

PLANET4B Project

understanding Plural values, intersectionality, Leverage points,
Attitudes, Norms, behaviour and social Learning in
Transformation for Biodiversity decision making



What should we wear on a planet in peril?

Twelve key messages about transformative change for fashion and biodiversity

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About this document

This document highlights the research findings on fashion and biodiversity, conducted as part of the PLANET4B project, by our team at the University of Pisa.

Inside, you will find a concise executive summary and twelve key messages to provide you with quick access to essential information.

This document is designed for everyone engaged in promoting ecological change in the fashion industry.

Whether you're a student, an environmental or social activist, a consumer, a trade union member, an entrepreneur, a policymaker, or simply someone curious about making a difference.

Our research

Our research delves into the critical relationship between biodiversity and the textile, apparel, and fashion industry (TAF). We aim to identify pathways through which the fashion sector can transform to halt and reverse biodiversity loss.

Fashion is a global industry with high environmental and social impact, and enormous financial resources. Given its cultural relevance, positive changes within the sector could foster wider societal transformations. However, despite its importance, the connection between biodiversity and the fashion system has largely been overlooked in academic literature and recent EU policies.

Our study is based on over 30 interviews with experts, an analysis of documents published by companies, business organisations, consultancies, and private research institutes; and future visioning workshops with key actors. We have also examined the efforts of three small to medium-sized fashion companies that are making significant strides toward sustainability by focusing on quality, sufficiency, and responsible practices.

We hope this document serves as an inspiration!

For further information, please read our latest article [here](#) or feel free to contact us.

Executive summary

What is biodiversity and why it is so important

Biodiversity, or biological diversity, refers to the richness of life on Earth. Put it simply, biodiversity includes all living organisms - millions of animals and plants- their habitats and ecosystems, and the way in which they interact with each other. While species extinction can be a natural occurrence, recent estimates indicate that biodiversity is currently declining at a pace thousands of times faster than usual due to human action.

We are losing pieces. Biodiversity loss in numbers

- 8 million: total estimated number of animal and plant species on Earth, including 5.5 million insect species (Diaz and Malhi, 2022).
- Up to 1 million species threatened with extinction, many could face it within decades (IPBES, 2019).
- 73% in species population reduction since 1970 (WWF, 2024).
- 290 million hectares native forest cover lost from 1990-2015 due to clearing and wood harvesting (IPBES 2019).
- 100-300 million people in coastal areas at increased risk due to loss of coastal habitat (IPBES, 2019).

Fig 1: Data on biodiversity loss.

The decline of biodiversity has significant consequences for the health of entire ecosystems and our ability to adapt to a changing environment. We are endangering the basis of our livelihoods, food security, health, and overall quality of life around the world.

Placing the biodiversity and nature loss crisis at the forefront of our agenda is more urgent than ever.

The fashion system

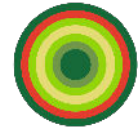
The textile, apparel and fashion (TAF) industries are among the most exploitative and unjust sectors globally. This is largely due to their intensive use of natural resources and reliance on low-cost labour (Hachfeld and Schenk 2024).

The spatial and functional distribution of the fashion industry is fragmented and globalised, revealing stark power imbalances within the supply chains of both the fast fashion and luxury brands. These disparities are evident in the relationships between brands and suppliers, the economic divide between the Global North and the Global South, and in the dynamic between companies and governments.

The sector's short-term business strategy is mainly based on a combination of reduced prices and increased sales volumes. Profit margins are maximised at the expense of social and environmental impacts, and sustainability is often considered a costly

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additional feature. Low prices lead to increased consumption, speed and quicker obsolescence of the items, nourishing a 'consumerism culture' that values immediacy and novelty.



Fig 2: Microplastic in the marine environment. Source: Naja Bertolt Jensen-Unsplash.

Fashion and biodiversity

The fashion industry has a profoundly damaging impact on global biodiversity, influenced by both direct and indirect factors or drivers (Navarro-Gambin et al. 2025). Regarding the direct drivers:

Land-use change

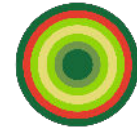
A considerable proportion of fashion's impact on biodiversity results from habitat change caused by agriculture and the intensive use of pesticides to produce cotton, viscose, wool, rubber, and leather. Fashion strongly contributes to deforestation.

Pollution

While the full extent of fashion's contribution to pollution is unknown, estimates suggest that 20% of global freshwater pollution comes from the wet processing of the textile industry (Granskog et al. 2020). This processing involves various water- and chemical-intensive processes, including scouring, bleaching, dyeing, printing and finishing of raw textiles.

Climate change

TAF industries were the fourth largest emitter of CO₂ in 2016, accounting for 8.1% of global greenhouse gas (GHG) emissions (Quantis 2018). Approximately 52% of fashion's GHG emissions come from the production of raw material and the preparation



of fabric and yarn. Emissions are driven by the fashion industry's massive use of synthetic oil-based materials such as polyester.

These factors reflect underlying causes rooted in how societies organise themselves and interact with nature, such as our economic models and patterns of production and consumption, i.e., indirect drivers. Current practices are still based on the belief in the endless availability of natural resources and the pursuit of continuous economic growth, a belief that persists today, despite evidence of planetary boundaries that have already been transgressed (Richardson et al. 2023).

As the production and consumption of textile products continue to grow, their impact on biodiversity increases. While technical solutions, energy source substitution (such as renewables) and improved efficiency could lessen the environmental impact per unit, these benefits will be offset by the increasing volumes.

The more is not the better. Fashion in few numbers

- From 2000 to 2022 global fibre production doubled (from 58 million to 116 million tonnes). It is expected to reach 147 million tonnes by 2030 (Textile Exchange, 2023).
- Synthetic fibres made 65% of global fibre production in 2022. Polyester is 54% of the total (Textile Exchange 2023).
- Textile production increased from 5.9 kg/pc in 1975 to 13 kg/pc in 2018 (Niinimäki et al., 2020).
- Expenditure on clothing and footwear in the EU and UK has decreased from 30% of the total household expenditure in the 1950s to 5% in 2020 (Niinimäki et al. 2020).

Fig 3: Data on global fiber production and clothing expenditure.

The **'take-make-waste'** linear fashion model significantly contributes to the pressures fashion places on biodiversity loss. The fashion industry generates millions of tonnes of waste every year, with a substantial portion exported from countries in the Global North to those of the Global South (Niinimäki et al, 2020).

Suffocated by waste

- From 2000 to 2015 consumers disposed 60% of their clothes within a year of buying them (Business for Nature 2023)
- 92 million tons of textile waste are produced every year (Niinimäki et al. 2020).
- Only 12% of textile waste is downcycled, and less than 1% is closed loop recycled, i.e., recycled into the same or similar quality applications (Niinimäki et al. 2020; Textile Exchange 2023).
- 73% of the fibre produced in 2015 was incinerated or ended up in landfills (Niinimäki et al. 2020; Wagaw and Babu 2023).

Fig 4: Data on textile waste and recycling.

12 Key messages for the future of fashion

Our research findings are summarised into twelve short messages highlighting potential strategies for transforming the fashion industry to protect biodiversity. Together, these messages present a vision for a new, biodiversity-friendly fashion sector.

While some of these pathways are specifically relevant for the fashion industry, others are part of a wider transition that may occur in various sectors.

1. Protecting biodiversity becomes a priority in Fashion.

Vision: Our perspective is shifted. Nature and biodiversity are no longer seen as merely resources for human exploitation and consumption. Instead, they are now recognised as a complex, interconnected system where all living beings, humans included, and their environment harmoniously coexist. Biodiversity is valued, conserved, restored and wisely used to benefit both people and the planet.

2. Reducing the volumes of production and consumption.

Vision: We cannot grow indefinitely on a finite planet. The flow of new products entering the market has notably slowed. The number of seasonal fashion collections has decreased, and marketing campaigns are limited. However, the quality of clothing is significantly improved; garments are designed to last, and our desires have finally shifted. We are starting to value what we already own, and our urge to buy more and more items is fading.

3. Encouraging a transition to agroecology in fashion's agriculture.

Vision: Fashion relies on natural raw materials that are cultivated within fair and sustainable farming systems that utilise agroecological practices to regenerate the health of natural ecosystems. No new natural areas are converted into farmland or plantations, and hazardous, non-degradable chemicals are eliminated.

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4. Promoting a shift in the production materials.

Vision: Fashion minimises its dependence on virgin materials and is actively working toward phasing out fossil fuel-based materials and plastics.

5. Supporting the circularity of textiles, clothing materials, and apparel.

Vision: The use of garments is significantly extended. Repair services are accessible and affordable, and skills in mending and care are widely shared. At the end of their life cycle, garments and their materials are recovered and recycled. Products are designed for recyclability, and fabric-to-fabric recycling is supported to create closed production cycles. The number of products sent to landfill or incinerated is minimised, ensuring low environmental impacts and safe jobs.

6. Ensuring sustainable water and chemical use.

Vision: Water resources are used sustainably throughout the entire production cycle. The fashion industry protects ecosystems and meets human water needs without causing any further water stress.

7. Fostering changes in fashion business models towards circularity, sufficiency, and regeneration. Support small and local enterprises.

Vision: Fashion companies are building meaningful relationships with local communities and traditions, while embracing high labour and environmental standards. With a commitment to quality over quantity, they are shifting away from profit-maximising business models. Their focus on sustainable practices reflects a thoughtful balance among profit, labour, land use, and productivity, prioritising responsible craftsmanship.

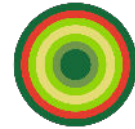
8. Providing safe and fair conditions for workers and local communities.

Vision: Jobs are regulated to minimise the risk of precarious and exploitative working conditions. All workers benefit from the full range of labour rights and receive robust social protection. Trade unions and labour organisations amplified their voices, shifting

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power relations in the sector away from the most powerful brands and corporations towards democratic and equitable industrial relations and trade practices.

9. Moving away from voluntary governance to legally binding regulations across areas.

Vision: A regulatory framework is setting the industry on a path of transformation, moving beyond private initiatives and business self-organisations, which have proved inadequate, while supporting companies that adopt sustainable business models.

10. Understanding the interdependencies between fashion and biodiversity.

Vision: Increased research, skills, knowledge, networks of individuals and organisations, as well as public action plans, support business transition towards sustainability and biodiversity conservation.

11. Improving transparency, traceability and accountability throughout the entire supply chain.

Vision: All business actors, including brands, producers, sellers, brokers, are accountable for their social impacts and effects on biodiversity throughout the long and complex supply chains.

12. Strengthening vertical and horizontal collaboration between actors, institutions, levels and scales of government.

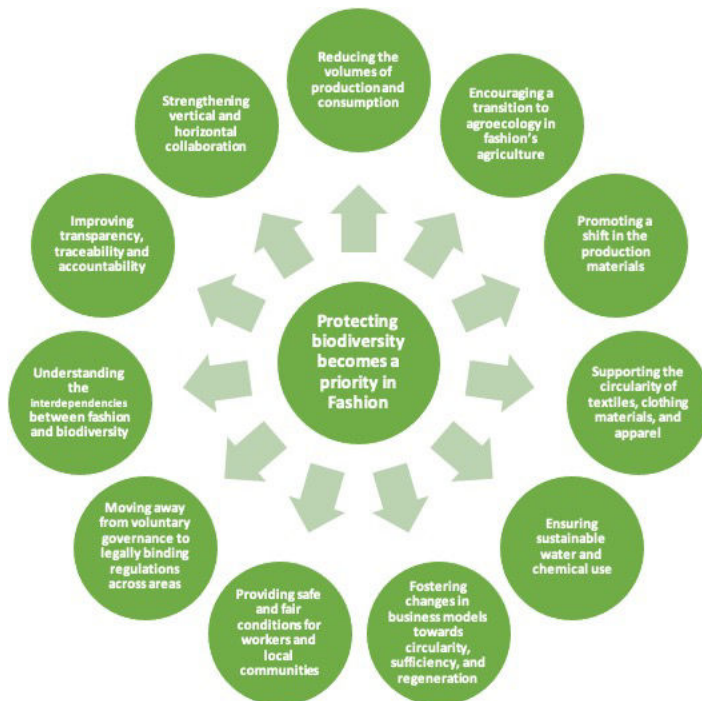
Vision: Public action plans support top-down initiatives from institutions, as well as bottom-up, self-organised efforts, to improve the governance of the new fashion system at local and global levels. The system is funded on a virtuous combination of collaborations and cooperation, rather than on maximising competition.

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Fig 5: Priority actions for transforming the fashion sector.



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