



Fashion and apparel: Priority actions towards a nature-positive future

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Table of contents

1. Executive summary	3
Nature-related impacts	4
Nature-related dependencies	4
Priority actions and opportunities	5
<hr/>	
2. Introduction	6
Why nature matters for business	6
How business can take action on nature	8
About this report	9
<hr/>	
3. Understanding fashion's impacts and dependencies on nature	10
Fashion Impacts on nature	11
Fashion Dependencies on nature	16
<hr/>	
4. Fashion sector's contribution to a nature-positive world by 2030	17
1. Avoid and reduce the use of high-impact or uncertified materials	18
2. Avoid and reduce the use of hazardous chemicals in supply chains	19
3. Avoid and reduce freshwater use through sustainable water management	20
4. Restore degraded land and move towards regenerative agricultural practices	21
5. Transform business models and build for circularity	22
<hr/>	
5. Conclusion	27
<hr/>	
Resources	25
Contributors and credits	25
References	26

Executive summary

The fashion and apparel sector represents a significant part of our economies, with the multibillion-dollar sector employing an estimated one in eight workers globally.¹ While the sector has experienced rapid growth over the past few decades, increasing attention has been brought to its impacts on people and the planet. Fashion businesses have been called out for poor labor conditions, child labor, accelerating global greenhouse gas (GHG) emissions, the depletion of freshwater stocks and the degradation of natural ecosystems.

But these impacts also highlight the many dependencies that the sector has on natural resources. Fashion is reliant on sectors like agriculture, mining and forestry for its raw materials, including cotton, wool, cellulose and plastics. Protecting the natural systems which support these sectors is therefore key to securing the supply chains and economic resilience of fashion

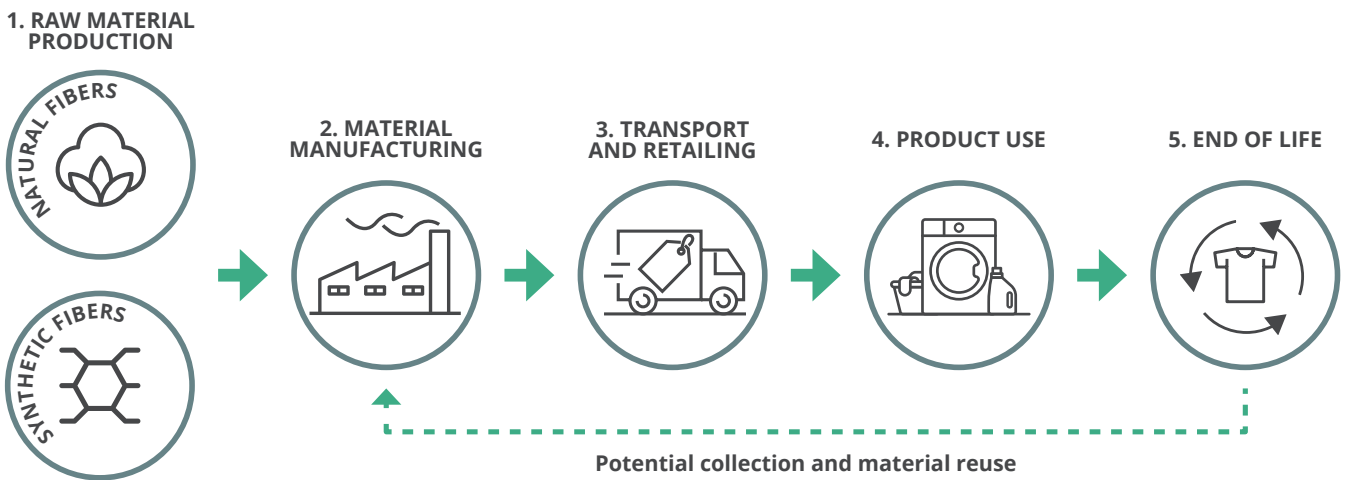
businesses. To change course and build long-term resilience to climate change and nature loss, the sector needs to shift towards circular and regenerative business models. Changes are required at all stages of its value chain, necessitating the support of research and development to drive innovation and accelerate this transformation.

To complement ongoing sustainability initiatives, all businesses need to **Assess, Commit, Transform and Disclose** ([ACT-D high-level business actions on nature](#)). They should acknowledge the value of nature to their business; assess and measure their impacts and dependencies on nature; set transparent, time-bound, science-based targets; take actions to address their key impacts and dependencies; and publicly disclose performance and other relevant nature-related information.

Scope of this report

This overview covers the full value chain of businesses in the fashion and apparel sector ([SICS code: CG.1](#)), from raw material production of both natural and synthetic fibers to the end of life of products.

Figure 1. Fashion and apparel value chain



Nature-related impacts

Fashion companies should direct their efforts towards addressing the most significant impacts on nature in their operations and value chains, namely:



- **Freshwater use** | Occurring across the lifecycle of garments (especially during raw material production and material manufacturing) and causing the depletion of groundwater and surface water (especially in high stressed basins), which affects local ecosystems and threatens local communities' livelihoods.
- **Soil exhaustion** | With inefficient water usage and management, monoculture farming and chemical use leading to soil exhaustion, whereby the soil is no longer able to support plant life. This is most prominent in cotton cultivation.
- **Land use change and degradation** | Through the expansion of agricultural crops for plant-based fibers and land for cattle ranching. This drives deforestation, accelerates the release of greenhouse gases (GHG) into the atmosphere and affects local ecosystems and wildlife.
- **Exploitation and loss of species** | Through the harvesting of furs, skins and leather. Species loss also occurs indirectly from habitat loss, and directly through lethal management in response to human-wildlife conflict. This in turn disrupts the balance in local species populations.
- **Pollution** | From the use of industry pollutants of concern during raw material production to microfiber shedding at end of life, fashion businesses contribute to pollution throughout the lifecycle of garments, contaminating land, ocean, freshwater and the atmosphere.

Nature-related dependencies

Like many sectors, fashion is dependent on a number of ecosystem assets, flows and services to function and grow. In particular, fashion companies rely heavily on:

- **Fibers and other materials** | The production of garments requires materials such as cotton, viscose, wool, leather, silk, rubber, dyes and metals. Some of these are derived from plants and rely on pollination for their production. Many also require plant, animal and algal material for fodder and fertilizer use.
- **Freshwater** | Essential throughout the fashion value chain, from the irrigation of crops or mining of raw materials to manufacturing processes and consumer washing.
- **Soil quality** | From increasing productivity and yields to capturing carbon, healthy soil is crucial to growing agricultural crops for natural fiber production. This can also lead to more resilient crops that are better able to withstand droughts and other challenges.
- **Energy** | The fashion sector relies on energy feedstocks throughout its value chain, from growing raw material to manufacturing processes, retail and consumer washing.

These dependencies strengthen the business case for investing in protecting and restoring nature.



Priority actions and opportunities

The fashion sector has begun making progress in tackling its contributions to climate change. Now is the time for the sector to also take bold action to reverse nature degradation and biodiversity loss. Businesses in the sector can reduce their organization's negative impacts on nature, mitigate risks to their operations and unlock commercial opportunities by prioritizing five key actions:

1. Avoiding and reducing the use of high-impact or uncertified materials | Fashion businesses should use the [Textile Exchange's Preferred Fiber and Material Matrix](#) to identify more sustainable materials. They should seek to adopt innovative low-impact alternatives wherever possible, follow robust sustainability standards, and implement traceable and responsible sourcing policies (such as deforestation-free and conversion-free policies).

2. Avoiding and reducing the use of hazardous chemicals | Thorough assessments should be conducted using the [Restricted Substances List \(RSL\)](#) and [Manufacturing Restricted Substances List \(MRSL\)](#) in order to control and avoid the use of hazardous chemicals throughout the manufacturing process.

3. Avoiding and reducing freshwater use through sustainable water management | This involves implementing water-efficiency technologies, optimizing production processes, reusing effluent water and innovating to avoid water use. This will both lessen a company's contribution to water stress and build its resilience against water shortages.

4. Restoring degraded land and moving towards regenerative agricultural practices | Companies should work with supply partners, conservation experts and local communities to recreate the conditions necessary for the natural recovery of soils, vegetation and wildlife. They should incentivize farmers to adopt regenerative practices to prevent future nature degradation.

5. Transforming business models and embracing circularity | Fashion businesses must prioritize decoupling their company's value creation from the extraction of new resources by considering the entire lifecycle of final products at design stage, stopping over-production and discouraging over-consumption. This means engaging directly with suppliers, local government and consumers to embed circularity at all stages of the value chain.

Importantly, efforts to deliver these priority actions and transform the sector must be delivered in alignment with a just and equitable transition, including meaningful dialogue with affected groups, such as employees, local communities, Indigenous Peoples and marginalized communities. While these five actions are crucial in mitigating the nature and climate risks faced by the fashion sector, they could also help it realize huge commercial opportunities from moving to a circular fashion system – estimated by the Ellen MacArthur Foundation to reach \$560 billion.²



Introduction

Nature underpins our collective wellbeing and is critical to our survival as a species. The services it provides promote human and economic development, health, security and equality. Nature is also our best ally in building resilience to climate change.

Nature's critical role is being increasingly recognized within the business and finance community – with some companies starting to embed natural capital in their decision-making to transform value chains and respond to shifting expectations from consumers, policymakers and regulators. However, corporate action on nature is lagging far behind climate action. Research

shows that 83% of Fortune Global 500 companies have targets to address climate change, versus only 5% for biodiversity loss.³

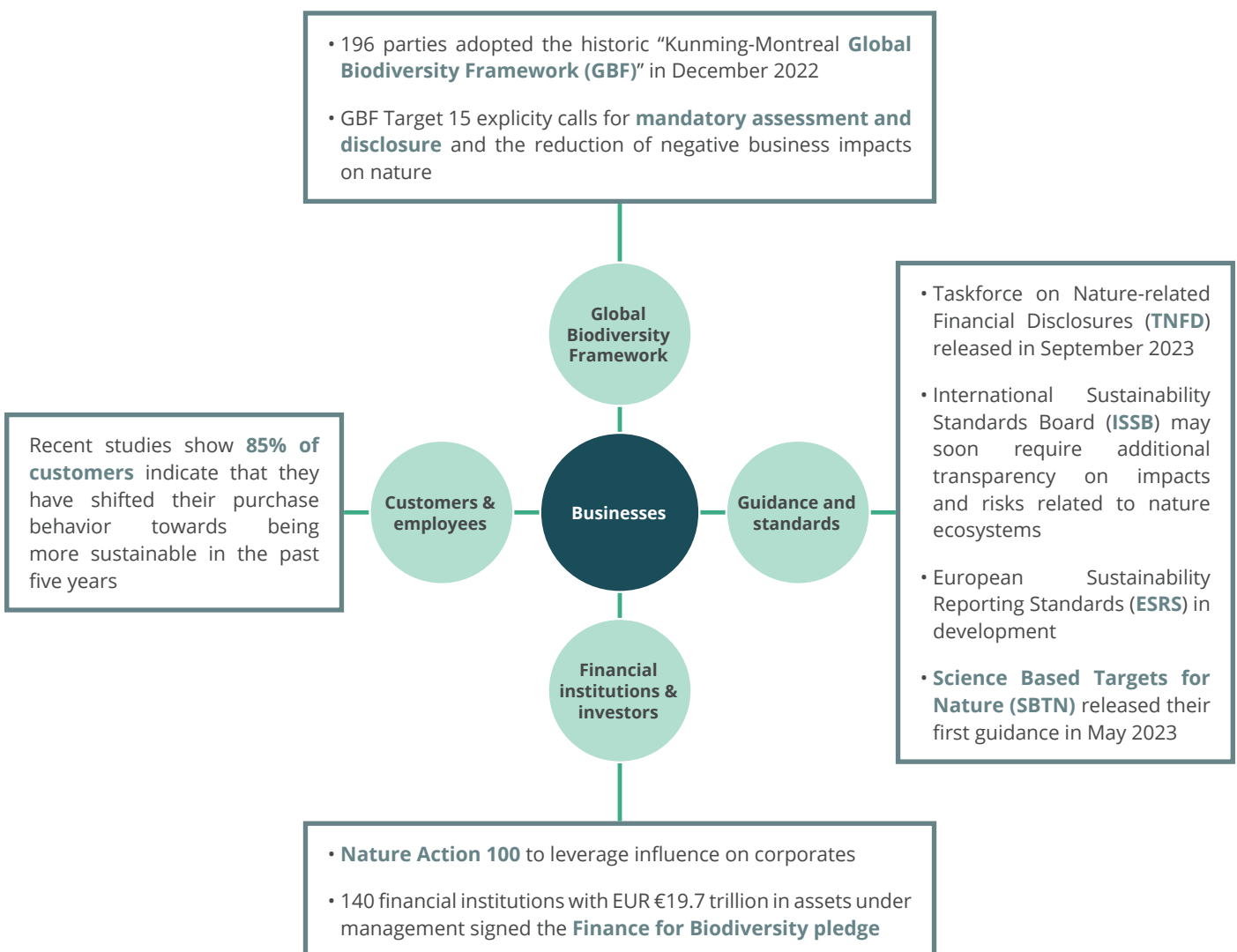
All parts of our economy are dependent on nature and its ecosystem services to continue functioning. Yet, each sector has unique dependencies and impacts on nature along its value chain. To take nature-positive action at the scale and speed required, it is therefore crucial for businesses to understand their specific interactions with nature within their sector context.

This report examines fashion and apparel specific impacts and dependencies on nature and biodiversity and sets out the priority actions that businesses in the sector should take now to credibly contribute to a nature-positive future.

Why nature matters for business

The importance of nature is swiftly rising for businesses in the real economy, as well as for the financial services industry and investors. A growing number of corporate leaders recognize the need to step up corporate action on nature, with four key dynamics shaping this imperative, as set out in figure 2.

Figure 2. Key nature-related dynamics impacting business action on nature⁴



The [Kunming-Montreal Global Biodiversity Framework \(GBF\)](#), adopted in December 2022 by 196 parties, commits governments to adopt policies to halt and reverse nature loss by 2030. The framework's 23 targets call for the collective effort of all actors of society: governments, business and civil society. Target 15 in particular explicitly calls for the mandatory assessment and disclosure of businesses' risks, impacts and dependencies on nature – sending a strong signal that businesses will need to step up their efforts to protect and restore biodiversity.

Business action on nature is also driven by the recent introduction of **voluntary guidance and mandatory standards**. For example, the [European Sustainability Reporting Standards \(ESRS\)](#) under the [Corporate Sustainability Reporting Directive \(CSRD\)](#) will mandate companies to disclose specific metrics regarding their impacts on nature and biodiversity, as well as their exposure to nature and biodiversity loss. Voluntary initiatives include the [Science Based Target Network's \(SBTN\)](#) initial set of science-based targets for nature and the [Taskforce on Nature-related Financial Disclosures \(TNFD\)](#) recommendations for nature-related financial disclosures, both designed to guide and support businesses in taking action on nature and meeting upcoming regulatory requirements.

Initiatives by **financial institutions and investors** are also ramping up, with over 140 financial institutions representing EUR €19.7 trillion in assets under management signing the [Finance for Biodiversity Pledge](#). In addition, investors are coming together through the [Nature Action 100](#) initiative to engage corporates on the importance of taking action on nature. The finance sector has a crucial role to play in allocating capital that will enable the transition towards a just, resilient and nature-positive economy.

Finally, **customers and employees** are increasingly expecting business to shift to models and products that protect nature and biodiversity rather than harm it. In UEBT's 2022 Biodiversity Barometer,⁵ the loss of biodiversity was the second most urgent environmental concern for consumers after climate change. A company's approach on nature is therefore likely to increasingly influence consumer choices going forward. Indeed, research shows that there are significant commercial opportunities to be unlocked by companies willing to embrace nature-positive business models.⁶



Fashion and apparel: Priority actions towards a nature-positive future

How business can take action on nature

The concept of “nature positive” is widely acknowledged as a global goal to halt and reverse nature loss by 2030 and achieve full recovery by 2050, as captured in the mission statement of the GBF. A **nature-positive** world is a world where nature – species and ecosystems – is being restored and regenerated rather than declining. Individual companies, financial institutions and investors can contribute to this shared goal by adopting nature strategies across their spheres of control and influence. This includes modifying their direct operations (specifically at sites in locations of biodiversity significance) and helping drive change along their value chains.

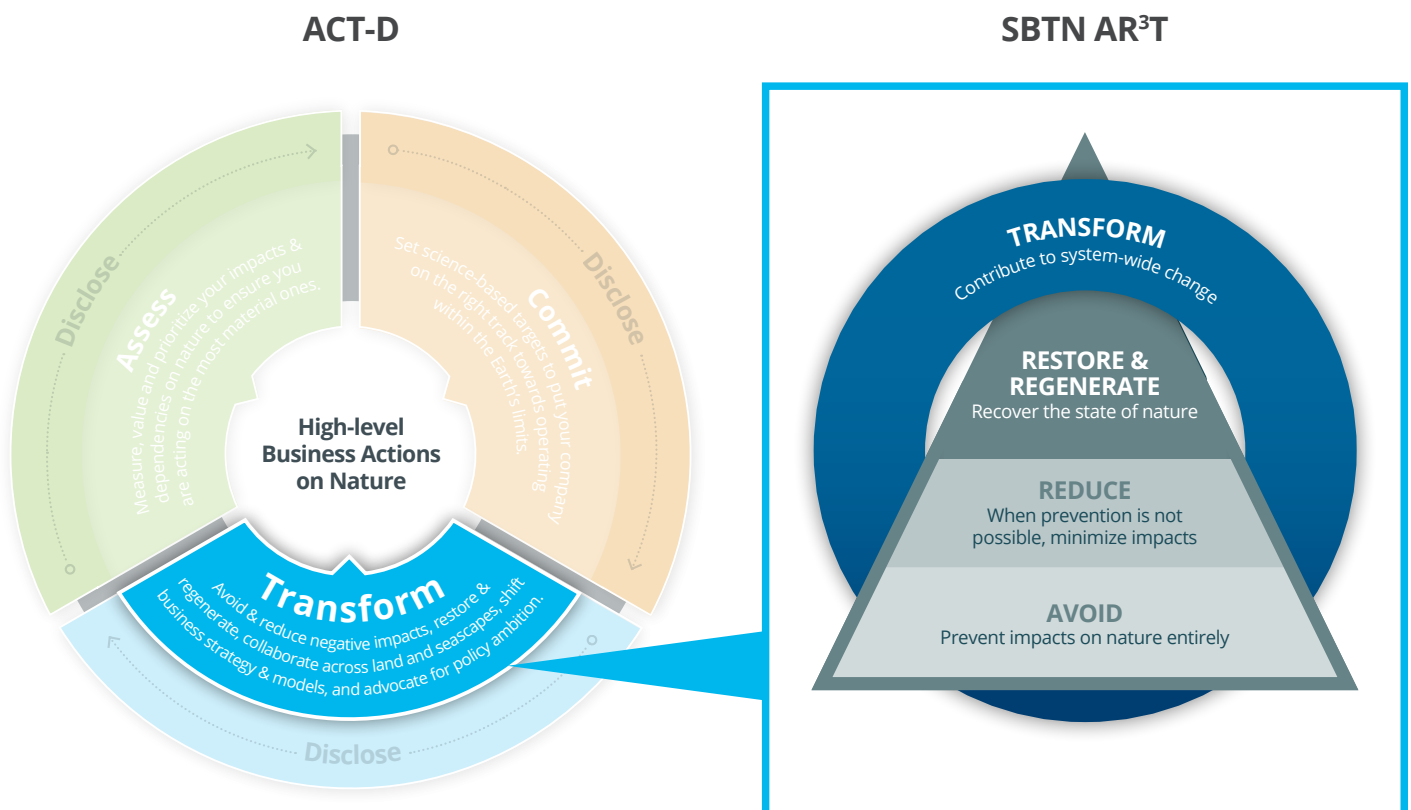
Nature is inherently complex and hence cannot be measured with a single metric or methodology. The [Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services](#) (IPBES) and SBTN define nature as “all non-human living entities and their interaction with other living or non-living physical entities and processes”. TNFD defines it as encompassing four realms – freshwater, ocean, land and atmosphere – with biodiversity as an essential characteristic of nature that enables ecosystem assets to be productive, resilient and able to adapt to change.

All businesses need to acknowledge the value of nature to their business; **assess** and measure impacts and dependencies on nature; **commit** to setting science-based targets; **transform** their business models, operations and advocate for policy ambition and **disclose** material nature-related information. This is also known as the **ACT-D framework** which sets out the [high-level business actions on nature](#).

To **transform**, businesses should follow the SBTN’s Action Framework (AR3T), which encourages businesses to:

- **Avoid and reduce** pressures on nature;
- **Restore and regenerate** to recover the state of nature;
- **Transform** underlying systems to address the drivers of nature loss.

Figure 3. High-level business actions on nature and the SBTN’s AR³T framework



SBTN’s Action Framework (AR³T) defines the hierarchy of actions that companies can put in place as part of the “Transform” stage of ACT-D.

About this report

Business for Nature, along with the World Economic Forum (WEF) and World Business Council for Sustainable Development (WBCSD) have developed sectoral guidance to support businesses in **transforming** their business activities and contribute to a nature-positive future. The collection of sector-specific actions is available [here](#).

Business for Nature and Accenture have conducted in-depth analyses of three sectors: fashion and apparel, fashion and water utilities and services. Building on the [high-level business actions on nature](#), this report provides an overview of the typical impacts and dependencies of businesses in the fashion sector and sets

out the **priority transformative actions** that businesses in the sector can take to help halt and reverse nature loss along the full value chain. Using the SBTN framework, the report distinguishes actions that contribute to halting nature loss (actions to avoid and reduce nature loss) and those that contribute to enhancing nature (actions to restore and regenerate nature).

Ultimately, this report aims to provide a strong foundation for fashion business to contribute to building a nature-positive world by 2030.



Fashion and apparel: Priority actions towards a nature-positive future

Understanding fashion's impacts and dependencies on nature

This section summarizes the potential key impacts and dependencies on nature of companies within the fashion sector, based on a **sector-level, global analysis and not ranked in order**. Company-specific impacts and dependencies will vary according to their specific activities, supply chains and operational locations. Companies will need to conduct assessment to locate their interface with nature and evaluate the impacts and dependencies using company-specific operation and supply chain information ([TNFD's LEAP](#) approach and [SBTN's step 1 \(screen and assess\)](#) and [step 2 \(prioritize\)](#)) are useful frameworks to guide companies through their own assessment.

The impacts and dependencies have been developed predominantly using the online [ENCORE tool](#) (Exploring Natural Capital Opportunities, Risks and Exposure) and [the SBTN sector materiality tool](#) (which only covers upstream and direct operations), considering impacts and dependencies with high and very high materiality. The content was developed in consultation with nature experts and key players in the fashion sector, listed in the acknowledgements. Other sources are referenced throughout the document and include extensive desk research and academic reviews.



Fashion and apparel | Impacts on nature

Despite its heavy reliance on nature, fashion is a key contributor to biodiversity loss. The way the sector currently operates significantly damages the ecosystems on which it depends, through freshwater use, soil degradation, the conversion of natural ecosystems, the exploitation and loss of species, and pollution. The negative impacts of fashion businesses often begin with raw material production, but damage spans garments' whole lifecycles.

The supply chain network which supports the sector is global and fragmented, and reducing its impact on nature is a complex challenge. Yet, tackling this challenge is vital in halting and reversing biodiversity loss by 2030, the key mission at the heart of the [Global Biodiversity Framework \(GBF\)](#).

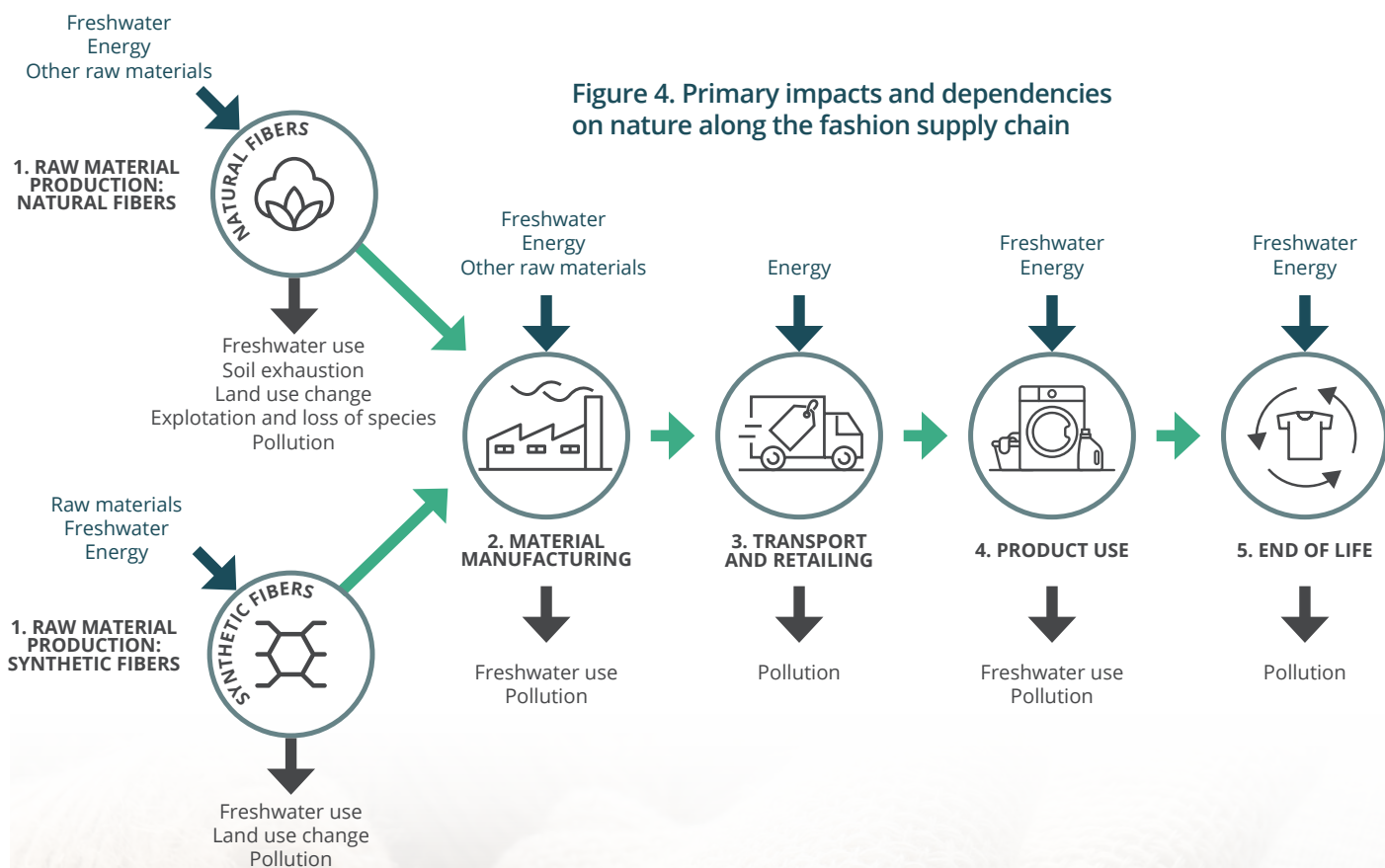
Businesses across the sector therefore need to step up their efforts on conserving and sustainably managing nature, starting

with building traceability down their supply chains to raw material level.

Currently, many companies do not consider the impact of the products they sell beyond their direct operations. Yet, many impacts stem from the products' retailing, use and end of life. These have been magnified by the rise of mass-produced, cheap, low-quality and disposable 'fast fashion'.

All in all, the current linear fashion system – which leads to 99% of materials being sent to landfill, incinerated, downcycled, or leaked into the environment as microfibers – puts a heavy burden on our natural world.

Details on each of these impacts are included below, as well as their links to the [five key threats to biodiversity as defined by the IPBES](#) (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services).



1. High freshwater use across manufacturing

Fashion is a major industrial user of freshwater. From growing raw materials to manufacturing the textiles and finishes in the final product, water is used at every step of garment production. The high use of freshwater represents a key dependency for the sector, but also a major impact through the depletion of freshwater stocks.

Freshwater basins play a crucial role in supporting biodiversity and enabling regional agricultural and industrial economies. Yet, their overexploitation can lead to water shortages, especially during dry seasons. This compromises local water security, affecting local communities and their livelihoods. Further, water exploitation by the fashion sector can divert water sources from other farmers' irrigation water, causing potential conflicts to develop.

The Noyyal-Bhavani basin in Southern India faces huge demand for water to produce textiles, with the middle Noyyal region being responsible for 90% of total cotton knitwear exports from India.⁷ This demand results in the overexploitation of the basin, leading to surface water shortages and depleted groundwater levels. This in turn has been accelerated by unsustainable groundwater abstraction by wet processing, creating shortages of water for irrigation, livestock rearing and fisheries, all of which impose heavy costs on farmers. Water shortages also threaten the survival of many animal species in the region, including the country's largest population of Asian elephants and Bengal tigers.



IPBES defines five key threats to biodiversity. This impact of the fashion and apparel sector directly contributes to:



Pollution



Overexploitation



Land use change



Climate Change



Invasive Species

2. Soil exhaustion and water usage in agriculture - spotlight on cotton

The unsustainable agricultural practices used to produce raw materials have immense negative impacts on nature and can lead to soil exhaustion. Healthy soils are essential to tackling nature loss and climate change – not only do they support plant life, but they also sequester carbon, acting as the world's largest terrestrial carbon sink.⁸

Preventing soil exhaustion therefore needs to be a priority for fashion companies – starting with those using large quantities of cotton in their products. Cotton cultivation is one of the most exploitative raw materials to water and soil and is the focus of this section. However, it is important to note that negative impacts extend to other plant-based fibers too. Further details on cotton and other materials can be found in the [Textile Exchange's Preferred Fiber and Material Matrix](#) to guide sourcing decisions.

Cotton is the second-most produced fiber after polyester, accounting for approximately 22% of global fiber production in 2021.⁹ Cotton production leads to soil exhaustion through the

inefficient use and management of water, monoculture farming and the use of chemicals.

Inefficient use and management of water | Globally, approximately 73% of cotton is grown in irrigated fields, requiring water to be diverted from surface and ground water.¹⁰ This water often contains impurities - such as salt - which can enter the soil and impact its nutrient balance, reducing its ability to support plant life.

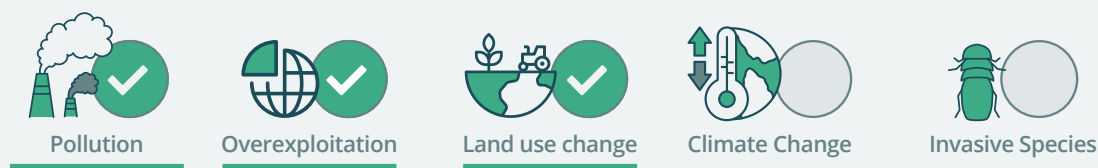
Monoculture farming | Monoculture is the practice of growing one crop species in a field year-on-year, enabling farmers to use machinery to increase the efficiency of planting and harvesting. However, every crop absorbs varying quantities of different nutrients in the soil, which means that growing the same crop year-on-year reduces the availability of certain nutrients and can lead to soil exhaustion. In addition, the risk of pest and disease outbreaks is increased in monoculture systems, which can have devastating impacts on crop yields.

Chemical use | Another key driver of soil exhaustion is the excessive use of chemicals in cotton farming. To limit the risk of pests and diseases, and sometimes to compensate for soil exhaustion, farmers often increase their use of agricultural chemicals (pesticides), further disturbing the natural balance of soils, and leading to wider environmental impacts such as water pollution. Most cotton farmers use synthetic pesticides, including those that target insects (insecticides), weeds (herbicides), and fungal infections (fungicides).¹¹ These pose risks to nature and have a direct impact on workers in cotton farms as they can lead to serious health hazards.

In recognition of these risks, an increasing number of farmers are adopting regenerative and organic practices. Organic farming is based on principles of health, ecology, care, and fairness. It is also legally controlled, with farmers required to meet set requirements around soil health and the prohibition of artificial fertilizers, hazardous synthetic pesticides, and genetically modified organisms (GMOs).

However, in 2021, only 1.4% of global cotton was certified organic, highlighting the need to focus on ending unsustainable processes in cotton production and explore further innovation to secure sustainably produced yields.¹²

IPBES defines five key threats to biodiversity. This impact of the fashion and apparel sector directly contributes to:



3. Land use change and degradation for material production

The fashion sector causes changes in land use and drives land degradation by increasing demand for specific crops, sourcing uncertified wood pulp fibers and accelerating deforestation for leather as a co-product of the meat sector. Not only does degradation of the natural landscape contribute to climate change and threaten species survival, but it also impacts local communities who rely on these lands for their livelihoods through agriculture, hunting, or traditional crafts.

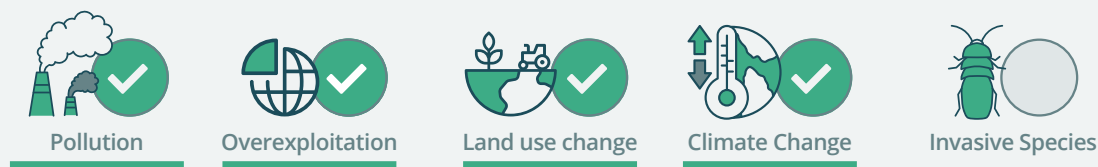
Agricultural crops (natural fibers) | Natural fiber production requires vast areas of land. As described above, monocultural crops can degrade the soil quality and lead to soil exhaustion, causing farmers to expand into new areas to compensate for declining crop yields, which in turn drives deforestation and wildlife habitat loss.

Sourcing of uncertified wood pulp fibers (man-made cellulosic fibers) | Man-made cellulosic fibers (MMCF) are regenerated fibers made from the dissolved wood pulp (cellulose) of trees. As renewable and biodegradable materials, these fibers have the potential to be a sustainable alternative to conventional textiles and are the fastest growing share in global fiber production.¹³ However, over 50% of MMCFs are sourced from uncertified forests,¹⁴ rendering valuable ancient and endangered forests vulnerable to deforestation.¹⁵ This further releases CO₂ and can also disturb the rich variety of rare species and native plant communities in these areas.



Deforestation for cattle ranching (leather) | A vast majority (80%) of the destruction of the Amazon rainforest is attributed to cattle ranching, from which leather is a valuable 'co-product'.¹⁶ Starting fires is often the quickest - and seemingly cheapest - way to clear land for cattle ranching, sometimes illegally.¹⁷ However, the hidden and indirect costs of deforestation are high and unaccounted for by businesses. CO₂ is released into the atmosphere through the burning of trees. According to WWF, deforestation contributes to 10% of global warming.¹⁸ Moreover, clearing forests reduces our natural world's ability to absorb future human-caused carbon emissions, as forests are an important carbon sink. Beyond the release of greenhouse gases (GHG), deforestation destroys entire natural ecosystems, leading to negative impacts on local communities and migratory animals, and increasing the loss of precious animal and plant species.

IPBES defines five key threats to biodiversity. This impact of the fashion and apparel sector directly contributes to:



4. Exploitation and loss of species

In addition to its impacts on land and freshwater, which themselves affect the ability of many species to thrive, the fashion sector poses direct threats to plant and animal life in the early stages of its value chain.

Loss of species from habitat loss |

Deforestation for material production can lead to a direct loss of wildlife habitat, with the removal of trees and other types of vegetation reducing available food, shelter and breeding habitat for animals. Species loss also occurs due to the creation of boundaries on agricultural lands which can separate adult wildlife from their young, prevent movement across landscapes and can injure wildlife trying to cross. In areas affected by deforestation and agricultural boundaries, the creation of wildlife corridors - a strip of land connecting wildlife populations separated by human activities - is extremely important. They serve as traveling avenues for wildlife species and provide resources that are essential to survival - such as food, water and cover from predators.

Killing of keystone predators | Where livestock is raised for animal fibers and materials such as wool and leather, keystone predators may be killed if they pose a risk to flocks and herds. Keystone species are species that define an entire ecosystem and which, if lost, cannot be replaced. These predators play an integral role in keeping other animal populations in balance.¹⁹ Native herbivores may also be killed if their grazing competes with livestock.

Exploitation of wildlife products | Some fashion businesses make and sell items that incorporate wildlife products - exotic skins, for example - which, if not handled responsibly, can threaten a species' survival.²⁰ International wildlife trade is estimated to be worth billions of dollars per year and affects hundreds of millions of plant and animal specimens.²¹ The unsustainable harvesting of flora - such as nettles and raffia and fauna - such as furs, skins, and leathers - is a major form of wildlife overexploitation. The conditions in which animals are reared and killed also raise significant ethical concerns.



Fashion companies have a responsibility to adhere to the [Convention on International Trade in Endangered Species of Wild Fauna and Flora](#), known as CITES, not only through their direct operations, but also by demanding and verifying that none of their suppliers contravene its regulations. CITES is an agreement between governments that regulates the international trade of wild fauna and flora to ensure the survival of the species is not threatened. CITES protects more than 37,000 species of animals and plants - whether they are traded as live specimens, fur coats or dried herbs - and applies to the [184 parties](#) that signed up to the legally binding framework.

IPBES defines five key threats to biodiversity. This impact of the fashion and apparel sector directly contributes to:



Pollution



Overexploitation



Land use change



Climate Change



Invasive Species

5. Pollution at every stage of production and consumption

The processes involved in the manufacturing, distribution, care and disposal of textiles make fashion one of the most polluting sectors in our economies – affecting all realms of nature throughout the lifecycle of garments.

Microfiber pollution | Fiber fragmentation refers to the action of a fiber being released from a textile body. Microfibers are smaller than five millimeters in length and are commonly released from clothing during consumer wear and washing.²² Recent estimates suggest that textiles are responsible for 35% of ocean microplastic pollution, in the form of synthetic microfibers. This equates to about 2.2 million tons of microfiber entering the ocean every single year.²³ These are then ingested by a range of marine species and travel through the food chain, affecting marine biodiversity. Microfibers can also interact with soil fauna, affecting their health and soil functions. Some toxic microfibers can build up in biological bodies, further threatening the health of wildlife and humans.

Chemical pollution | Thousands of chemicals are used across the fashion supply chain, including water repellents and dyes. Their effects go beyond disturbing soil health and can impact other ecosystem assets on land, in water, and in the atmosphere. Many agricultural chemicals used in the cultivation of natural materials are toxic and impact both land and marine biodiversity. Chemicals used to produce clothes can indirectly harm local communities too – disrupting hormone systems, harming liver health, or causing cancer.²⁴

Where chemicals are necessary, a closed-loop approach is vital to preventing leakage into the environment. Chemicals that are released into land, water and air need to be properly managed under restrictions to prevent damage to soil, water and wildlife.

Water pollution | Around 20% of global industrial water pollution can be traced back to the textiles sector.²⁵ From the chemical contamination of drinking water to the spread of microfibers in the world's waterways, textile-related pollution affects all aspects of water ecosystems.



For example, the runoff of some chemicals (such as nitrogen or phosphorus from fertilizers or other nutrient pollution) can enter aquatic systems and promote algal growth to the extent

that light is prevented from penetrating the surface. This results in the formation of harmful algal blooms which reduces plants' ability to photosynthesize and lowers oxygen levels in the water, killing aquatic plants and animals. Untreated toxic wastewater is also harmful to the many communities living by affected water bodies.

Weak regulation and poor infrastructure in some countries where textile processing is concentrated result in wastewater being dumped into streams and rivers, where it can be a danger to nature, biodiversity and human health.

Air pollution | For both synthetic and plant-based fibers, manufacturing processes release pollutants into the air, including particulate matter, sulfur dioxide, nitrogen oxide and other non-product outputs. These pollutants can be deposited in water, on vegetation and in soils as 'acid rain', causing adverse effects on flora and fauna.²⁶ Air pollution can also cause and worsen health effects in all individuals, particularly in the most vulnerable populations.

Additionally, these processes release large quantities of greenhouse gases (GHG) into the atmosphere. In 2018, the global fashion sector was responsible for approximately 4% of the world's total GHG emissions – equivalent to the combined annual emissions of France, Germany, and the UK.²⁷ An estimated 70% of the sector's GHG emissions stem from upstream activities, such as energy-intensive raw material production and fabric and yarn preparation.²⁸

Solid waste pollution | Most of the negative impacts of waste pollution on nature in the fashion sector occur at a garment's end of life. Between 2000 and 2015, global clothing production approximately doubled, while the average number of times a garment was worn before it was disposed of decreased by almost 40%.²⁹ On average, consumers dispose of 60% of their clothes within a year of buying them,³⁰ most of which are either sent directly to landfill or incinerated.

Non-compostable textiles can harm wildlife when not disposed of appropriately. For example, animals can become trapped and injured by textile waste. When waste is disposed in landfills, it decomposes or biodegrades at a very slow pace. Rainwater can filter through landfill waste, causing chemicals and constituents from the waste to be drawn out and leak into surface water, groundwater, soil and plants. This affects their physicochemical parameters and results in heavy metal concentration.³¹ Further, the decomposition of organic material can release methane and CO₂, both of which contribute to global warming.

All these types of pollution represent severe threats to ecosystems and biodiversity through habitat loss and degradation, animal infestations, contaminated water streams and reduced soil quality.

IPBES defines five key threats to biodiversity. This impact of the fashion and apparel sector directly contributes to:

				
Pollution	Overexploitation	Land use change	Climate Change	Invasive Species

Fashion and apparel | Dependencies on nature

The fashion sector is heavily dependent on the extraction of natural resources - relying on the production and processing of a wide range of raw materials to produce garments. These raw materials include plant fibers (such as cotton and linen); animal fibers and materials (such as wool, silk, and leather, skins and furs); manmade cellulosic fibers (such as viscose and lyocell); and synthetic fibers (such as nylon, acrylic and polyester).

The prominence of raw materials in the fashion value chain leads to a number of **key dependencies** on nature and the services it provides.

Fibers and other materials | Fashion's linear business model requires the direct physical input of fibers and raw materials to produce garments for customers. Synthetic fibers are the most common type of fiber (accounting for 64% of global fiber production in 2021)³² and are dependent on the extraction of petrochemicals. Non-synthetic fibers (also known as 'natural fibers') are most commonly derived from cotton, viscose, wool and other natural materials. Plant-based fibers are reliant on successful pollination which facilitates the reproduction of flowering plants and ensures the production of seeds, fruits and other plant materials. Many of these raw materials also require large quantities of plant, animal and algal material for fodder and fertilizer use.

Freshwater | Both natural and synthetic fibers are dependent on freshwater and the hydrologic cycle for the recharge of groundwater sources and the maintenance of surface water

flows. Freshwater is needed for the irrigation of crops. Cotton farming often occurs in dry areas and is the single largest water consumption factor in the fashion supply chain.³³ The manufacturing process for synthetic fibers is also a very water-intensive process, albeit slightly lower than for plant-based fibers. For both types of fibers, fabric dyeing is particularly water intensive, and the washing and care of garments further increases water use downstream of production.³⁴

Soil health | The cultivation of natural fibers is dependent on healthy soils which perform the functions and ecosystem services needed to sustain life. Soil is a complex structure formed by different organisms, mineral materials, organic matter, air and water. Its rich organic content provides the necessary environment for many plants to grow and for animal species to thrive.³⁵ Healthy soils boost crop yield, control plant disease as well as insect and weed pests and help build resilience against drought and flooding.³⁶

Energy | The fashion sector is dependent on feedstocks for energy supply as it is a critical input for every step of the fashion value chain. The specific dependency varies according to the energy source used, spanning solar, wind, hydro, geothermal, and biofuel energy and fossil fuel feedstocks. Energy use is at its highest at the raw material production and manufacturing stages but continues throughout the lifecycle of garments. As a result, the sector consumes more energy than the aviation and shipping industries combined.³⁷



Fashion and apparel sector's contribution to a nature-positive world by 2030

As a significant contributor to nature degradation and biodiversity loss globally, and with growing evidence of its dependencies and impacts on nature, it is crucial for the fashion sector to urgently change course and become a steward of the natural world.

Some businesses in the fashion and apparel sector have made progress in tackling their impacts on climate change (with climate change forming one of the five direct drivers of biodiversity loss according to IPBES), but the sector now needs to move further

and faster to address its impacts on biodiversity and nature more broadly.

This report puts forward **five priority actions** that fashion companies can implement simultaneously to effectively reduce their impacts and dependencies on nature. These high-level actions are based on the [Science Based Target Network's](#) (SBTN) Action Framework (AR3T – see “Introduction”).



1. Avoid and reduce the use of high-impact or uncertified materials

Fashion companies should start by reviewing the set of materials they use in their products, with a view to moving away from high-impact or uncertified materials. They should use the [Textile Exchange's Preferred Fiber and Material Matrix](#) to identify more sustainable materials and, where possible, authenticate their sustainability claims by following robust standards and seeking third-party verification. To get visibility over their supply chain and understand where their raw materials are sourced, businesses should implement traceable and responsible sourcing policies such as deforestation-free and conversion-free policies. This allows them to have more responsibility over the impacts of their products from raw material production to end use, encouraging suppliers to ramp up their sustainability ambitions, and can empower consumers to consider sustainability in their purchasing decisions.

The [Accountability Framework Initiative](#) supports companies in setting robust supply chain goals, taking effective action and tracking progress to build and scale up ethical supply chains for agricultural and forestry products.

Appropriate standards will differ for each business, depending on the materials it uses and its sustainability priorities. **When choosing a certification, businesses must ensure they understand what it covers, and identify any remaining gaps to authenticate all their sustainability claims.** To avoid compromising the livelihoods of current suppliers, it is crucial to support them in adopting more sustainable practices and meeting certification standards over changing suppliers.

The [International Trade Center](#) has identified 68 standards relevant to the textiles and garment sector, which are centered around the following key themes:

Fiber standards | Focusing on the production and use of fiber as the unit of certification. For example, [Textile Exchange](#) has developed standards specific to wool, mohair, alpaca and down. These require farms to develop a Biodiversity Management Plan (BMP) that conserves and enhances biodiversity on and around the farm.

Chemical control standards | Focusing specifically on chemical usage. For example, the '[Oeko-Tex Standard 100](#)' ensures there are no harmful chemical residues in final products, considering both regulated and non-regulated substances.

Circular standards | Which provide a means to demonstrate efforts in adopting circular principles in product design (see [building for circularity](#)). An example is the '[Cradle to Cradle](#)' certification which assesses businesses' use of renewable energy, water efficiency and recycling practices. The '[Recycled Content Standard](#)' (RCS) and '[Global Recycled Standard](#)' (GRS) set the criteria for third-party verification of recycled materials and chain of custody. The GRS includes additional requirements in terms of proportions of recycled content in products and social and environmental requirements related to processing and chemical use.

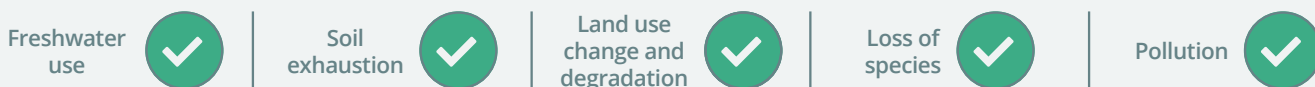
Nature-specific standards | Which directly monitor the impact of products and supply chains on nature and biodiversity. For example, [Wildlife Friendly™](#) certifies suppliers and producers that implement sustainable supply chain practices, which have direct benefits for biodiversity and for communities who co-exist with wildlife. The [Forest Stewardship Standards](#) set the bar for responsible forestry and ensure textiles sourced from forest products are environmentally appropriate, socially beneficial, and economically viable.

The above list is non-exhaustive. Some of the standards identified by the ITC go beyond nature-related criteria and consider labor rights, working conditions and other sustainability issues. Businesses should use existing tools to navigate the complex textile certification landscape, such as the [ITC's Standards Map](#), which provides free, accessible, comprehensive, verified and transparent information on over 300 standards for environmental protection, worker and labor rights, economic development, quality and food safety and business ethics.

Textile Exchange's latest [Preferred Materials Market Report](#) (2022) also highlights the need to innovate to scale new emerging low-impact materials. The report showcases a selection of preferred fibers which are developed by innovative processes. For example, pineapple leaves and wine pulp are among the hundreds of innovative elements that fashion businesses are starting to use as alternatives to high-impact fibers.

Implementing this action could address the following impacts and dependencies of the sector on nature:

Impacts



Dependencies



2. Avoid and reduce the use of hazardous chemicals in supply chains

Companies should carry out a thorough assessment on how they use and manage chemicals in their supply chain – using the [Manufacturing Restricted Substances List](#) (MRSL) and [Restricted Substances List](#) (RSL) to control the use of restricted chemicals from the extraction of raw materials throughout the whole manufacturing and finishing processes. Businesses should also focus on strengthening their relationships with suppliers to improve their visibility of the production of materials going into the company's products where there are gaps.

In addition, fashion businesses should avoid and reduce the use of hazardous chemicals by using organically grown raw materials. For example, organic cotton can support the restoration of soil health and increase water retention by eliminating artificial pesticides and fertilizers, and using crop rotation, composting and inter-cropping instead. Organic cotton is estimated to use 91% less water than non-organically grown cotton.³⁸ Using [Textile Exchange's Organic Cotton Market Report](#) can help to better understand organic and in-conversion cotton production. Although converting crops to organic practices brings long-term benefits and resilience, yields tend to be lower, especially during the conversion period. As such, it is important to focus on reducing overall demand through reuse and recycling (see [building for circularity](#)), to ensure organic conversion does not lead to higher land and water demand. Organic cotton

cultivation should be certified to an organic farming standard, with its supply chain also certified through the [Global Organic Textile Standard \(GOTS\)](#) or [Organic Cotton Standard](#) to guarantee the textile processing phase is free of toxic chemicals.

Chemicals used in dyeing, tanning and other textile processes can have detrimental impacts on people and the environment. **Companies should consider using undyed textiles as this will always have the least impact and will be suitable for many consumer applications.** If using dyes, these must be certified as environmentally friendly, such as [Oeko-Tex certified](#) dyes.³⁹ Traditional natural dyes are another option but have a much lower yield, and growing enough crops to meet demand may ultimately compete with food production. Other dyes should be explored as the market develops, such as the relatively new approach of creating dyes from food and agricultural waste.⁴⁰

[Archroma](#) has developed a new method of creating nature-based warm shades and has released a range of dyes called Earthcolors. The dyes are fully traceable and are synthesized from non-edible agricultural or herbal waste such as leaves or nutshells.



Implementing this action could address the following impacts and dependencies of the sector on nature:

Impacts



Dependencies



3. Avoid and reduce freshwater use through sustainable water management

The fashion sector needs to urgently transition to more efficient water management practices, and actively look for innovation opportunities to reduce water use during processing and production processes. Beyond considering water when avoiding high-impact materials (see “Action 1: Avoid and reduce the use of uncertified or high-impact materials) and adopting regenerative agricultural practices to produce raw natural fibers (see “Action 4: Restore degraded land and move towards regenerative practices”), a sustainable water management approach includes:

- **Implementing water-efficiency technologies** | Business should invest in water-efficient machinery and equipment across the entire production process. For example, businesses can utilize low-flow fixtures and leak detection and repair. For more details on water-efficiency, please refer to Business for Nature’s [report on water utilities and services](#).
- **Optimizing production processes** | By right-sizing production plants, fashion businesses can align production capabilities with actual demand, reducing water waste associated with maintaining larger facilities than necessary.
- **Re-using effluent water** | This involves treating and recycling wastewater generated during production processes for non-potable purposes such as cleaning or irrigation to help reduce reliance on freshwater sources. Additionally, fashion businesses can implement rainwater harvesting systems to capture and utilize rainwater as an alternative water source, further reducing the strain on freshwater supplies.
- **Innovating to avoid water use** | By leveraging innovative technologies, such as waterless dyeing techniques, laser or ozone-based finishing methods,⁴² and alternative methods for achieving desired stone-washed effects, businesses can significantly reduce or eliminate the need for water in dyeing, stonewashing and finishing processes. These advancements not only conserve water resources but also minimize wastewater generation and the associated impacts on nature.

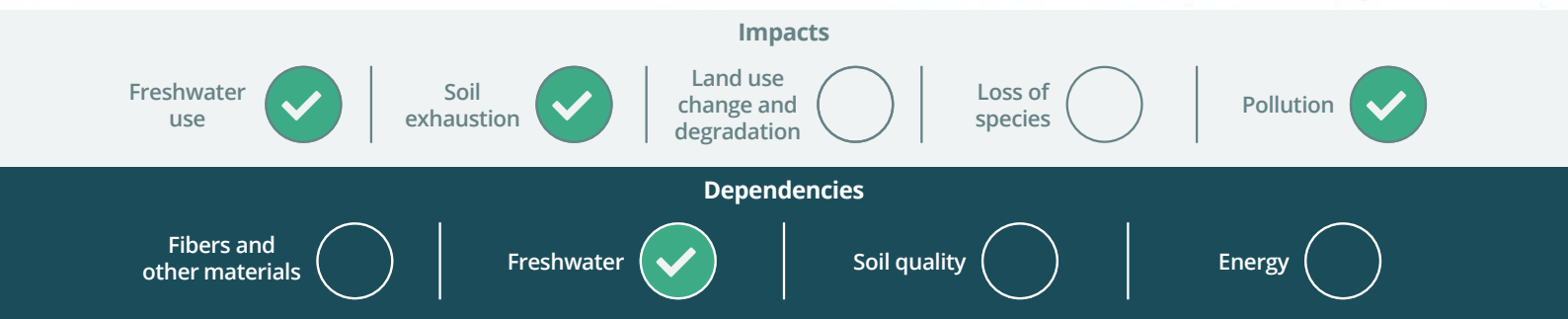
• **Educating consumers** | By providing clear instructions on proper garment care and encouraging practices such as washing clothes on lower water settings, using full loads, and opting for shorter wash cycles, fashion businesses can empower consumers to make more water-conscious choices at home.

The World Bank projects that key apparel production regions like Pakistan, India and China may experience a decline of up to 6% in growth by 2050 due to freshwater stress.⁴³ Thus, reducing the water intensity of fashion businesses not only reduces their contribution to the problem but also enhances their resilience against water risks.

Through its [WATER<LESS initiative](#), Levi Strauss & Co has developed a set of 20+ techniques used to reduce the amount of water it takes to finish a pair of jeans by up to 96%. This includes for example using ozone rather than detergent and tumbling jeans without water but with bottle caps and gold balls. Further, the organization has open-sourced their innovations to allow other competitors to access their water-saving practices.



Implementing this action could address the following impacts and dependencies of the sector on nature:



4. Restore degraded land and move towards regenerative agricultural practices

Fashion companies should seek to recover and regenerate previously impacted land by supporting restoration programs, prioritizing those within their supply chains. Working with supply partners, conservation experts and local communities is crucial to understanding and recreating the conditions necessary for the natural recovery of vegetation and wildlife. Indigenous knowledge and the practices of local communities are critical to the successful restoration and regeneration of their forests and landscape. They should therefore be involved throughout the process. Businesses can refer to the [World Economic Forum’s Principles for Partnering with Communities on Forest Restoration](#) and ensure they always consider existing tenure conditions to avoid property rights-related conflicts.

Restoring historically affected land is important but not sufficient. **Businesses should encourage suppliers to adopt sustainable farming methods and principles of regenerative agriculture to prevent future nature degradation.** Regenerative agriculture is a conservation and rehabilitation approach to farming systems, supported by functional ecosystem processes and healthy soils that produce a suite of ecosystem services. It aims to improve soil health, increase biodiversity, sequester carbon through bio-sequestration, and increase resilience to climate change. Companies should refer to Textile Exchange’s [regenerative agriculture principles](#), which include minimizing/eliminating

external inputs, maximizing on-farm inputs, integrating livestock whenever possible given cropping systems, reducing tillage to preserve life in the soil, and aiming for a broad and holistic set of outcomes.

Recognizing that current agricultural practices are key contributors to biodiversity loss and climate change, the regenerative fashion movement is growing rapidly. Companies such as Patagonia, Eileen Fisher, Burberry and Kering Group (owner of Gucci, Saint Laurent and other major fashion houses) are all committed to working with farmers to adopt regenerative practices in their supply chains.

[VF Corporation](#) (including Timberland, Vans and The North Face brands) has partnered with rubber producers in Thailand to pilot the sector’s first regenerative rubber supply system. This partnership sees farmers transition to agroforestry production and improve soil health by incorporating multiple tree species to mimic a natural forest ecosystem, instead of replicating current monoculture systems where only rubber trees are planted.

Implementing this action could address the following impacts and dependencies of the sector on nature:

Impacts



Dependencies



Fashion and apparel: Priority actions towards a nature-positive future

5. Transform business models and build for circularity

Current mainstream business models in the fashion sector do not facilitate nature-positive activity. Value creation is strongly coupled with the extraction of new resources to make new products, which drives the sector's growth today. **Circular business models for fashion are a significant opportunity to reduce the sector's impacts and dependencies on nature.** Adopting circular business models does not necessarily mean sacrificing revenue, but rather decoupling growth from raw material production, and even unlocking new revenue streams or realizing additional value from the same product. This involves 'designing out' waste and pollution by planning for longevity, durability and recyclability.

Embracing circularity is about adopting a systems-level approach that keeps products and materials in use and regenerates natural systems. For the fashion sector, this means:

Stopping over-production | transitioning to circular business models begins by actively seeking to minimize raw material exploitation, and stopping over-production is a first step. Many fashion businesses still rely on outdated inventory models to predict demand that creates overstocking – representing both an environmental and business cost.

Fashion businesses should leverage AI forecasting to facilitate proper production size. This allows brands to operate more efficiently, decrease textile waste in production and cut over-production - and its associated resource and financial costs - by 15%.⁴⁴ Another promising development is the rise of on-demand production, where clothing is made as ordered and where unnecessary production and deadstock are eliminated.

[Rapanui](#) makes its products only after they have been ordered. The efficiency and productivity gains enable the business to save money that can be spent on making organics and renewables affordable.

To further decrease pressures on raw materials, fashion companies should discourage over-consumption. Researchers suggest that consumer education programs are essential to shifting consumer's consumption patterns from a quantity-base to a quality-base.⁴⁵

Patagonia became known for rejecting consumerism through its "[Don't Buy This Jacket](#)" campaign. The message was intended to nudge customers to consider the impacts of consumption and think twice before they buy.

Designing for circularity | physical product durability is critical to reducing waste and raw material extraction. For customers to extend the wear of their products, these need to be resistant to damage and wear over long periods of time through the careful choice of materials and garment construction.

Lacoste has introduced a [Product Durability Protocol](#) to apply durability standards to all its textiles. These are developed considering individual components and finished product testing, as well as customer testing.

As well as embedding durability in product design, businesses can extend product lifespan by empowering customers to use their products more and for longer. This means educating customers on the impact of their garments and encouraging a shift away from the traditional 'take-make-waste' models. Brands should provide simple and clear instructions for customers to care for their clothes, including advice on efficient appliances and washing techniques.

The [Guppyfriend Washing Bag](#) can considerably reduce microfiber pollution from washing synthetic clothes in washing machines. The organization also gives guidance on washing temperatures and detergents, educating their customers on the environmental impact of washing clothes.

In addition to design and education, providing repair services for all items and pointing customers to repair facilities are key enablers of circularity. Businesses can partner with local governments to advocate for effective recovery and repair schemes and to empower customers to, where possible, repair their clothing at home.

Raeburn took a stand against Black Friday with its '[Buy Nothing, Repair Something](#)' campaign. On Black Friday 2017, the company closed its stores and website and invited customers to have an item of clothing from any brand repaired instead.

Circulating products | designing for durability enables the circulation of products, which can be facilitated through rental or resale business models. The [British Fashion Council's Circular Fashion Ecosystem Report](#) and [Ellen MacArthur Foundation's Circular Business Models study](#) examine how businesses can seize the economic and environmental opportunity of such business models. Resale business models include peer-to-peer sale of second-hand items, third-party marketplaces and own-brand re-commerce and take-back. Meanwhile, rental models include one-off peer-to-peer rentals by private owners, as well as large-scale rental and subscription models by multi-brand platforms or individual brands.

Ganni has launched a rental platform 'Ganni Repeat' and has introduced remade products to the platform from previous collections. Ganni has also created rental-only collections (reworked from existing fabrics) to incentivize customers to try renting items rather than buying new.

H&M's Foundation's Global Change Awards helps innovations accelerate and scale by working closely with innovators to give them the tools and network they need to develop circular fashion solutions, to scale and drive change in the sector.

Circulating materials | textile recycling presents a significant opportunity to meet the demand for new materials while decreasing reliance on raw materials, reducing pressure on land, and addressing textile waste. Some technologies, like the mechanical recycling of pure cotton, are already available, and companies should integrate such recycled fibers into their products whenever possible. Companies should seek third-party certification of recycled materials to ensure the materials are responsibly produced, for example through [the Recycled Claim Standard \(RCS\) or Global Recycled Standard \(GRS\)](#). To enable system-wide recyclability of textiles, recyclability should be considered at the design stage.

Where there are no alternatives to virgin materials, companies should prioritize those from renewable feedstock - such as plant-based or animal-based natural fibers - produced in regenerative ways over non-renewable virgin materials such as fossil-based synthetics. There are opportunities to integrate innovative materials that harness 'cradle-to-gate' design approaches to mitigate their impacts on nature. Biosynthetic textiles are increasingly popular and made from up to 100% renewable resources such as corn, sugar cane, sugar beets, and plant oils, or from waste materials such as waste vegetable oil or algae. Biomass feedstocks also have the potential to create biodegradable materials which eliminate the risk of microfiber release into the environment.

RenewCell's textile 'Circulose' is made from textile waste with high cellulose content, such as worn-out cotton jeans and cotton production scraps. Circulose is certified by the RCS, which sets out criteria at every step of its supply chain, from the raw material recycling to the end seller in a business-to-business transaction.

Kintra has created a 100% bio-based and biodegradable polyester (polybutylene succinate) derived from corn. Kintra's fibers can easily be integrated into existing synthetic manufacturing and textile production supply chains and are designed to naturally degrade in the aerobic environment of a wastewater treatment facility.

However, currently, the principles of recyclability and durability can be conflicting, as the most durable products are often the most challenging to recycle. And for some materials, recycling technologies are not as mature as others. In both cases, innovation is critical to finding industrial-scale low-impact solutions. Some small-scale solutions exist but require the support of big players to be scaled and impactful. Fashion businesses should invest in the research and development of low-impact materials and recycling technologies to meet their sustainability objectives. This also provides an opportunity to scale the recycling of currently available textile waste. A [study completed by Fashion for Good in collaboration with Circle Economy](#) shows that an additional €74 million per year could be generated by reintroducing sorted and recycled textiles back into the value chain. €74 million per year could be generated by reintroducing sorted and recycled textiles back into the value chain.



Implementing this action could address the following impacts and dependencies of the sector on nature:

Impacts

- Freshwater use
- Soil exhaustion
- Land use change and degradation
- Loss of species
- Pollution

Dependencies

- Fibers and other materials
- Freshwater
- Soil quality
- Energy

Conclusion

An increasing number of fashion and apparel companies have recognized their reliance and impact on nature in recent years and taken steps to reduce both. However, mounting policy, regulatory and consumer pressures, and above all, the accelerating threats posed by nature loss, call for more rapid and deliberate transformative action by the sector. This action will not only promote the health of the planet, but also of corporate bottom lines - by minimizing risks and maximizing the commercial opportunities that come from protecting and restoring nature.

Taking into consideration the most material impacts and dependencies of the fashion and apparel sector on nature and drawing on this report as well as the growing body of sector-specific and sector-agnostic guidance and frameworks available to support them, it is time for businesses to embed nature in all levels of decision-making. This will not only ensure they continue to function and thrive but will also contribute to the essential transformation of the sector on the path to a resilient, equitable and nature-positive future.



Resources

The following **sector-specific guidance and tools** are currently available to companies in the fashion sector:

- [Apparel Sector Guide](#) (Capital's Coalition)
- [Material Exchange Index](#) (Textile Exchange)
- [The TNFD's resources \(v1.0 available from September 2020\) including the additional guidance for textiles and apparel](#)
- [A fashion, textile and apparel sector primer on the first science-based targets for nature](#) (Little Blue Research, CISL)
- [Biodiversity Strategy Tool Navigator](#) (The Fashion Pact and Conservation International)
- [Fashion Nature Risk Lens](#) (The Fashion Pact and Conservation International)
- [Eau Courant: Water Stewardship and Apparel and Textiles](#) (WWF and H&M Group)

- [Avant-Garde: The Water Risks and Opportunities Facing Apparel and Textiles Clusters](#) (WWF and Open Supply Hub)

- Relevant chemical and wastewater management guidelines:
 - o [Restricted Substances List](#) (RSL)
 - o [Manufacturing Restricted Substances List](#) (MRSL)
 - o [Zero Discharge of Hazardous Chemicals \(ZDHC\) Management System Framework](#)
 - o [Zero Discharge of Hazardous Chemicals \(ZDHC\) Wastewater Guidelines](#)

The following **organizations and coalitions** also provide useful information for the sector:

- The [Textile Exchange](#) and the [Fashion Pact](#)

For additional sector-agnostic resources, please refer to Business for Nature's [High-level Business Actions on Nature](#).

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