspective.

It is critical to ensure that restoration does not become the sole focus or justify degrading land in the first place. Restoration is often a long-term and resource-heavy activity that very rarely replenishes the value of original ecosystems (and the biodiversity they support) to the same degree.

Regenerate

Regenerative actions are designed to improve the integrity of an ecosystem through the implementation of land management practices that support ecosystem function and the provision of ecosystem services. They are implemented on productive landscapes, with the aim of sustaining or improving biophysical composition and/or ecological function. Examples of these actions include:

- Adopting standards, initiatives, and other programs or projects with criteria aligned with the principles of regenerative agriculture;
- Going beyond certifications to support suppliers' transition to regenerative agriculture practices by investing in technical assistance and infrastructure upgrades;
- Working with local and other stakeholders to approach projects from a regional or landscape-based perspective.

Transform

To ensure system-level change, companies should consider transformative measures within their own organizations, such as shifting business strategies and models within and beyond their own supply chains and leveraging their control and influence in the sector where possible. Example actions include:

- Accelerating whole-industry progress by joining other companies that are making public commitments, investing, and taking action;
- Working with a range of partners within specific landscapes (landscape initiatives).

Enablers that support action

Specialist support

Biodiversity specialists and landscape-focused conservation organizations can help an organization with action-planning and guide action-oriented work with implementation further into the supply chain. To ensure that action is relevant and impactful, in terms of both the particular geographical and material contexts, it is also best to seek out supporting organizations that can provide relevant expertise—either in-house or through local networks. For certified materials or sustainability programs, standards organizations or implementation partners can also help facilitate connections to local groups and partners. See, for example, the case studies of Primark and CottonConnect, and H&M Group and BKB, in Section 5.

The use of voluntary standards for biodiversity action

> "The need for effective mechanisms, such as sustainability standards, that help shift unsustainable production and consumption patterns that are harmful to biodiversity is crucial."

— Elizabeth Maruma Mrema, CBD Executive Secretary[106]

To date, companies have relied on sustainability certifications and standards for much of their sustainable sourcing strategies. Credible standards and certifications offer a mechanism to encourage the adoption of practices that can minimize negative biodiversity impacts and promote beneficial biodiversity outcomes (particularly for managed lands). A UNCTAD review of standards found that many voluntary sustainability standards for agriculture have requirements that are clearly relevant to biodiversity protection, though to date, they have primarily focused on impact avoidance or reduction, rather than beneficial outcomes.[107] Most of the standards reviewed by UNCTAD included requirements prohibiting the conversion of forest to agricultural land, as well as requirements around pesticide use and protecting water from contamination. The review also found that, while most standards contain basic management criteria that can lead to biodiversity protection and require practices that can deliver positive biodiversity impacts, only a small portion contain explicit requirements for restoration activities or biodiversity-related performance.

The current voluntary sustainability standards landscape is therefore hugely varied, both in terms of the level of ambition and requirements set by the standards, and the effectiveness of their implementation. Companies can build on the standards and certifications they have previously incorporated into their sourcing strategies, but they should be aware that most of them do not include the full scope of the Mitigation and Conservation Hierarchy (MCH) or Avoid Reduce, Restore, Regenerate, Transform (AR3T) action framework, and are therefore unlikely to be sufficient for addressing a company's full impact on biodiversity and nature.

> "Biodiversity is incredibly complicated, multi-faceted, and multi-layered. Whilst certifications have a place, there must be allowances for local nuances in regions you are operating [in]."

— Phil Townsend, Primark

Standards organizations are beginning to link practices to outcomes more closely. However, standards are often limited by the level of detail they can provide for land management and biodiversity due to the contextual variability of each unique environment. For this reason, standards have, historically, mostly limited themselves to recognizing the minimum requirements for land management that can be standardized regionally or globally. Many of the standards organizations active in the International Social and Environmental Accreditation and Labelling Alliance (ISEAL)—the global membership organization for voluntary sustainability standards—recognize the importance of biodiversity and are actively working to challenge and strengthen their biodiversity-related criteria, as well as considering how they can support biodiversity action through capacity-building and training (see Appendix B for examples from Better Cotton and CmiA). Standards organizations are also actively exploring opportunities to support the collection and analysis of biodiversity impact data (see Step four: Measuring progress).

Textile Exchange's Preferred Fiber and Material Matrix (PFMM) includes an assessment of what is covered by voluntary standards and certifications used in the textile sector, including insights on biodiversity. The next version of the PFMM is scheduled for release in September 2023.

Sourcing certified materials, certifying supply chains, and implementing chain of custody systems will require different ways of working, as well as potentially longer lead times and additional costs. A large number of resources to support brands in using standards and sourcing certified materials are also available on Textile Exchange's webstite.

Total volumes of raw materials and fibers connected to different certifications can be viewed in Textile Exchange's annual Materials Market Report.

Driving action beyond certification

As voluntary sustainability standards work to become more outcome-oriented and closely linked to avoiding and reducing negative biodiversity impacts, the infrastructure established either by or as a result of voluntary sustainability standards, such as extension service providers or farm group management systems, can provide a foundation for additional site- and landscape-level action. Implementation partners that support the adoption of standards at the field level often already provide extension services, technical support, and capacity-building. This also leaves them well-positioned to be implementation partners for biodiversity action projects at the field level. See the BKB and H&M case study in Section 5 as an example of successful collaboration in the supply chain that used a certification as a starting point to drive action.

Collaboration for action

Collaboration is a key guiding principle for action and was a recurring theme in the interviews conducted for this report. In particular, interviewees mentioned the power of sharing data and the complexity of biodiversity interventions aimed at long-term improvement. In the face of growing urgency, collaboration can speed up biodiversity knowledge-sharing, supply chain adaptations, and on-the-ground interventions for biodiversity.

Interviewees reiterated the importance of getting involved in peer groups and industry collaborations such as those discussed throughout this paper, including The Fashion Pact, Textile Exchange, SBTN and TNFD, Business for Nature, and others.

> "Everything's moving really quickly. There's lots of different ways to tackle this. How can we learn from others so that we can put together a pretty rigorous plan?"

— Amy Low, Piping Hot Future

Biodiversity is place-specific, meaning the industry needs to collaborate across large landscapes if it is going to help supply chain actors work together to optimize biodiversity outcomes. Companies sourcing from the same regions have the opportunity to develop landscape-level approaches. If all companies sourcing materials from a given region pre-competitively invest resources, engage with stakeholder groups and communities on the ground to develop shared biodiversity indicators, and commit to buying materials from the landscape, then farmers and suppliers will receive market signals that encourage them to prioritize biodiversity and nature more deliberately.

> "No one manages landscapes alone. We work in collaboration with a host of partners such as Natural Resource Conservation Service, university extension research teams, and local, district, and federal agencies—all of us on the ground have partners and, together, are invested in the health of the land, inclusive of biodiversity. The trick is, how do we bring our brand partners or our food partners into the existing work so that we don't create a new set of relationships for ranchers to try to manage?"

— Jeanne Carver, Shaniko Wool Company

Voluntary sustainability standards organizations such as Better Cotton, Cotton made in Africa, and Textile Exchange, as well as capacity-building programs and initiatives such as CottonConnect and the Organic Cotton Accelerator, are well-positioned to connect stakeholders and facilitate collaborative action in the landscape. The Textile Exchange Round Table communities are another avenue for connecting different stakeholders to create landscape initiatives. This collaborative landscape approach has demonstrated success in improving both biodiversity and social outcomes (see the Good Growth Company case study in Section 5).

Stakeholder engagement

For the textile industry, collaboration and equal partnership within supply chains is also a critical guiding principle for successful biodiversity initiatives. Brands must center their biodiversity actions around strong **relationships with the farmers, growers, and suppliers in their network. This typically means that** brands will need to engage in a **fundamental traceability exercise (mapping back to its tier-4 farmers and growers) as a critical first step,** in order to build deeper relationships with suppliers and identify those where the company previously lacked visibility.

It is important to consider local stakeholders, cultural values, and the social context for biodiversity action. Biodiversity is just as intertwined with society, culture, and the economy as it is linked to carbon and water. Without full consideration of social and cultural contexts, an intervention may do more harm than good or have unintended consequences. **Participatory consultation with local stakeholders** is an important step in any biodiversity action plan, incorporating local knowledge and experiences in order to increase the likelihood of local stakeholder support and subsequent biodiversity outcomes and benefits.

If biodiversity action involves practice or management changes with short-term negative socio-economic impacts, they need to be mitigated through measures such as incentives and/or financial assurances. A 2020 review of incentive programs found that interventions with short-

term economic benefits have a higher adoption rate by farmers than those that solely deliver ecological benefits.[108]

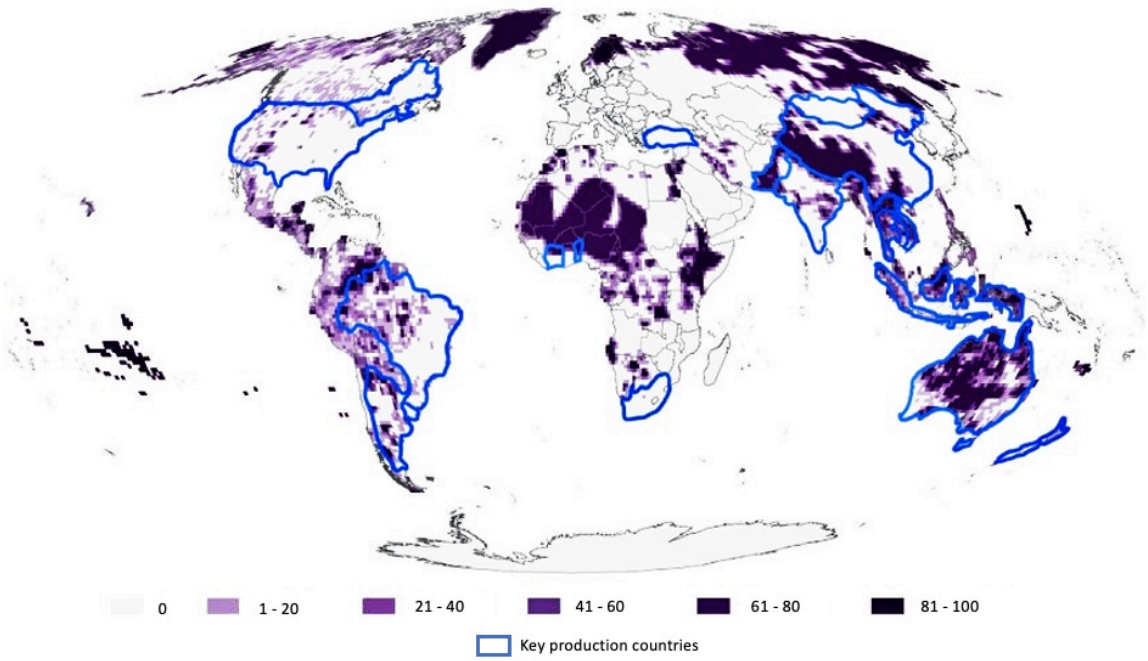
Biodiversity Benchmark:

The 32% of companies that are engaging with stakeholders about biodiversity risks and opportunities are consulting mostly with suppliers, NGOs, and independent experts.

Indigenous knowledge

Indigenous peoples constitute just 6.2% of the world's population, but their lands host 80% of the world's biodiversity (see Figure 17 for global representation).[109] For this reason, Indigenous peoples are a critical stakeholder group in efforts towards positive biodiversity action. Indigenous peoples' traditional knowledge of biodiversity, nature, and ecosystems in local areas has long been intertwined with agricultural practices and management of lands/waters that are in keeping with ecosystem limits.

Figure 17: A global map of Indigenous peoples adapted from Garnet, S et al. to show overlap with key production countries. Mapping here shows the percentage of each degree square mapped as Indigenous. Blank areas do not necessarily mean no Indigenous people operate there, but rather indicate a possible lack of publicly available geo-spatial data.[110] Please note that the production areas are crude representations and are used for illustrative purposes only.



However, according to Textile Exchange's 2022 Materials Benchmark results, only 5% of companies said they are consulting with Indigenous leaders and communities, and 15% are consulting with feedstock producers. Traditional farming knowledge holds significant value and lessons for how to work with nature and its limits, thereby benefiting biodiversity. It is important to understand, however, that many traditional practices have been changed or lost over time due to the development of modern techniques, introduction of commodity markets, and poverty, exclusion, and displacement from ancestral lands. This reinforces the importance of engaging with Indigenous peoples as vital stakeholders and custodians of the land, to facilitate mutual learning and adjust agricultural management to support healthy ecosystem function and thriving communities.

Julian von Bibra, a farmer in Tasmania, has done just that—see the full case study in Section 5.

As set out in the United Nations Declaration of the Rights of Indigenous Peoples (UNDRIP), Indigenous peoples have the right to Free, Prior and Informed Consent (FPIC), which means they can give or withhold consent for a project that may affect them or their territories. Once consent is given, it can be withdrawn at any stage. Additionally, FPIC allows Indigenous peoples to negotiate the conditions under which a project can be implemented, monitored, and evaluated.[111] If organizations take action to embrace and engage Indigenous peoples on biodiversity action, and respect the right to FPIC, they can benefit from increased resilience grounded in traditional knowledge of local biodiversity and ecosystems. These opportunities are as important as ever, as across the globe Indigenous people remain vulnerable to violence, human rights abuses, and the negative impacts of commercial development on their ancestral lands.[112]

The long-term sustainability of biodiversity action

It is widely accepted that improvements to ecosystem integrity and biodiversity intactness—especially in restoration activities and transitions in land use management—take time. There are no quick fixes or silver bullets.

The best way to ensure long-term sustainability is to co-design interventions with farmers and growers, to help ensure successful integration into their business model, land management plan, and day-to-day operations.

If interventions rely solely on specialist input (which comes at an additional and sometimes unfeasible cost), it is very unlikely that they will continue after funding comes to an end. It is important to design scalable, practical, and realistic projects.

3.4.4 Step four: Measure progress and report results

Step on the biodiversity journey	Science-based Targets for Nature	Taskforce on Nature-related Financial Disclosures	Business for Nature
 Measure progress and report results	**Step 3: Measure, Set & Disclose** • Measure baseline • Develop Monitoring Plan • Set Targets • Disclose Baseline & Target	**Prepare: To Respond and Report** • P2 Performance measurement • P3 Reporting • P4 Presentation	**Disclose** • Monitor your progress regularly • Report progress made towards nature positive goals and communicate findings with key stakeholders throughout the process • Seek out independent validation of processes and verification to enhance credibility of actions • Align reporting with major reporting standards

Measuring biodiversity

> " Measuring impacts and outcomes is difficult, as there is no one set of metrics for biodiversity as we have for climate, but being context-specific and taking the time to understand the ecosystem and the landscape in which you work can help you work with local communities and stakeholders to identify outcomes that prove you are having a positive impact."

— Yoann Regent, Kering

Understanding an organization's impacts and dependencies on biodiversity helps to inform which metrics and indicators to use.

The right kind of metric to implement is determined by not only the level of the impact or scale of the landscape under focus, but also the level of claim that can be made from the findings. This can be imagined by an upside-down triangle that shows the typical trade-off between accuracy and resource burden at different monitoring scales.

Figure 18: Varying levels of data collection and analysis

With these limitations in mind, it is important to note that all three scales of focus can be useful, depending on the monitoring and evaluation objectives. More data does not necessarily mean better data, and data collection should be strategic and clearly set out to answer the key questions aligned with a company's needs while avoiding data collection fatigue. Another important consideration is to ensure accurate analysis of the data collected, recognizing and transparently communicating any assumptions or limitations underpinning the chosen metrics (misrepresenting data can also add to an organization's risk). Site-level data is critical to understand impacts, dependencies, risks, and opportunities for biodiversity. This data is also crucial for continuous monitoring and can inform future changes to agricultural practices and biodiversity management.

Biodiversity metrics

There are several species-, land-, or ecosystem-based metrics that can be used to measure progress with on-the-ground biodiversity work. These can be measured directly (site-level) or through secondary data and modeling approaches (regional and global). It is also crucial to measure biodiversity impact in situations where there is a lack of traceability, as well as measuring at scale to track progress against global goals and targets.

This report does not set out to provide an exhaustive or finite list of available metrics or methodologies, but rather highlights a company's need to strategically design monitoring and evaluation systems to accurately track progress against objectives in different contexts. A successful biodiversity and evaluation strategy requires:

- Clear definition of the question/s one is trying to answer;
- Sound selection of available metrics and methodologies to answer these questions;
- Consideration of the accurate scale needed for the purpose (global, national, regional, and/or local);
- Clear understanding of the underlying assumptions in datasets;
- Responsible analysis of data findings;
- Accurate reporting of the findings and how it relates to company strategy.

Appendix C provides examples of approaches for measuring general biodiversity considerations at different scales of application.

Tracking progress against global goals and frameworks

There are numerous reporting frameworks related to biodiversity in the textile industry:

- Science-based Targets for Nature (cross-industry target-setting and progress tracking methodology, in alignment with the GBF)
- Taskforce on Nature-related Financial Disclosures (cross-industry risk reporting and disclosure framework)
- Corporate Disclosure Project (cross-industry reporting framework)
- Textile Exchange Biodiversity Benchmark, in partnership with The Fashion Pact (industry-specific reporting)
- Global Reporting Initiative Biodiversity Standard (cross-industry corporate reporting standard)

Spotlight on GRI Biodiversity Standard
As of June 2023, the Global Reporting Initiative (GRI) Biodiversity Standard is under revision. Proposed changes to the updated standard include:

- Reflect reporting throughout the supply chain, given many biodiversity impacts are found beyond the scope of a company's own operations;
- Help organizations prioritize attention on their most significant impacts, recognizing the challenge of scale in addressing biodiversity impacts;
- Add new disclosures to connect with the drivers of biodiversity loss, including climate change, pollution, and overexploitation of resources;
- Introduce requirements for biodiversity-related human rights impacts, such as impacts on Indigenous peoples, local communities, and workers;
- Emphasize location-specific data, to ensure businesses are transparent about the sites where their biodiversity impacts take place.

Spotlight on: Natural Capital Accounting
Natural capital accounting enables inclusion of nature in decision-making. For most companies, interactions with nature do not affect the market value of said company, nor does nature affect the price of materials or a risk profile. Nature and biodiversity are considered 'externalities', in that these issues are external to the company – the issues are outside day-to-day business operations, management systems, and accounting practices. A natural capital approach seeks to address this by specifically accounting for nature and ecosystem services through monetary valuation process. Given that biodiversity is place/context specific, support for local expertise and implementation should be included as part of the resource allocation processes. Organizations that have adopted a natural capital accounting framework report increased transparency into impacts and dependencies on nature, as well as improved business decision-making. Clearly, natural capital accounting is a powerful framework, and it is highly adaptable.

A regenerative paradigm of data collection

The report 'Methods for Measurement of Regenerative Agriculture in Practice' by the Rockefeller Foundation, Smallholder Data Services, and Terra Genesis (available on request) proposes a regenerative paradigm for data collection, which highlights the principles that should underpin any farm-level data collection.

The key points are as follows:

- Build a community's power and capacity within the global network they are a part of;
- Develop social cohesion amongst community members;
- Support community learning and agency;
- Contribute to a community's ability to achieve locally relevant goals;
- Honor the wisdom of community members, even as/especially when they are from a different culture or worldview than those with more power in the project;
- Enable a community, and the place they are a part of, to evolve over time;
- Focus on communities of people, land stewards, smallholders, and key informants;
- Make smallholder data collectors owners of their data, rather than individuals from whom data is extracted.

Monitoring tools, verification methodologies, demand for data collection, and other aspects may change over time, but what remains consistent is the idea that producers should maintain power and ownership over their data and be compensated for their licensing of it to other users. Data collection can quickly become extractive, and all monitoring, reporting, and verification systems should be designed to uphold the principles outlined above.

3.4.5 Step five: Share successes and challenges

Step on the biodiversity journey	Science-based Targets for Nature	Taskforce on Nature-related Financial Disclosures	Business for Nature
 Share successes and challenges	**Step 5: Track** • Monitor • Report • Verify	• Stakeholder, including rights-holder, engagement (in line with TNFD Disclosure Recommendations	**Commit** • Make commitments • Set targets

This step of the biodiversity journey focuses on sharing information and learning together with peers in the fashion industry. Sector-wide collaborations and collective action networks exist at all levels, from the material-specific, such as the Textile Exchange Material Round Tables, to sector-wide networks such as the Fashion Pact, as well as broader networks such as Business for Nature.

The Sustainable Fashion Communication Playbook, co-published by UNEP and UN Climate Change, provides a shared vision, principles, and guidance on how to align consumer-facing communication across the global fashion industry with sustainability targets.

ISEAL also provides guidance and resources to support standards organizations and companies that source certified materials in making credible sustainability claims.

> "Collective action approaches are powerful in helping the sector have impact and in enabling individual brands to engage and act in a way that helps them build their own knowledge and comfort with new approaches."

— Dr. Helen Crowley, The Pollination Group

> "The really valuable thing outside of our organization is the collaboration with other brands that are working on similar topics. The whole industry needs to make the change together."

— Amy Low, Piping Hot Futures

4. Recommendations and next steps

Below is an outline of the key recommendations for brands as they take action on biodiversity in their sourcing and use of raw materials. The order and priority of these recommendations depend on where a company is in its biodiversity journey. However, it is important for companies to take a holistic approach—both in terms of the type of action (be it biodiversity loss and reduction measures, or restoration and regeneration efforts) as well as the approach, considering both individual and collective action across the supply chain.

Recommendation one: Take a science-based approach to inform decisions

Build a strategy informed by the latest available science on biodiversity, nature, and climate to ensure that your strategy and targets reflect planetary boundaries, align with global biodiversity priorities, and adequately address your company's impact on biodiversity and nature. Aligning with global targets based on the best available science will ensure that investments truly contribute to industry-level and global goals.

At the same time, it is important to recognize that scientific understanding changes almost daily. Educate your internal organization about this reality and set expectations that the strategy may change as the science evolves.

Recommendation two: Recognize the need to act on a landscape level

Recognize that the whole ecosystem's health is important for biodiversity outcomes, and action therefore needs to be taken at a landscape level that considers areas in need of protection, restoration, and regeneration.

The term "biodiversity" is closely linked to the role of land management and soil health in supporting diverse ecosystems. Consider the major drivers of global biodiversity decline and assess your company's current impacts on biodiversity. You should also take into account the wider landscapes where your raw materials are sourced and explore ways to protect, restore, and regenerate them to create a thriving environment for all living things.

This shift requires moving beyond individual species conservation to focus on overall impacts and habitat/landscape management. The primary objective should be preventing further losses of intact natural ecosystems and promoting management practices that enhance ecosystem function, ultimately supporting positive outcomes for biodiversity.

Recommendation three: Accept that there is no one-size-fits-all solution for biodiversity

Accept and understand that there is no single solution available to guide action for biodiversity and no single strategy will be suitable for all materials or regional locations.

With so much regional variability in biodiversity risk and opportunities, strategies need to be carefully structured to align with the size and scope of biodiversity impact in relevant locations. They must also be focused on the most suitable actions to ensure positive outcomes for nature and people, that enable long-term business viability and supply chain security as well.

Make use of tools and resources to map supply chains, develop a deeper understanding of impact, and prioritize action and frameworks for action—such as the Science Based Target Network's Action Framework (AR3T) —to guide your development of strategies and interventions.

Recommendation four: Build strategic collaborations at all levels to enable impact at scale

Embrace collaboration as the key to driving collective action and impact at scale—particularly at the landscape level.

Every company and industry has contributed to the crossing of the planetary boundaries and resultant biodiversity crisis. Similarly, success in reaching positive outcomes for biodiversity cannot be achieved by any one company or organization.

The good news is that there are many stakeholders ready and willing to work together on biodiversity issues. Support local leaders, communities, groups, and markets that possess fundamental knowledge by acknowledging and partnering with their existing work.

Future-proofing supply will also mean taking a multi-faceted approach, supporting action in locations where the need is greatest. This might mean investing strategically outside of your current and existing supply chains, as production geographies will shift due to the changing climate.

As our understanding of the fashion, textile, apparel, and footwear industry's biodiversity footprint advances, more players entering the landscape will create more opportunities to bring stakeholders together to collaborate on landscape-level interventions.

Recommendation five: Take action, monitor, and adapt

Take a continuous improvement approach to your biodiversity strategy.

As our understanding of the biodiversity crisis evolves, so must the way we address it**.** As supply chain data availability and accuracy improves, science advances, and nature evolves and adapts, continued monitoring and evaluation is critical to support adaptive management. While it is also crucial to be honest and transparent about the gaps in data and where assumptions have been made, do not let these shortcomings stand in the way of action.

Next steps

Textile Exchange

Textile Exchange is a global non-profit driving beneficial impact on climate and nature across the fashion, textile and apparel industry. We guide a growing community of brands, manufacturers, and farmers towards more purposeful production, right from the start of the supply chain.

In relation to nature and biodiversity, upon publication of this Biodiversity Landscape Analysis Report, Textile Exchange will take the following actions starting in late 2023:

- Launching a Biodiversity Community of Practice, to convene the industry around shared knowledge, resources, and project opportunities related to the topic of biodiversity. More information can be found on the Textile Exchange Hub, our online community platform.
- Developing and launching sector targets for nature, in alignment with the Global Biodiversity Framework and SBTs for Nature, as part of the Climate+ strategy, which emphasizes a focus on climate and GHG impact reduction while also addressing biodiversity, soil health and freshwater impacts. These targets build upon Textile Exchange's existing 45% greenhouse gas emissions reduction goal for the sector by 2039 related to the pre-spin phase of the supply chain.
- Following the launch of the nature targets, build out a hot-spotting approach to nature related impact data collection, to begin measuring progress.
- Building on the existing Deforestation-Free Call to Action for Leather launched in Spring 2023, develop additional fiber- and geography-specific calls to action and industry challenges, to support the achievement of sector targets.
- Supporting the Regenerative Fund for Nature, led by Conservation International (more details below).

In addition, Textile Exchange will continue collaborating with The Fashion Pact and Conservation International on projects related to biodiversity, deforestation, and other nature-related topics, to ensure harmonization of industry resources and to avoid duplication of efforts.

The Fashion Pact

The Fashion Pact is a CEO-led organization, representing companies from the fashion and textile industry across the entire value chain, with a focus on creating meaningful, large-scale change to improve industry practices for the good of our planet. The initiative is committed to accelerating action on nature, climate change mitigation and the protection of our oceans by addressing key tipping points that will help shift the industry for the better.

In an effort to continuously push fashion companies to begin mitigating and transforming their impacts to be nature positive through action and investment, The Fashion Pact will build on the results and learnings of the Global Environment Facility-funded initiative called "Transforming the Fashion Sector with Nature" co-led in partnership with Conservation International.

The Fashion Pact will accelerate on key urgent challenging areas such as deforestation that needs scale and speed. Almost all key fashion materials are produced in or near deforestation front areas, highlighting the need for further examination by companies into the commodities driving those deforestation fronts, focus and due diligence across companies' material portfolios.

Together with Conservation International we will launch a workstream to address Deforestation in fashion supply chains. This work will build on the learnings from the GEF project, leverage CI's expertise, and help us address a topic that is urgently needed. We are just at the very beginning but look forward to catalyzing industry transformation on such a critical topic.

Conservation International

Conservation International has long believed that corporations have a responsibility not only to embrace environmentally and socially sustainable business practices, but to invest in the conservation of the nature their business depends upon

Informing **science** and key global frameworks will continue to underpin all our work, including continued engagement in the Science Based Targets Network. Conservation International co-leads the Land, Oceans, and Biodiversity hubs within SBTN. CI is also a member of the Network Council, Corporate Engagement Program, and the Referral Program, contributing both ongoing technical expertise as well as strategic oversight. Conservation International partners with fashion and textile companies to unlock opportunities for sustainable, nature-based development models and transform supply chains in support of nature and people. We are committed to growing the number of partnerships with fashion and textile companies to undertake three critical steps:

1. **Transform Production.** We work with partners to evaluate their supply and sourcing practices and influence progress towards more sustainable models, enabling fashion production that benefits people and nature. We support committed brands and companies to determine their unique nature footprint and impact on biodiversity for their business, set targets that are right sized for reversing these negative impacts, and craft portfolios of investments that deliver on targets and have positive outcomes for biodiversity in alignment with SBTN, TNFD, and other best in practice framework.
2. **Invest in Nature.** We guide companies' investments to protect nature for their benefit and the benefit of humanity. Through the Regenerative Fund for Nature, we provide grants to farming groups, project leaders, non-governmental organizations and others that are ready to test, prove and scale regenerative practices in fashion supply chains to ensure the long-term viability of the land and deliver benefits for farmers, nature and the climate
3. **Inspire and Activate.** We work with companies to show them the value of protecting nature and to encourage support for conservation efforts. Our work connects with the brand purpose and storytelling, engaging and inspiring key stakeholders from the c-suite to the consumers.

Conservation International works in collaboration with fashion industry associations and coalitions to align the market with environmentally friendly policies and to help partners adopt more sustainable production practices and transforms supply chains at scale.

- Building on a 2.5 year partnership as lead delivery partner for Biodiversity with The Fashion Pact as part of a Global Environment Facility-funded initiative called Transforming the Fashion Sector with Nature, Conservation International is working with The Fashion Pact on a roadmap for deforestation and conversion-free collective action by signatories.
- Conservation International will continue to engage in the Textile Exchange Regenerative Community of Practice and, upon its launch, in the Biodiversity Community of Practice.

5. Case studies

5.1 Case study: Scalable action through supply chain partnership

BKB and H&M Group

How H&M Group and BKB are driving positive impact in the wool supply chain, in one of South Africa's prioritized areas for biodiversity protection.

A biodiversity footprint assessment found that H&M Group has a large impact on biodiversity through the wool it sources from South Africa, as the land used for grazing is considered to have high conservation value; most small-stock wool farming uses natural ecosystems as extensive rangelands. The H&M Group has ambitions to reduce its own environmental impact and support farmers in building on their farms' potential for long-term ecosystem health and climate resilience. To achieve this, the company has partnered with BKB to implement a Biodiversity Restoration and Regenerative Land Management project in South Africa.

BKB is South Africa's leading authority on agriculture, managing 60% of the country's wool and 70% of its mohair through its brokerage. It is the leading supplier of Responsible Wool Standard (RWS) wool and Responsible Mohair Standard (RMS) mohair globally. In recognizing the responsibility of being the largest South African agricultural broker and representing thousands of producers, this project forms part of the broader BKB Nxt sustainability strategy within the BKB Group. BKB recognizes its role in educating and facilitating on-farm projects such as this, to bridge the gap between knowledge and practice, as well as the gap between the two ends of the

supply chain. It has thus committed to—and embarked on—a process to bring about regenerative change, assist in and monitor this change, and report on the healing of the land in a transparent, scientifically proven, and replicable manner at scale with the RWS and RMS certified farm group.

The H&M Group and BKB are developing a scalable model for working with farmers to deliver positive land management with conservation, restoration, and regenerative outcomes. Their work serves as not only a means of implementing regeneration and restoration on the participating farms, but also a means of fine-tuning a methodology that can be applied beyond this specific project and benefit other farmers in other biomes. This project also has the potential to influence other interconnected areas of impact, such as opportunities for social capacity-building in restoration and monitoring efforts. This in turn could improve potential climate change resilience by restoring ecosystems and drive positive impacts on biodiversity by developing botanical reserves—and a better understanding of how to gauge and manage impact on the ecosystems used for fiber production. The project has an initial rollout target of 85 farms, including a minimum of seven emerging farms, covering an average of 500,000 hectares.

The first phase of the project is being implemented in the Albany Thicket Biome in the Eastern Cape, which is situated along the Sundays, Gamtoos, and Fish River valleys, due to its sensitivity to improper management and high conservation value. For this phase of the project, the focus area is a biome with a high level of biodiversity and endemic species that falls within three known centers of endemism, making it highly irreplaceable for biodiversity. The project provides an opportunity for farmers to work closely with biodiversity specialists, who will guide them in the restoration and preservation of this biome on their land. The botanical reserves planned for the project will assist in the preservation and future research of highly rare and endemic species found within the project footprint.

The project actions include the following:

a. Introducing regenerative land management techniques and monitoring their outcome by baselining the farm in general (and, more specifically, for thicket), including farmers in this activity to highlight regenerative focuses and the importance of the different vegetation types. The project also aims to guide adapted management where relevant, to support regeneration of the farm.

b. Restore land using passive and active restoration techniques: passive restoration through adjusted grazing management, and active restoration through several direct restoration interventions, from fire management to multi-species planting.

c. Establish botanical reserves to protect community assemblages (groups of related species that are found in the same place) that are unique to the thicket type/s found on the farm.

d. Farmer training and awareness:

    - Botanical diversity awareness training—supporting information-sharing on thicket types and the effects of stock management on these species;
    - Farmer training days covering both biodiversity and regenerative land management;
    - Developing a biodiversity index for thicket monitoring, which includes additional indicators that can be used to measure the impact of livestock management on thicket specifically. The index can also be used in conjunction with the Ecological Outcome Verification short-term methodology used for the rest of the farm.

To date, the project has shown that many of the farmers had been implementing regenerative practices without realizing it. Farmers' participation in the baseline assessments helped to show them which indicators are being measured and why, which has been very well-received and

started many useful conversations. This outcome aligns with the project's wider ambition of supporting a transition to measuring regenerative impact.

It has been extremely valuable for both H&M Group and BKB to have successfully collaborated with partners on either end of the value chain, as the project incorporates different perspectives: a brand that needs a scalable solution to decrease negative impacts associated with fiber production, and farmers who need to improve ecosystem health and climate change resilience. This project can be seen as enabling the transition from good to better, as well as being an opportunity to learn from the farmers and understand their realities, needs, successes, and challenges. This helps ensure that they can continue to build on any successful interventions this project enabled and support the long-term future of their farming. It also facilitates co-creation and lateral buy-in, with a deep understanding of the on-farm practicalities when it comes to achieving global goals.

This collaborative project is a key example of how companies can successfully bridge the gap between not only knowledge and practice, but also both ends of the supply chain.

5.2 Case study: Conservation and traditional knowledge

The von Bibra family and Beaufront Farm

The von Bibra family are fourth-generation farmers producing over 180 Tonnes of Merino wool annually from a free-roaming herd of 25,000 sheep at their Beaufront Farm property in Ross, Tasmania.[113] The von Bibras have long implemented conservation practices and efforts to engage Indigenous communities on their land.

Photo: Indigenous Tasmanians calling on private landholders to share access to cultural sites Sourced: ABC Rural (2022).

Conservation and biodiversity

Areas of land at Beaufront are reserved for habitat regeneration, locked in paddocks to enable native seedlings and tree saplings to grow free from grazing species. This was in response to a decline in native tree and grassland populations, caused by deforestation and unsuitable land management practices. In recognition of the necessity of balance with nature, and to increase water resiliency and reduce ground erosion during times of drought and heavy rainfall, the von Bibras began a multi-species afforestation approach. Subsequently, Beaufront Farm has seen reduced habitat fragmentation, driven by the creation of biodiversity buffers and species corridors.

Moving forward, there are plans to return more land to nature in the form of biodiversity buffer zones and extend monitoring efforts. Beaufront currently monitors carnivorous predators such as the Tasmanian Devil, recognizing that, as keystone species, they provide a gauge for the general health of biodiversity within an ecosystem. However, supported by technological progression over the next decade, several other species are expected to fall into the scope of their monitoring practices. Such monitoring is pivotal for demonstrating tangible benefits for biodiversity as a result of conservation practices.

Indigenous peoples and traditional knowledge

Much like the rest of Australia, Tasmania has a dark history of European colonialism, which included genocide, human rights abuses, the resettlement of Aboriginal populations, and loss of traditional knowledge. The von Bibras, acknowledging that Aboriginal people were the original stewards of Tasmanian landscapes and what is now Beaufront Farm for thousands of years, embarked on a study of the benefits of traditional cultural burning for land management, in a project connecting science and culture. Beaufront farm now jointly works with Indigenous groups on fire management, burning, and management of native Tasmanian grasslands.[114] This was partly driven by the von Bibras' understanding of the success of Indigenous techniques to overcome issues arising from chemical remedies and monoculture crops. It was also driven by an understanding that this is not just an agricultural landscape, and although they understand that they cannot remedy the past histories of exploitation of Tasmanian Aboriginal people and their environment, the von Bibras are keen to better understand how they can respectfully connect with local Indigenous groups, learn and implement their traditional practices, and mutually manage agriculture whilst protecting the environment and biodiversity. Local Indigenous groups now also have access to the farm's significant cultural sites including quarries, caves, and critically endangered native grasslands.[115]

> "Although we can't go backwards, we can listen, engage and learn and improve what is already there."

— Julian von Bibra, Beaufront Farm

5.3 Case study: Partnering to pilot biodiversity monitoring on smallholder cotton farms

Biodiversify, CottonConnect, and Primark

Primark has been working within the sustainability space for some time, but over the last three years the company has integrated biodiversity into its thinking. Primark began by recognizing that negative impacts on biodiversity could undermine its business. Additionally, it recognized the holistic opportunities for action in tandem with other sustainability areas, and the utter importance of integrating this thinking across the board if the company truly going to have a positive impact.

Photo: Sourced from Primark, "Positively Promoting Biodiversity"

To better understand what biodiversity means to Primark's business, the company commissioned an independent Biodiversity Risk Assessment of its operations, which helped shape its biodiversity strategy. From this assessment, Primark recognized that growing cotton well in the future depends on healthy soils, pollination, and seed dispersal, all of which are linked to healthy biodiversity. Since cotton is Primark's most widely-used raw material, the company has put it at the core of its biodiversity strategy.

> To deliver against our goal of restoring biodiversity we must improve our understanding of how to measure progress, and given the interconnected nature of our wider environmental sustainability programme, we must move towards a more integrated approach when deploying our programmes in order to drive the change we aim to see over the long term."

— Nick Farrar, Primark

Primark Sustainable Cotton Programme

Primark launched its Sustainable Cotton Programme (PSCP) in 2013, in partnership with CottonConnect and the Self-Employed Women's Association, an Indian NGO.[116] As of mid-2022, the PSCP has helped train 252,000 farmers across India, Bangladesh, and Pakistan in sustainable farming practices in its work with CottonConnect and other local partners.[117] The program aims to expand, using more natural and regenerative farming methods such as reducing water, pesticide, and chemical fertilizer use, and includes training farmers on these methods, through CottonConnect's REEL Programme.[118] It also aims to improve the livelihoods of the farmers who grow the cotton. As a result of the program, the cotton quality has improved, and farmer profits have increased.

The PSCP therefore presented a unique opportunity for Primark to commit to restoring biodiversity. It began by working with Biodiversify to develop a Biodiversity Monitoring Framework. Together with local ecologists, Primark is currently piloting biodiversity surveys at a number of PSCP cotton farms in India. The learnings from these pilots will help the company to develop an effective biodiversity monitoring program that can be scaled up and delivered across all PSCP farm locations.

5.4 Case study: Regenerative landscape model

Good Growth Company, Mongolia

Good Growth is rolling out a regenerative landscape model in the rangelands of Mongolia. The system addresses the primary drivers of degradation—especially overgrazing—by integrating multi-fiber value chains into long-term regeneration programs. The main focus is on the condition of the whole landscape, not just the production practices of a single commodity. Herders commit to regenerative practices across the landscape, adopting animal welfare and science-driven herd destocking plans (especially reducing goat numbers) in exchange for the commercialization of all their fibers: sheep, camel, horse, and yak, as well as cashmere. The value chains are designed based on the landscape, preserving and amplifying the place of origin whilst fostering biodiversity. Reducing pressure helps restore rangeland condition, providing a richer (and more palatable) plant mix, more space and food for wild animals and ungulates, and better soil and carbon sequestration capability. Herder incomes are diversified across multiple fiber types in line with the carrying capacities of the landscape; they earn more by reducing pressure on the landscape. At present, the system is operating in Bayan-Ovoo and Bayankhongor before it expands to a further 1 million hectares in other regions of Mongolia over the next couple of years. This initiative is supported by The Regenerative Fund for Nature, but brands can also support this project in several ways, including at the system level, by helping to develop scalable monitoring and value chain technologies, and at the product level, by collaborating to create demand and value for all fibers cultivated in a given landscape.

6. Biodiversity Program Matrix

The Biodiversity Program Matrix presented below is intended to guide the reader through a selection of high-impact tools, frameworks, standards, and initiatives to help the fashion industry take rapid action on biodiversity. This is not an exhaustive list of biodiversity resources, nor is it intended to be an authoritative list of the best ones.

The program matrix below serves as a companion to this report. Throughout the report, all programs are referenced as opportunities for more information, deepening understanding, or guiding action. The program name is provided, followed by a brief description. The third column indicates which step in the biodiversity journey the program is best suited for—read the corresponding section of the report for more information and a breakdown of important concepts.

Program Purpose	Program Title	Summary	Step on the biodiversity journey	More information
Initiative	Business for Nature's Call to Action	Initiative started by Business for Nature, where more than 1,100 companies are calling on governments to adopt policies now to reverse nature loss in this decade. The call to action was used in particular at COP15.	3	https://www.businessfornature.org/call-to-action
Strategy tool	Fashion Pact Biodiversity Strategy Navigator	Interactive website that supports fashion companies to develop a biodiversity strategy aligned with the Science Based Targets Network. This includes understanding risks and impacts, target-setting, implementation, traceability and reporting & transparency. A Tool Catalogue directs users to a number of tools that can be used for each stage of the biodiversity strategy and includes a summary; steps of the SBTN the tool aligns with; sectors covered; data requirements and whether the tool requires an external consultant to implement.	1 - 4	https://biodiversitystrategytoolnavigator.thefashionpact.org/ https://biodiversitystrategytoolnavigator.thefashionpact.org/section/tool-catalogue/
Standards schemes		A large number of standards schemes focused on different textile raw material commodities and geographies exist. Textile Exchange's Preferred Fiber and Material Matrix (PFMM) includes an assessment of what is covered by voluntary standards and certifications used in the textile sector, including insights on biodiversity. The next version of the PFMM is scheduled for release in September 2023.	3, 4	https://textileexchange.org/about-materials-matrix/
Regulation	EU Deforestation Regulation (EUDR)	New regulation that prevents companies from placing commodities linked with deforestation or forest degradation onto the EU market, or exporting them from the EU. These commodities include soy, palm oil, cocoa, beef, coffee, timber, rubber and charcoal and their derivatives (e.g leather and furniture). The regulation has due diligence requirements, strong traceability & transparency obligations and in future will have an accompanying central database of risk assessments to benchmark nations on their level of risk for commodities to be associated with deforestation and forest degradation.	1, 3	https://ec.europa.eu/commission/presscorner/detail/en/IP_22_7444 https://www.iucn.org/news/202212/eu-adopts-regulation-deforestation-free-products-effective-complementary-measures-key https://preferredbynature.org/EUDR
Regulation	EU Green Claims	Proposed directive from the EU on substantiation and communication of explicit environmental claims. Its purpose is to take action on greenwashing, protecting consumers and the environment. It also aims to boost competitiveness of businesses who are increasing the environmental sustainability of their product. Includes a number of requirements for traders.	-	https://environment.ec.europa.eu/publications/proposal-directive-green-claims_en https://www.gtlaw.com.au/knowledge/european-commission-takes-action-tackle-greenwashing#:~:text=The%20Green%20Claims%20Directive%20aims,labels%20across%20the%20European%20Union
Risk assessment tool	Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE)	Interactive tool that enables users to understand and visualise how different sectors, sub-industries and production processes impact (impact drivers) and depend (ecosystem services) upon nature, and how these potential impacts and dependencies may represent a business risk. Aligns with the impact drivers defined by the Natural Capital Protocol and ecosystem services according to the Common International Classification of Ecosystem Services (CICES). Each sector's potential impacts on nature and dependency on ecosystem services are assessed using sector research and expert interviews to provide a materiality rating ranging from Very High to Very Low.		https://encore.naturalcapital.finance/en

Program Matrix - Appendix V3_expanded (continued on next page)

Program Purpose	Program Title	Summary	Step on the biodiversity journey	More information
Risk assessment tool	Integrated Biodiversity Assessment Tool (IBAT)	Online tool providing fast, easy and integrated access to IUCN Red List of Threatened Species, World Database on Protected Areas and World Database of Key Biodiversity Areas data. User inputs a site-location/area, and IBAT provides a biodiversity data report and related shape files for spatial visualisation of biodiversity impacts and risks in proximity to site location. Can be used when understanding biodiversity-related impacts and risks associated with sourcing and operations.	1	https://www.ibat-alliance.org/
Risk assessment tool	Materials Impact Explorer (scheduled for release fall 2023 by the Textile Exchange)	Helps brands understand the environmental, reputational and regulatory risks of their fibre portfolios across five categories: air pollution, forest biodiversity, climate and water usage and quality. The main purpose of the tool is help brands understand the environmental impacts and risks associated with sourcing decisions, identify high risk fibres in their portfolio and provide recommendations to address these issues. Brands upload their fibre portfolio and relevant factors (e.g type of fibre, certification level of fibre, country/region of origin etc) and the tool considers location- specific context and environmental risk data to provide a risk score for regions and fibres.	1	https://materialsimpactexplorer.com/
Risk assessment tool	WWF Biodiversity Risk Filter and WWF Water Risk Filter	Spatially explicit explicit corporate and portfolio-level screening and prioritization tools for biodiversity and water-related risks. Companies can use the filters to understand, assess and respond to the biodiversity and water-related risks of their operational locations and from their suppliers.	1, 4	https://riskfilter.org/biodiversity/home
Risk assessment tool	Fashion Nature Risk Lens	In collaboration with The Biodiversity Consultancy, The Fashion Pact and Conservation International present a combined website and dashboard to help fashion companies understand the sector's risks and impacts on biodiversity, with a particular focus on terrestrial biodiversity impacts from raw material production (sometimes referred to as Tier 4).	1, 4	Fashion Nature Risk Lens
Spatial data tool	Global Forest Watch (GFW)	Online platform which provides spatially explicit data and tools for monitoring global forests and how they are changing in real time. Tool is often used to monitor and manage deforestation and sustainably source commodities. The platform can present spatial outputs for various topics and underpinning indicators, including forest change, land use, land cover, climate and biodiversity. Biodiversity incorporates underpinning metrics including global biodiversity intactness, global biodiversity significance, key biodiversity areas and biodiversity hotspots. Can be used when understanding biodiversity-related impacts and risks associated with sourcing and operations.	1, 4	https://www.globalforestwatch.org/
Spatial data resource	Natural Lands Map	Using the Accountability Framework definition of natural ecosystems, the SBTN Land Hub, in collaboration with World Resources Institute's Land and Carbon Lab, has produced the Natural Lands Map. This map combines the best available global spatial data on land cover/land use and can be used to help companies set their targets for landscape engagement	1, 4	https://wri-datalab.earthengine.app/view/sbtn-natural-lands
LCA assessment tool	World Apparel and Footwear Life Cycle Assessment Database (WALDB)	Provides life cycle assessment data on the environmental impacts of appareal and footwear supply chains to inform sourcing decisions.	1, 2	https://quantis.com/who-we-guide/our-impact/sustainability-initiatives/waldb/ https://quantis.com/what-we-do/our-expertise/biodiversity-loss/
LCA assessment tool	Higg Materials Sustainability Index (MSI)	Material assessment tool that uses peer-reviewed life-cycle assessment data to quantify the environmental impacts of material production from the extraction or production of raw materials. This environmental impact is measured across global warming, nutrient pollution in water, water scarcity, use of fossil fuels and chemistry. The index helps companies in the apparel, footwear and textile industry to assess and compare the cradle-to-gate impacts of 90+ different materials, providing a comparable Higg MSI score and calculated environmental impacts.	1, 2	https://apparelcoalition.org/higg-product-tools/
Mandatory Reporting framework	EU Corporate Sustainability Reporting Directive (CSRD)	Upcoming mandatory sustainability disclosure obligation for large EU companies. Its main purpose is to improve transparency and accountability on corporate ESG performance. Within the CSRD companies must report against 13 EU Sustainability Reporting Standards (ESRS). ESRS 4 requires the disclosure of information related to Biodiversity and Ecosystems.	1 - 4	https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

Program Matrix - Appendix V3_expanded (continued on next page)

Program Purpose	Program Title	Summary	Step on the biodiversity journey	More Information
Mandatory Reporting framework	EU Taxonomy	Upcoming mandatory classification system for companies to disclose the impact of individual activities related to turnover, capital expenditure and operating expenditure. Its main purpose is to create transparency and enable the financial system to guide investment decisions in a more sustainable direction. Companies must determine if their economic activities can be considered sustainable by meeting technical screening criteria outlined for each activity within delegated acts of six environmental objectives. The sixth objective relates to the protection and restoration of biodiversity and ecosystems. All companies that must report under the CSRD must report against the EU taxonomy.	1, 4	https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R0852
Reporting framework	Kunming-Montreal Global Biodiversity Framework (GBF)	Global Biodiversity Framework (GBF) agreed upon at the end of COP15 in December 2023 in order to conserve, protect and restore biodiversity and spur action towards "Living in Harmony With Nature" by 2050. The GBF has four overarching goals for 2050 and 23 targets up to 2030. These targets cover reducing threats to biodiversity; meeting people's needs through sustainable use and benefit-sharing and tools/ solutions for implementation and mainstreaming.	2 - 4	https://www.cbd.int/article/cop15-final-text-kunming-montreal-gbf-221222
Reporting framework	Science-based Targets for Nature (SBTN)	Five-step target setting framework that supports companies to assess, measure, begin action, track progress and set targets for their impacts and dependencies on nature and biodiversity. The framework helps companies to address their most urgent impacts and dependencies by prioritizing places and issue areas for action. The SBTN are aligned with global goals and earth limits, including the Kunming- Montreal Global Biodiversity Framework and the Sustainable Development Goals. Has an online tool database.	1 - 4	https://sciencebasedtargets.org/about-us/sbtn https://sciencebasedtargetsnetwork.org/wp-content/uploads/2020/09/SBTN-initial-guidance-for-business.pdf
Reporting framework	Taskforce on Nature-related Financial Disclosures (TNFD)	Market-based initiative that is developing a risk-management and disclosure framework for corporations to disclose and act upon nature-related impacts, dependencies, risks and opportunities. The ultimate aim is to support the shift of global financial flows away from nature-negative outcomes towards nature-positive outcomes. The TNFD's recommended 'LEAP' approach (Locate, Evaluate, Assess and Prepare) is an assessment process for nature-related risk and opportunity management, helping companies begin to understand their impacts, dependencies, risks and opportunities related to nature across their portfolio of operations. The interactive online platform contains a tool catalogue for organisations to use that apply to each phase of the LEAP approach.	1 - 4	https://tnfd.global/ https://framework.tnfd.global
Reporting framework	CDP	Voluntary-market initiative that releases an annual questionnaire to collect information on impacts, opportunities and management of climate change, water security and deforestation. The Climate Change questionnaire now includes biodiversity-related questions. Eight questions require an overview of a company's approach to addressing and managing biodiversity, including assessment of impacts and dependencies;proximity of activities near sensitive areas (data required; application of biodiversity indicators and external reporting.	1 - 4	www.cdp.net/en/info/about-us www.cdp.net/en/climate www.cdp.net/en/forests www.cdp.net/en/articles/governments/bridging-the-sdg-data-gap-for-biodiversity-and-nature
Reporting framework	Global Reporting Initiative (GRI)	Global standards organisation used by companies to understand and report on their sustainability related impacts. Its main purpose is to enable transparency, accountability, consistency and global comparability in sustainability reporting. GRI304: Biodiversity 2016 standard contains topic specific disclosures on biodiversity. At present, a draft for the revised GRI Biodiversity Standard is available online. This is intended to replace the old standard, represent internationally agreed best practice and align with recent regulatory developments in the biodiversity arena.	1 - 4	https://www.globalreporting.org/standards/standards-development/topic-standard-project-for-biodiversity/
Reporting framework	Higg Brand & Retail Module (BRM)	Holistic sustainability assessment of value chains for brands in the apparel, footwear and textile industry. The questionnaire-based resource can be used to measure and report on environmental, social and governance impacts and benchmark performance scores across other industry actors. Higg BRM provides a total score out of 100, score breakdowns per pillar (environment, social, governance) and per impact area, including under the environment pillar biodiversity, climate, chemicals, waste and water. Biodiversity within the Higg BRM covers land use, habitat protection and degrowth.	1, 4	https://apparelcoalition.org/higg-brand-tool/

Program Matrix - Appendix V3_expanded (continued on next page)

Program Purpose	Program Title	Summary	Step on the biodiversity journey	More information
Environmental accounting standard	ISO 14007	International standard providing guidelines for determining environmental costss and benefits. Addressess dependencies of an orgsnisation on the environment, and the context in which an organisation operates or is located. Environmental costs and benefits can be expressied quantitavely (in money and or/ non-monetary terms) and qualitatively. Includes guidance on disclosure.	4	https://www.iso.org/standard/70139.html
Environmental accounting standards	ISO 14008	International standard providing a methodological framework for the monetary valuation of environmental impacts and related environmental aspects. Monetary valuation methods provided in the framework can be used to understand organisations dependendencies on the environment. Does not include costing or accounting.	4	https://www.iso.org/standard/43243.html
Nature based solutions standard	IUCN Global Standard for Nature based Solutions	Standard developed by IUCN to provide clarity and precision around what Nature-based Solutions entails and the requirements for success		
Natural capital accounting framework	Natural Capital Protocol	Decision making framework that enables organisations to identify, emasure and value their direct and indrect impacts and dependencies on natural capital. Broken down into 4 stages and 9 steps which contain questions to be answered when integrating the value of natural capital into organisational processes. Significant amount of guidance on biodiversity.	4	https://capitalscoalition.org/capitals-approach/natural-capital-protocol/?fwp_filter_tabs=guide_supplement

Appendix A. Further detail on biodiversity risks to companies

Physical risks and supply chain resilience

Amid global and local challenges for the fashion industry, building supply chain resilience is critical for ongoing operational success. Resilience also provides a key competitive advantage for companies.[119] Acting on biodiversity, when done holistically (such as through nature-based solutions),[120] can produce a myriad of cross-cutting benefits for local communities and regional economies as they build resilience for the future. Ultimately, biodiversity action, driven by the powerful narrative of a nature-positive transition, provides a strategic advantage and business opportunity to build resilience across the fashion supply chain. The finance and investment industry is increasingly recognizing the economic advantages, as evidenced by the growing investment in businesses that strategically manage climate- and nature-related risks.[121] Biodiversity action that addresses water scarcity and quality, mitigates and adapts to climate change, and protects and restores ecosystem services will help ensure supply chain resilience and the future of the fashion industry.

Raw material supply resilience

There is an increasing awareness of the risks associated with an organization's reliance on ecosystem services to continue production. This means that raw material supply is directly linked to ecosystem function that supports agricultural systems and, without this ecosystem function, raw material sourcing may be at risk. Agricultural supply chains are impacted by several risk factors, including the rising cost of fertilizers,[122] [123] the increasing impacts of climate change driving water scarcity, and extreme weather events.[124] Supporting resilience in these agricultural systems, by reducing the degradation of ecosystem services and biodiversity, would, in turn, improve supply chain resilience.

Farm-level resilience

The resilience of the industry's agricultural raw material production is, first and foremost, rooted in the continued viability of farms and ranches. In other words, farm resilience supports supply chain resilience. There are many factors that affect farm resilience, some of which are within the control of the landowner/operator (but not all). Understanding the producer reality is key to solving for better supply security and identifying opportunities to partner with producers for positive biodiversity outcomes.

Ensuring the long-term sustainability of raw material production systems requires an understanding and consideration of ecosystem function, to support sound long-term land management. Experiencing agricultural pressures and risks often reminds farmers of the need to build long-term resilience into their farming practices. These risks can include the cost or supply of artificial inputs (e.g., feed, seed, animal medications, fertilizers, and pesticides), which lead to greater reliance on natural ecosystem services to make farming feasible. For example, extended droughts experienced in both Australia and South Africa in recent years were a stark reminder that drought reserves, or grazing planning that provides enough feed through drought periods, are crucial. Farmers' reliance on bringing in animal feed, or the dramatic reduction of livestock, could create significant financial pressures that, even after the drought period, are difficult to recover from.

There is some evidence of companies' business models and supply chain relationships that provide longer-term agreements with farmers, which helps support the long-term resilience of the farm and surrounding land, with consideration for the impacts that current management techniques have on nature. These opportunities would help keep farmers farming, rather than

losing land to other types of development that may have a lower potential to contribute to positive biodiversity outcomes.

Many farmers are generational farmers, meaning that they often inherit the business from their family and plan to pass this on to the next generation for time to come. This means that long-term sustainability needs to be at the core of farm management, to ensure that generational handover remains possible. Even non-generational farmers have a vested interest in ecosystem function as a means of driving productivity from the land, even if the sustainability-related responsibility is only short-term for them. It is also important to note that land leasing is also common and incentives for farmers on leased land may be different to those on owned land. In some supply chains, such as wool production in India or cashmere in Mongolia, production takes place on communal land. The models for supporting resilience in these contexts may be different to those of single-farmer engagements.

Market access risks

While farmers often have a planning time frame that spans generations, market realities mean that decisions often have to be made within a short-term time frame, based on what would be good for the next year or cycle in terms of yield and income. There is some evidence of companies exploring business models and supply chain relationships that would support the long-term resilience of the farm and surrounding land, with consideration for the impacts that current management techniques have on nature.

Reputational risks

Research has found that environmental concerns are becoming increasingly important to consumers, which is driving many brands to begin taking action on biodiversity. These concerns now rival price and brand reputation as leading influences on shopping choices and constitute an emerging form of reputational risk.

Research conducted by IBM in 2020 found that 90% of consumers reported biodiversity loss and 92% reported protecting rainforests and other ecosystems to be moderate to extremely important to them.[125] 55% of consumers reported that environmental responsibility is extremely important to them when choosing a brand, with half of consumers saying they are happy to pay a premium for products from environmentally responsible brands. Given this data, it is not surprising that fashion brands cite consumer values as a major driving factor for acting in this area.

Research conducted by the Economist Intelligence Unit in 2020 found that consumers and environmental activists were the biggest driver for the fashion industry's focus on sustainability issues.[126] The rise in consumer awareness adds a new challenge for the industry, as information must not only meet regulatory standards, but also be accessible to the public.

Due to the increased awareness and action in the sustainability space, the term 'greenwashing' has become a major part of consumer vocabulary. Greenwashing refers to a product or process being made to appear more environmentally friendly than it actually is. Concerns around greenwashing have led to efforts to ensure that consumers are not being misled by the claims brands are making, and in some cases made brands more cautious about disclosing their work to improve environmental conditions—an act now referred to as 'greenhushing'.[127] Fashion brands, including several major retailers, have faced public scrutiny due to claims of greenwashing.[128] Amid the increased discussion of biodiversity among companies, there is already evidence of growing scrutiny of their biodiversity-related actions. This is notably an issue for a developing space like biodiversity, where definitions of terminology and guidance have been vague.[129] [130]

Appendix B. Voluntary sustainability standards and biodiversity examples

B.1 Better Cotton Initiative

Spotlight on: BCI and the Production Process
Better Cotton Initiative (BCI) supports farmers too...

- Adopt a Biodiversity Management Plan that conserves and enhance biodiversity on (and surrounding) their farm. This includes identification and mapping of biodiversity values; restoration of degraded areas and ensuring practices such as crop rotation. Identifying and mapping biodiversity resources helps BCI farmers better understand animal, vegetal and microbial species are present in and around their farms.
- Develop an Integrated Pest Management Plan to diversify pest control techniques and reduce reliance on chemical pesticides which pollute the environment. This may include encouraging natural bird and bat species to predate on cotton pests. Moving away from the use of chemical pesticides is important to protect and support animal, vegetal, insect, and soil biodiversity from pollution. This also demonstrates a mutual dependency of agriculture and biodiversity, whereby animal species remove crop pests and simultaneously provide a safe food source.
- Conduct a High Conservation Value (HCV) Risk Assessment using field data and local stakeholders. The involvement of local stakeholders is key for gaining valuable traditional knowledge on biodiversity. Areas with HCV cannot be converted with cotton production, with support given to BCI farmers to manage and protect them.
- Take steps to enhance natural habitats, biodiversity and degraded cropland in line with local and regional priorities with projects taking a collaborative approach with other relevant local actors. Enhancing biodiversity and ecosystems is key to achieve widespread biodiversity net gain and secure a nature positive future. Doing so, with acknowledgement of an integration with local and regional biodiversity is pivotal, as biodiversity and ecosystems cross beyond the limits of just one farm. For example, the application of harmful pesticides on one farm can quickly spread downriver and downwind to impact terrestrial and aquatic biodiversity in other local areas. This can have subsequent negative impacts on raw material production, which depends on biodiversity for other farmers.

The revised version of the BCI standard includes more stringent requirements for biodiversity.

B.2 Cotton made in Africa

Spotlight on: CMiA and the Production Process

Cotton made in Africa (CMiA) is a comprehensive sustainability standard, including aspects to tackle biodiversity loss in raw material production. It supports cotton companies operating in Sub-Saharan Africa to help small scale farmers by:

- Providing core and improvement indicators for biodiversity value for both field and ginnery activities.
- HCV land is not converted for cotton production (Core). Threatened and endangered species in fields and ginneries are respected/protected (Improvement).
- Adopting Biodiversity Management Plan that identifies and restores degraded areas; enhances insect populations and ensures practices such as crop rotation (Core). Taking this pro-active approach to restoring and enhancing habitat and species populations in agricultural supply chains is critical for moving towards biodiversity net gain and a nature positive future. The utilization of regenerative agricultural practices such as crop rotation are also key for biodiversity, as they limit the pressures of conventional intense farming, or practices which rely on consistent use of harmful fertilizers which can negatively impact biodiversity.
- Specific to water scarcity pressures in Sub-Saharan Africa, training CmiA farmers to protect bodies of water, water-related habitats and their rare, threatened and endangered species and restoring riparian buffer zones (Improvement). This is important, as it recognizes the context-specific environmental pressures in the region of water scarcity, which has an intrinsic influence on biodiversity.

Appendix C. General Biodiversity Metrics and Considerations - Examples

Direct species measurements: regional or site-level

Conducting direct species counts is a fundamental step in any species-focused efforts to track the progress of biodiversity action. The level of expertise—and resultant level of accuracy—will differ depending on the metric of species count used. This level of detail offered by species counts could be useful for measuring biodiversity intactness in projects that focus on protecting more pristine/intact ecosystems. These types of detailed assessments are more useful in the context of project-specific monitoring and evaluation that require participants to report on site-level progress and impact.

Species richness: This refers to the number of species in an area. This type of count often relies on sampling areas and extrapolating the data to wider areas (such as linear transects or monitoring plots).

Species diversity: This refers to the number of different species present in an area and the relative abundance (evenness) of each of the species in that area. Species diversity is measured by determining the number of species present in a given area and calculating how evenly distributed a species is within that community. A biodiversity index is calculated by taking the number of different species (richness) in an area, divided by the total number of objects (evenness). Species diversity indices, such as the Shannon's Index and Simpson's Index, can be used to help with these calculations.

Ecosystem measurements: regional or site-level

Proxy biodiversity measures: If your objective is more aligned with an ecosystem integrity approach, on the assumption that healthy ecosystems will support higher levels of biodiversity, you may wish to measure the presence or absence of key or indicator species. It is well-known that both apex predators and other overly sensitive species can only be found in healthier ecosystems. Knowing what these species may be in a particular ecosystem allows you to monitor them and correlate their health (number and possible reproductive success) to ecosystem health. The same method could, conversely, be applied to species that prefer less favorable environments to thrive in (such as pioneer species or decreaser species), as their presence could be an indicator of poor ecosystem health.

One challenge with this methodology is that it requires a level of understanding of specific habitats and/or ecosystems in order to identify the correct indicator species. This means that for less-studied ecosystems, identifying indicator species may require intense specialist studies before proceeding with measurements. In general, this methodology remains very site-specific, which poses challenges for scaling, and should be used not as a measure of biodiversity but rather as a measure of ecosystem health (to be combined with other measurements).

Land-based metrics: If your objective is more aligned with ecosystem integrity, there are a host of land-based metrics that could be used to gauge impact on ecosystem function and biodiversity. Once again, it is important to note that many detailed site-level metrics may only be relevant when monitoring the impact of site-specific projects. For wider comparisons and tracking, there are metrics that are applicable to larger focus areas (on a regional, national, or global scale).

If you are using regenerative agriculture as a mechanism to improve biodiversity through improved ecosystem integrity, then monitoring outcomes of regeneration could be another approach worth taking. Regeneration considers the functioning of the four ecosystem processes: mineral, water,

and energy cycles, and the role and function of community dynamics. It is safe to assume that improvement in any of these natural cycles or ecosystem processes will have a positive impact on biodiversity. This level of data collection is very site-specific and is therefore more applicable to project-level monitoring of interventions.

Broad-level and/or global metrics

Change over time: Another broad-level, land-based metric involves measuring the change over time compared to a baseline, e.g. the retention or restoration of forest or other natural habitats over time. Satellite imaging data, if available, can be used, though this requires periodic updates. These methodologies are often a useful way to take a bird's-eye view and highlight areas that may need more detailed assessment or ground truthing. While this is a simple and cost-effective set of metrics that can be collected through, for example, certification schemes, it does not indicate the quality of the habitat or the biodiversity within it. Ground truthing, or using on-site surveys, will improve the accuracy of measurements.

Meta-analysis and modeling metrics

Global Biodiversity Score: There are currently several biodiversity metrics that use meta-analysis and modeling based on existing data. For example, the GLOBIO metric, which measures biodiversity using Mean Species Abundance (MSA) after disturbance, compared to their abundance in an undisturbed system, using a model based on a meta-analysis of over 200 field studies. The Global Biodiversity Score combines MSA with area data inputs to calculate a spatial biodiversity footprint of company activities or scenarios for policy measures. The Biodiversity Intactness Index uses a similar approach to GLOBIO, but it also uses records of biodiversity in existing similar habitats to establish baseline conditions.

Species Habitat Index: The Species Habitat Index (SHI) is calculated using local biodiversity observations, such as those as available through the Global Biodiversity Information Facility (GBIF), and remotely sensed habitat characterizations, and measures changes in the estimated size and quality of ecologically intact areas supporting species populations over time. The SHI provides a compound estimate of the ecological quality of natural ecosystems and the health and resilience of species populations within these ecosystems.[131] It can serve as a proxy for potential population losses and the extinction risks of individual species. A score of 100 indicates that a country has experienced no habitat loss since the year 2001, and a score of 0 indicates that the habitat has been completely lost.[132] The tool supporting this index is The Map of Life.[133]

Biodiversity intactness: Biodiversity intactness refers to how intact an ecosystem is in terms of the relative abundance of originally present species or level of human pressures (i.e., whether it is unimpaired by post-industrial human alteration). Intact areas are those that have integrity and maintain ecological functions. Retaining these intact areas is required globally to halt the loss of wild biodiversity and the ecosystem services it provides.[134] Several authors of ecoregion-scale conservation plans have empirically evaluated what is needed to represent and protect habitats and ecosystems (including marine) and have agreed that about half of any given region needs to be conserved.[135] The Biodiversity Intactness Index (BII) summarizes the change in ecological communities in response to human pressures. The BII is an estimated percentage of the original number of species that remain and their abundance in any given area, despite human impacts. It is averaged across areas (national, regional, or global) to estimate the remaining biodiversity.[136]

Ecosystem integrity: Ecosystem integrity is defined as an ecosystem's functional capacity to contribute to ecosystem processes and therefore produce ecosystem services. These include both larger Earth system-scale processes regulated by the biosphere and finer-scale ecosystem services at a local level. Converted or partially converted ecosystems (non-intact areas) can have integrity if they retain sufficient functional biodiversity to support the provision of ecosystem services irrespective of whether the species—or communities—they contain are native or not. The

Ecosystem Integrity Index provides a way of measuring, monitoring, and reporting on ecosystem integrity on a geographical scale. It combines three components: structure, composition, and function, and measures the states of each against a natural (current potential) baseline on a scale of 0 to 1. The index has been developed to help national governments and other stakeholders measure and report on various goals and targets developed under the GBF.[137]

Modeling metrics are all underpinned by databases and meta-analysis of existing studies. The benefit of these metrics is that they do not require any collection of primary on-site data; instead, they only require information about the location, area, and the nature or intensity of land use activity. The disadvantage is that the results are modeled and based on several assumptions and simplifications, which reduces the accuracy of the result. Accuracy is highly dependent on the quality, coverage, and relevance of underlying studies to the activity being assessed.

Appendix D: Interviewees

Name	Job Title	Organization
Alexandra Perschau	Head of Standard & Outreach	Aid by Trade / Cotton Made in Africa
Amy Low	Brand and Marketing Director	Piping Hot Future
Andrea Forssman	Sustainability Specialist	TOTEME
Anna Heaton	Fibre and Materials Strategy Lead for Animal Materials	Textile Exchange
Anneke Keuning	Senior Environmental Specialist	BESTSELLER
Aude Vergne	Chief Sustainability Officer	Chloé
Gonzola Pertile	Director Corporate Social Responsibility	J. Crew / Madewell
Helen Crowley	Managing Director	The Pollination Group
Jaco du Toit	Biodiversity and Policy Coordinator	WWF
Jennie Granström	Biodiversity Lead	H&M Group
Julian von Bibra	Farm Manager	W and C von Bibra
Linda Gustafsson	Sustainability Director	TOTEME
Liz Hershfield	Head of Sustainability	J. Crew / Madewell
Mirjam Hazenbosch	Senior Consultant	Biodiversify
Natalie Ernst	Sustainability Standards Manager	Better Cotton Initiative
Oscar Blumetto	Principle Researcher in Biodiversity in Productive Systems	INIA
Pedro Otegui	Director	Lanas Trinidad
Phil Townsend	Senior Technical Manager – Environmental Sustainability	Primark
Veronique Rochet	Senior Head of Sustainability	Puma
Yoann Regent	Sustainability Leader	Kering

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